European Physical Society
Conference on High Energy Physics 2015

22 - 29 July 2015
Vienna, Austria

Welcome to the European Physical Society Conference on High Energy Physics (EPS-HEP). This conference is one of the major international conferences reviewing the field every second year since 1971 organized by the High Energy and Particle Physics Division of the European Physical Society. In 2015 the EPS-HEP will take place in Vienna. The conference 2015 is organized by the Institute of High Energy Physics (HEPHY) of the Austrian Academy of Sciences, the University of Vienna, Vienna University of Technology and the Stefan-Meyer Institute (SMI) of the Austrian Academy of Sciences.

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Contents

This document is also available for download on the conference web page

http://eps-hep2015.eu/information-booklet

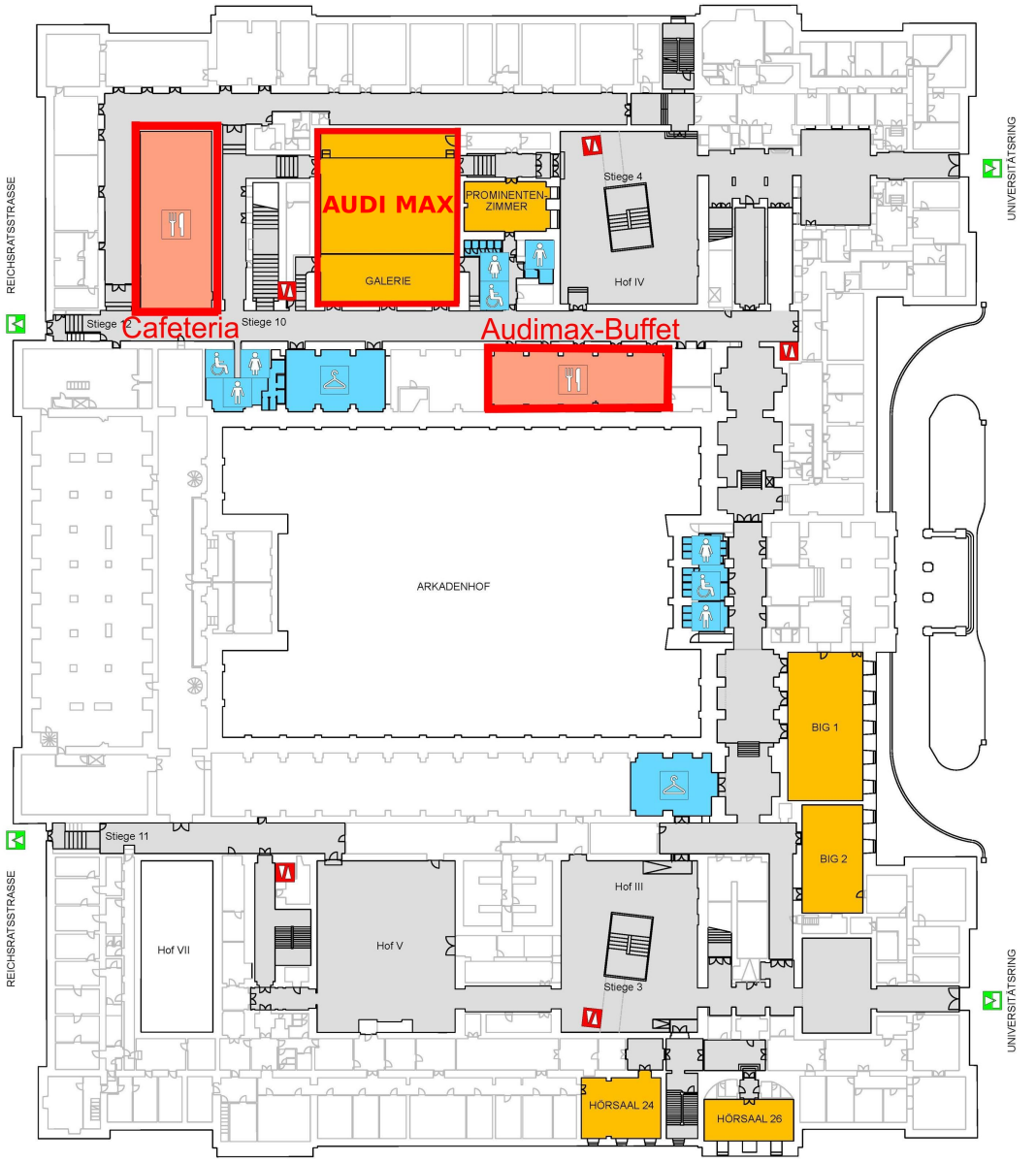
Conference Venue

Address
University of Vienna
Universitätsring 1
1010 Vienna
Austria

HAUPTGEBÄUDE

main building

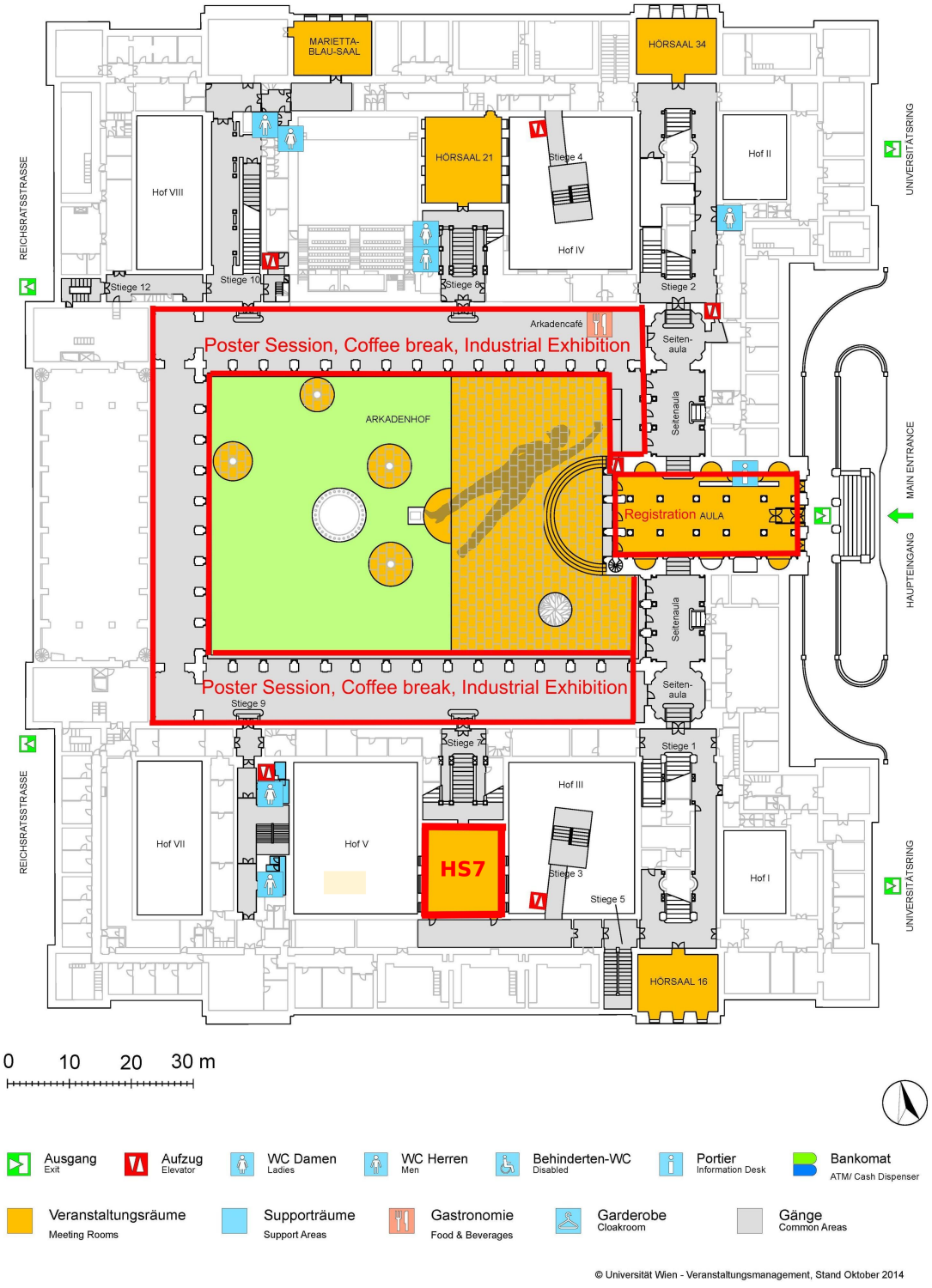
Tiefparterre / lower ground floor



HAUPTGEBÄUDE

main building

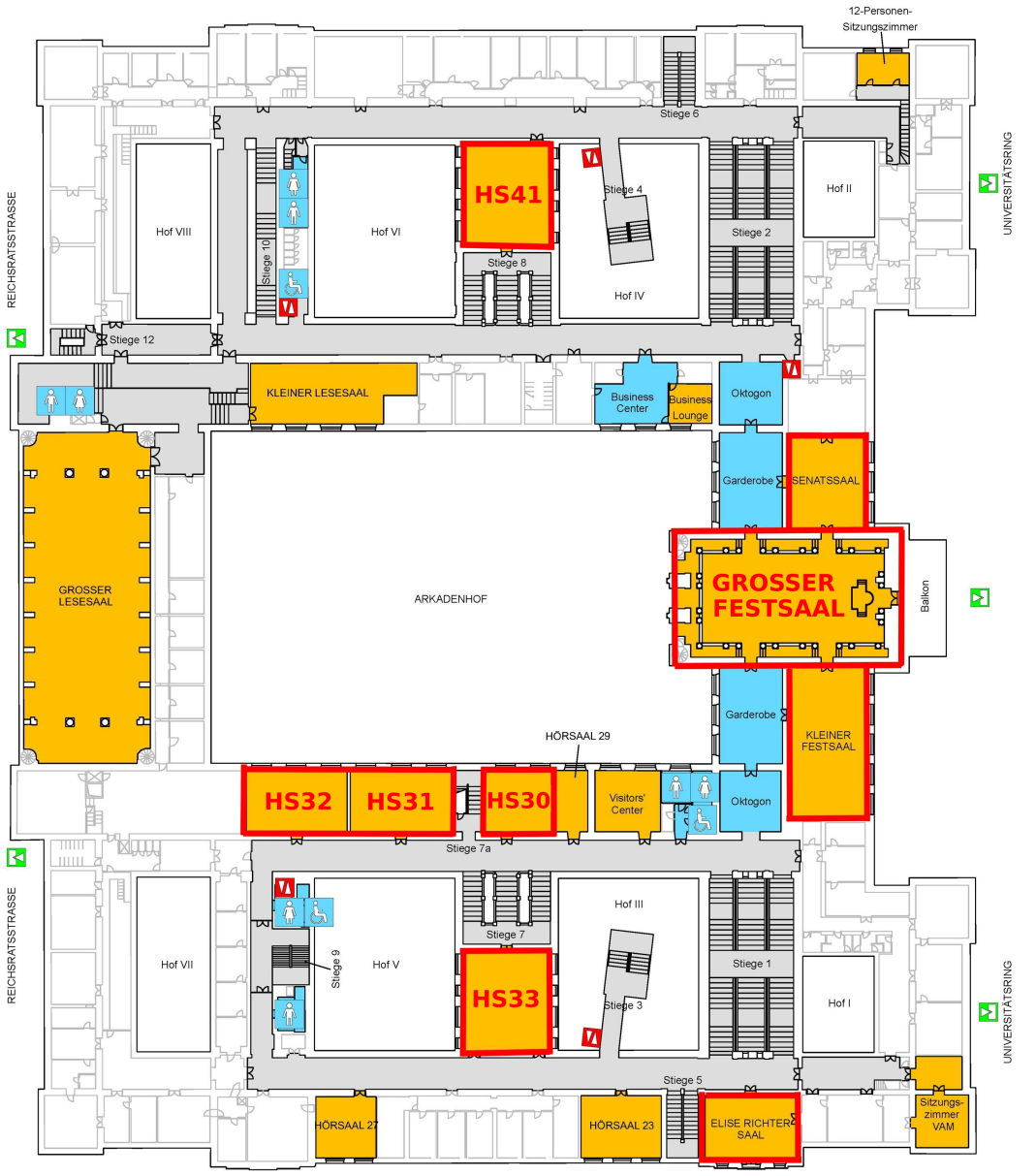
Hochparterre / raised ground floor



HAUPTGEBÄUDE

main building

1. Stock / first floor



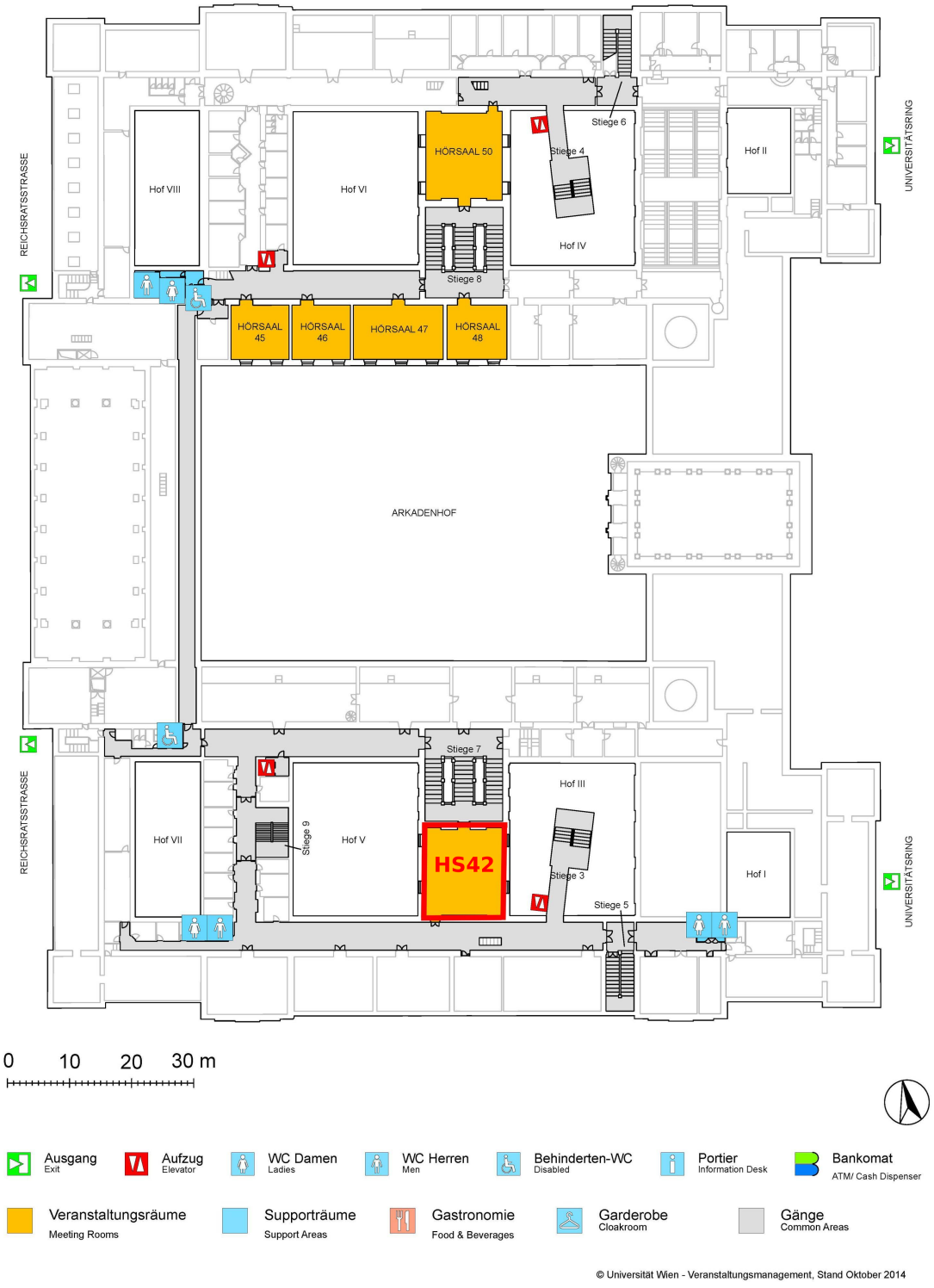
Ausgang Exit | Aufzug Elevator | WC Damen Ladies | WC Herren Men | Behinderten-WC Disabled | Portier Information Desk | Bankomat ATM/ Cash Dispenser

Veranstaltungsräume Meeting Rooms | Supporträume Support Areas | Gastronomie Food & Beverages | Garderobe Cloakroom | Gänge Common Areas

HAUPTGEBÄUDE

main building

2. Stock / second floor



Getting along

Registration Desk
The registration desk at the conference venue is located on the raised ground floor. The registration desk opens at 16:00 on Wednesday (22 July), at 8:00 on Tuesday (28 July) and at 8:30 on every other day (excluding Sunday) of the conference.

Internet Access
We will provide personalized WLAN access for all participants. You will get the access code with the name badge. Eduroam is also available.

Uploading
All talks and posters should be uploaded prior to the presentation to the Indico conference website

http://indico.cern.ch/e/eps-hep2015

Posters
The posters are on display during the whole conference. Two dedicated poster sessions will take place during the coffee break on Friday morning, July 24th, 11:00, and Monday afternoon, July 27th, 16:00. Poster presenters are asked to be available at their posters during the poster sessions.

Lunch
There are plenty of restaurants in the area; please feel free to find your personal favorite (we provide a local area map at the registration desk). The Cafeteria "Audimax-Buffet" is located on the ground floor of the University. Please note that lunches are not included in the conference fee.

Money
A cash dispenser (ATM) is located at the venue. The bank closest to the conference venue is UniCredit Bank Austria AG, Schottengasse 6-8, 1010 Vienna. Opening hours are Mon - Fri 09:00 - 18:00.

Public Transportation
Various types of tickets are sold at tobacconists ("Trafik"), at vending machines in subway and S-Bahn stations and in some hotels. There are several types of tickets available:

- Single ticket (2.20 Euros)
- Ticket with 4 single strips (8.80 Euros) - each strip is valid for one person and one zone. The whole city is one zone; a trip to the airport (by S-Bahn) requires a second zone (see the information in the arrival section). A multi-strip ticket can be shared by up to four people as long as everybody has his/her own strip. At vending machines (e.g. at the airport), you can also purchase tickets with 2 zones (valid for a trip to the city).
- Weekly pass: valid Mon 00:00 - Mon 09:00; transferable (16.20 Euros)
- Various tickets valid for one or several days:
  - 24 hours ticket (7.60 Euros)
  - 48 hours ticket (13.30 Euros)
  - 72 hours ticket (16.50 Euros)
- Half-price tickets are required for children (aged 6-15), dogs (except when carried in a container), and bicycles.
- Tickets must be stamped when beginning your journey.

Please refer to the conference website for additional information

http://eps-hep2015.eu/public-transportation

Water
It is perfectly safe to drink tap water in Vienna, which is delivered from the mountains oft the Alps about 100 km southwest of Vienna.

Social events
There are five social events included in the conference fee during the conference:

Wednesday, 22 July 2015; 16:00 - 21:00	Welcome reception @ Conference Venue
Thursday, 23 July 2015; 19:30	Heurigen reception @ Winery Fuhrgassl-Huber
Friday, 24 July 2015; 19:30	Portraittheater @ Conference Venue (max. 300 persons)
Sunday, 26 July 2015; 9:45	Excursion to MedAustron (max. 120 persons)
Tuesday, 28 July 2015; 19:30	Conference Gala Dinner @ Orangerie Schönbrunn

You (and your accompanying person(s), if registered) are welcome to these events. Please make sure to wear your name bagde and ticket, otherwise you will not allowed to enter.

Further information about these social events can be found at the end of this booklet from page 150 on.

Social Events and Guides Tours to be paid separately

Sunday, 26 July 2015	Several options are offered – Picturesque world heritage Danube valley "Wachau" – Burgenland impressions – Historical Vienna with tour through Schönbrunn Palace – Klosterneuburg and Heuriger – City walk Vienna - City of music
Monday, 27 July 2015, 19:30	Classical Concert @ Austrian Academy of Sciences
Tuesday, 28 July 2015, 18:15	Schönbrunn Palace Tour before Dinner

Further information about the social and public events can be found on the EPS-HEP2015 website under the tab Events

http://eps-hep2015.eu/events

and at the end of this booklet from page 153 on.

Proceedings
Proceedings will be published through Proceedings of Science (PoS) - http://poss.sissa.it., the open access online journal organized by SISSA, the International School for Advanced Studies based in Trieste.
The contribution should be written in MS Word or LaTeX. The procedure for submission and the required style-file is described on

http://pos.sissa.it/POSauthors.html .

Further Information
Further information can be found on the EPS-HEP2015 website unter the tap Travel

http://eps-hep2015.eu/travel

Timetable

EPS-HEP 2015 Conference timetable

	July 22	July 23	July 24	July 25	July 26	July 27	July 28	July 29
8:00→10:00		**9:00–13:00** *Parallel sessions*	**9:00–13:00** *Parallel sessions*	**9:00–13:00** *Parallel sessions*	**9:45–16:00** *Excursion to MedAustron*	**9:00–13:00** *Plenary sessions*	**8:30–12:30** *Plenary sessions*	**9:00–13:00** *Plenary sessions*
10:00→12:00		*<Parallel sessions to 13:00>*	*<Parallel sessions to 13:00>*	*<Parallel sessions to 13:00>*	*<Excursion to MedAustron to 16:00>*	*<Plenary sessions to 13:00>*	*<Plenary sessions to 12:30>*	*<Plenary sessions to 13:00>*
12:00→14:00		*<Parallel sessions to 13:00>* **13:00–14:30** *Lunch*	*<Parallel sessions to 13:00>* **13:00–14:30** *Lunch*	*<Parallel sessions to 13:00>* **13:00–14:30** *Lunch*	*<Excursion to MedAustron to 16:00>*	*<Plenary sessions to 13:00>* **13:00–14:30** *Lunch*	*<Plenary sessions to 12:30>* **12:30–14:00** *Lunch*	*<Plenary sessions to 13:00>* **13:00–14:30** *Lunch*
14:00→16:00		*<Lunch to 14:30>* **14:30–18:00** *Parallel sessions*	*<Lunch to 14:30>* **14:30–18:00** *Parallel sessions*	*<Lunch to 14:30>* **14:30–18:00** *ECFA/EPS session*	*<Excursion to MedAustron to 16:00>*	*<Lunch to 14:30>* **14:30–18:00** *Plenary sessions*	**14:00–17:30** *Plenary sessions*	*<Lunch to 14:30>* **14:30–18:00** *Plenary sessions*
16:00→18:00	**16:00–21:00** *Registration*	*<Parallel sessions to 18:00>*	*<Parallel sessions to 18:00>*	*<ECFA/EPS session to 18:00>*		*<Plenary sessions to 18:00>*	*<Plenary sessions to 17:30>*	*<Plenary sessions to 18:00>*
18:00→20:00	*<Registration to 21:00>*	**19:30–23:30** *Heurigen Reception*	**19:30–21:30** *Portraittheater*	**19:30–20:30** *Public lecture by Rolf-Dieter Heuer*		**19:30–21:00** *Physics Slam* **19:30–22:00** *Classical Concert*	**19:30–23:00** *Conference Dinner*	
20:00→22:00	*<Registration to 21:00>*	*<Heurigen Reception to 23:30>*	*<Portraittheater to 21:30>*	*<Public lecture by Rolf-Dieter Heuer to 20:30>*		*<Physics Slam to 21:00>* *<Classical Concert to 22:00>*	*<Conference Dinner to 23:00>*	

List of contributions

Talks

1 | TH 23-07-15 | 09:00-13:00 | HS33 | Astroparticle Physics, Cosmology, Gravitation

1.1	09:00	HESS-II: gamma-ray astronomy from tens of GeV to hundreds of TeV energies	
1.2	09:30	The HAWC Gamma Ray Observatory	Sandoval, Andres
1.3	09:45	Investigation of the Galactic Magnetic Field using Ultra-High Energy Cosmic Rays	Erdmann, Martin
1.4	10:00	Measurement of Feynman-x Spectra of Photons and Neutrons in the Very Forward Direction in Deep-Inelastic Scattering at HERA	H1, Collaboration
1.5	10:15	Observation of a knee in the cosmic ray p+He energy spectrum below 1 PeV with the ARGO-YBJ experiment	Surdo, Antonio
1.6	10:30	High-energy interactions at the Pierre Auger Observatory	Da Silva Conceicao, Ruben Mauricio
1.7	10:45	Global dark matter limits from a combined analysis of MAGIC and Fermi-LAT data	Rico, Javier
1.8	11:30	Status of the Advanced Virgo project and near term perspectives	Arnaud, Nicolas
1.9	12:00	Neutrons test Gravity, Dark Matter and Dark Energy: Snapshots of a Quantum Bouncing Ball & Gravity Resonance Spectroscopy	Jenke, Tobias
1.10	12:15	Dark matter, neutrino masses and LFV processes in the scotogenic model	Yaguna, Carlos
1.11	12:30	Prospects for SUSY dark matter after the LHC Run 1	Bagnaschi, Emanuele Angelo

2 | TH 23-07-15 | 09:00-13:00 | HS41 | Flavour Physics and Fundamental Symmetries

2.1	09:00	Electroweak penguins at LHCb	Coquereau, Samuel
2.2	09:15	Angular analysis of the decay B0 –> K*0 mu mu with CMS	Dinardo, Mauro
2.3	09:30	B to K* l+l- decays in the Standard Model: a theoretical reappraisal	Paul, Ayan
2.4	09:45	Violation of lepton flavour universality in composite Higgs models	Stangl, Peter
2.5	10:00	A class of Z' models with non-universal couplings and protected flavor-changing interactions	Fuentes-Martin, Javier
2.6	10:15	Leptonic and Radiative B meson decays at Belle	Chang, Paoti
2.7	11:30	Measurements of the photon polarisation in b–>γs decays	Ruiz Valls, Pablo
2.8	11:45	Charmless B decays	Sanmartin Sedes, Brais
2.9	12:00	Origin of a large CP asymmetry in B+- –> K+- K+ K- decays	Lesniak, Leonard
2.10	12:15	Investigation of 3-body Hadronic decays at Belle	Wang, Min-Zu
2.11	12:30	Charmless Two-body Baryonic $B_{u,d,s}$ Decays	Chua, Chun-Khiang
2.12	12:45	Searches for $B^0 \to \eta\pi^0$ and $B_s \to K^0K^0$ at Belle	Kwon, Youngjoon

3 | TH 23-07-15 | 09:00-13:00 | Grosser Festsaal | Higgs and New Physics

3.1	09:00	Update of the electroweak precision fit, interplay with Higgs-boson signal strengths and model-independent constraints on new physics	Reina, Laura
3.2	09:15	The Standard Model as an Effective Field Theory	You, Tevong
3.3	09:40	What we have learned about the Higgs boson from the bosonic decay channels and more inclusive combinations of data	Yuan, Li
3.4	10:10	Off-shell effects in Higgs processes at a linear collider and the LHC	Weiglein, Georg Ralf
3.5	10:25	Constraining new physics in the Higgs sector using differential and fiducial cross section measurements from the LHC	Bernlochner, Florian Urs
3.6	10:40	Effects of Beyond Standard Model physics on Higgs' p_T spectra in Effective Field Theory approach	Ilnicka, Agnieszka
3.7	11:30	EFT-naturalness: an effective field theory analysis of Higgs naturalness	Bar-Shalom, Shaouly
3.8	11:45	Differential distributions of Higgs boson in the two-photon channel at the LHC within k_t-factorization approach	Szczurek, Antoni
3.9	12:00	What we have learned about the Higgs boson coupling to fermions (in decay and production)	Gilbert, Andrew

3.10	12:30	Search for Higgs bosons beyond the Standard Model in b-quark final states at CMS	Mankel, Rainer
3.11	12:45	Searches for Higgs boson like high mass resonances in the bosonic decay channels with ATLAS and CMS	Lo Sterzo, Francesco

4 | TH 23-07-15 | 09:00-13:00 | HS32 | QCD and Hadronic Physics

4.1	09:00	Quarkonium and heavy flavour production in Run-1 and first results with 13 TeV data at CMS	Kratschmer, Ilse
4.2	09:15	Quarkonium and heavy flavour production measurements at ATLAS	Leontsinis, Stefanos
4.3	09:30	J/psi polarization measurements in p+p collisions at sqrts = 200 and 500 GeV with the STAR experiment	Trzeciak, Barbara
4.4	09:45	Recent results on exotic quarkonium states from Belle	Garmash, Alexei
4.5	10:00	Exotic and Charmonium(-like) states at BESIII	Liang, Yutie
4.6	10:15	Pentaquarks and Tetraquarks at LHCb	Stone, Sheldon
4.7	10:30	Measurements of production and decay of exotic mesons at the ATLAS and CMS experiments	Walder, James William
4.8	10:45	Measurement of low pT D+ meson production cross section at CDF	Marchese, Luigi
4.9	11:30	Measurement of Vector boson + heavy flavor jet production rates by D0	Price, Darren
4.10	11:45	Heavy flavour production in the forward acceptance at the LHC	Polyakov, Ivan
4.11	12:00	Measurements of open heavy-flavour production in pp collisions with ALICE at the LHC	Luparello, Grazia
4.12	12:15	Heavy flavour production and asymmetry measurements from the D0 experiment	Bertram, Iain
4.13	12:30	Central exclusive meson production at LHCb	Gandini, Paolo
4.14	12:45	Measurement of the charged-pion polarisability at COMPASS	Guskov, Alexey

5 | TH 23-07-15 | 09:00-13:00 | HS31 | Top and Electroweak Physics

5.1	09:00	Improved prediction for the mass of the W boson in the SM, the MSSM and the NMSSM	Weiglein, Georg
5.2	09:25	Measurements of *W* charge asymmetry	Holzbauer, Jenny Lyn
5.3	09:43	Precision measurements of Standard Model parameters with the ATLAS detector	Dimitrievska, Aleksandra
5.4	10:01	W/Z results from CMS	Chatterjee, Rajdeep Mohan
5.5	10:19	Measurements of *Z* production distribution and decay asymmetry	Garcia-Bellido, Aran
5.6	10:37	Measurements of Drell-Yan transverse momentum and lepton azimuthal decorrelation with the ATLAS detector	Zinser, Markus
5.7	11:30	Electroweak physics at LHCb	Barter, William James
5.8	11:48	Light-by-light scattering with intact protons at the LHC: from Standard Model to New Physics	Saimpert, Matthias
5.9	12:06	Measurement of exclusive gamma+gamma -> ll production in proton-proton collisions with the ATLAS detector	Przybycien, Mariusz
5.10	12:24	Exclusive W+W- production measured with the CMS experiment and constraints on Anomalous Quartic Gauge Couplings	Jeitler, Manfred
5.11	12:42	Measurements of Vector Boson Fusion and Scattering and Multiboson production with the ATLAS detector	Lorenzo Martinez, Narei

6 | TH 23-07-15 | 09:00-13:00 | HS7 | Neutrino Physics

6.1	09:00	Global fits to neutrino oscillations: status and prospects	Marrone, Antonio
6.2	09:15	Status of Double Chooz experiment	Chauveau, Emmanuel
6.3	09:30	Recent progress from Daya Bay	Ji, Xiangpan
6.4	09:45	Observation of energy dependent disappearance of reactor neutrinos from RENO & Future RENO-50	Seo, Seon-Hee
6.5	10:00	Antineutrino oscillations with T2K	Ravonel, Melody
6.6	10:22	Results from the OPERA experiment at the CNGS beam	Sirri, Gabriele
6.7	10:45	The NOvA Experiment	Habig, Alec
6.8	11:30	Theoretical models of neutrino-nucleus cross sections	Martini, Marco

6.9	11:45	Flux and Neutrino interaction model constraints using the T2K near detectors	Zambelli, Laura
6.10	12:00	Neutrino – Nucleus Interaction Measurements at MINERvA	Bravar, Sandro
6.11	12:15	Hadron production measurements from NA61/SHINE for LBL neutrino experiments	Korzenev, Alexander
6.12	12:30	Bimaximal Neutrino Mixing and GUT's	Meloni, Davide
6.13	12:45	Non-Zero θ_{13} and δ_{CP} in a Neutrino Mass Model with A_4 Symmetry	Umasankar, Sankagiri

7 | TH 23-07-15 | 09:00-13:00 | HS42 | Heavy Ion Physics

7.1	09:00	Understanding the J/Psi and Y suppression (and enhancement) at LHC and RHIC	Gonzalez Ferreiro, Elena
7.2	09:25	Quarkonia results in heavy ions from CMS	Benhabib, Lamia
7.3	09:45	Study of J/Psi and Y production in association with leading hadron at RHIC and LHC energies	Sumbera, Michal
7.4	10:05	Heavy quarkonium production at the STAR experiment	Chaloupka, Petr
7.5	10:25	Results on J/psi and psi(2S) in p-Pb Collisions at 5.02 TeV with ATLAS Abstract	White, Ryan Mackenzie
7.6	10:45	Thermalization of a boost-invariant non Abelian plasma with boundary sourcing	De Fazio, Fulvia
7.7	11:30	Measurements of leptons from open heavy-flavour decays in pp, p-Pb and Pb-Pb collisions with ALICE at the LHC	Valencia Palomo, Lizardo
7.8	11:50	LHCb results in proton-nucleus collisions at the LHC	Meissner, Marco
7.9	12:10	Measurements of Non-Photonic Electron Production with STAR Experiment	Rusnakova, Olga
7.10	12:30	review of heavy flavour production in AA collisions	Stocco, Diego

8 | TH 23-07-15 | 14:30-18:30 | HS33 | Astroparticle Physics, Cosmology, Gravitation

8.1	14:30	Precise Prediction of the Dark Matter Relic Density within the MSSM	Harz, Julia
8.2	14:45	Dulition of axion dark radiation	Seto, Osamu
8.3	15:00	Axino and gravitino dark matter with low reheating temperature	Trojanowski, Sebastian
8.4	15:15	Leptogenesis in natural low-scale seesaw mechanisms	Lucente, Michele
8.5	15:30	Dark Matter Self-Interactions via Collisionless Shocks in Cluster Mergers	Spethmann, Christian
8.6	15:45	Cosmological models with QGP: DM, DE and scalar perturbations	Eingorn, Maxim
8.7	16:30	The Dark Energy Survey: Status and First Science Results	Aleksic, Jelena
8.8	16:45	Investigating Dark Energy and Gravitation at cosmological scales	Blanchard, Alain
8.9	17:00	Holographic reconstruction of scalar field models of dark energy in the background of Brans Dicke cosmology	Chattopadhyay, Surajit
8.10	17:15	Dynamically Induced Planck Scale and Inflation	Kannike, Kristjan
8.11	17:30	On the smallness of the cosmological constant in SUGRA models with Planck scale SUSY breaking and degenerate vacua	Nevzorov, Roman

9 | TH 23-07-15 | 14:30-18:00 | HS41 | Flavour Physics and Fundamental Symmetries

9.1	14:30	Searches for low mass dark bosons	Mauri, Andrea
9.2	14:45	Search for the dark photon in π^0 decays	Fantechi, Riccardo
9.3	15:00	Measurements of CP violation in $B^0_{d/s}$ mixing through $B \to J/\Psi X$ decays	Cowan, Greig
9.4	15:20	Phi_s and Delta Gamma_s measurement in B->J/psi Phi using CMS data	Eerola, Paula
9.5	15:35	New physics searches with heavy flavour observables at ATLAS	Alpigiani, Cristiano
9.6	16:30	The Precision of the CKM Angles β and β_s	Frings, Philipp
9.7	16:45	Precision measurement of Δmd using semi-leptonic decays at LHCb	Khanji, Basem
9.8	17:00	Re-examining $\sin 2\beta$ and Δm_d from evolution of B^0_d mesons with decoherence	Umasankar, Sankagiri
9.9	17:15	Study of CP asymmetry in B0-B0bar mixing using inclusive dilepton samples obtained with the BABAR detector	Miyashita, Tomonari
9.10	17:30	Observation of CP violation in B0->D_CP($\star$)h0 decays in a combined analysis using BABAR and Belle data	Roehrken, Markus
9.11	17:45	Search for Violation of CPT and Lorentz invariance in B^0_s meson oscillations	D0 Collaboration

10 | TH 23-07-15 | 14:30-18:00 | Grosser Festsaal | Higgs and New Physics

10.1	14:30	Prospects for SUSY discovery after the LHC Run 1	Weiglein, Georg
10.2	14:45	Searches for squarks and gluinos in ATLAS and CMS	Khoo, Teng Jian
10.3	15:00	Searches for 3rd generation SUSY partners in ATLAS and CMS	Tripiana, Martin
10.4	15:15	SUSY searches with leptons, photons and taus in ATLAS and CMS	Botta, Cristina
10.5	15:30	Searches for R-Parity Violating SUSY at ATLAS and CMS	Morse, David Michael
10.6	15:45	Compressed SUSY searches at ATLAS and CMS	Barlow, Nick
10.7	16:30	Proposing a new LHC search for light compressed stop squarks	Petersson, Christoffer
10.8	16:45	Killing the CMSSM softly	Hamer, Matthias
10.9	17:00	pMSSM combination of SUSY searches at the LHC	
10.10	17:15	$h^0(125GeV) \to c\bar{c}$ as a test case for quark flavor violation in the MSSM	Hidaka, Keisho
10.11	17:30	Discriminating between SUSY and Non-SUSY Higgs Sectors through the Ratio $H \to b\bar{b}/H \to \tau\bar{\tau}$	Arganda, Ernesto
10.12	17:45	LHC phenomenology of light pseudoscalars in the NMSSM	Bomark, Nils-Erik

11 | TH 23-07-15 | 14:30-18:00 | HS32 | QCD and Hadronic Physics

11.1	14:30	Colour Reconnection - Models and Tests	Christiansen, Jesper Roy
11.2	14:45	Measurement of observables sensitive to coherence effects in hadronic Z decays with the OPAL detector at LEP	Kluth, Stefan
11.3	15:00	Measurements of particle production, Bose-Einstein correlations and Underlying Event properties with the ATLAS detector	Kuhl, Thorsten
11.4	15:15	Small-x QCD and forward physics results from CMS	Veres, Gabor
11.5	15:30	Charged-particle multiplicities at different pp interaction centre-of-mass energies measured with the ATLAS detector at the LHC	Morley, Anthony
11.6	15:45	Testing QCD with CMS using jets and diffraction	Van Haevermaet, Hans
11.7	16:30	Production of c cbar c cbar in single and double parton scattering in collinear and kt-factorization approaches	Maciula, Rafal
11.8	16:45	Study of fragmentation functions in e+e- annihilation process at Belle	Bracko, Marko
11.9	17:00	Measurements of the elastic, inelastic and total cross sections in pp collisions with ATLAS sub-detectors	Grafstrom, Per
11.10	17:15	Data-driven approaches to pile-up subtraction at the LHC	Van Haevermaet, Hans
11.11	17:30	Study of multiple parton interactions in diphoton plus dijet events and in double quarkonia production in pbar p interactions	Lincoln, Don
11.12	17:45	Measurement of Double Parton Scattering at LHC with the CMS experiment	Mehta, Ankita

12 | TH 23-07-15 | 14:30-18:00 | HS31 | Top and Electroweak Physics

12.1	14:30	Measurement of t-channel single top quark production in pp collisions	Fabozzi, Francesco
12.2	14:48	Measurement of single top production in the tW-channel and search for s-channel in pp collisions	Merola, Mario
12.3	15:06	Tevatron combined single top production cross sections	Ronzani, Manfredi
12.4	15:24	Measurement of ttbar production cross section	Peters, Reinhild
12.5	15:42	Top-quark pair production at hadron colliders: differential cross section and phenomenological applications with DiffTop	Lipka, Katerina
12.6	16:30	Measurements of the top quark pair production cross section in pp collisions	Ntomari, Eleni
12.7	16:48	Measurement of differential cross sections in top pair production in pp collisions	Husemann, Ulrich
12.8	17:06	Top quark pair production measurements using the ATLAS detector at the LHC	Romano, Marino
12.9	17:24	Measurements of ttbar+X using the ATLAS detector	Bessidskaia Bylund, Olga
12.10	17:42	t tbar + isolated photon production at NLO accuracy matched with parton shower	Trocsanyi, Zoltan Laszlo

13 | TH 23-07-15 | 14:30-18:00 | HS7 | Neutrino Physics

13.1	14:30	Status of Light Sterile Neutrinos	Giunti, Carlo
13.2	14:45	Search for sterile neutrinos at Long Baselines	Stanco, Luca

13.3	15:00	STEREO: search for a sterile neutrino at the ILL Grenoble reactor	Del Amo Sanchez, Pablo
13.4	15:15	First results of the deployment of a SoLid detector module at the SCK•CEN BR2 reactor	Ryder, Nick
13.5	15:30	SOX : Short Distance Neutrino Oscillations with Borexino	Agostini, Matteo
13.6	15:45	nuMSM: the model, its predictions and experimental tests	Gorbunov, Dmitry
13.7	16:30	Heavy neutrinos in particle physics and cosmology	Drewes, Marco
13.8	16:45	Searches for leptoquarks and heavy leptons with the ATLAS detector at the LHC	Grancagnolo, Sergio
13.9	17:00	Indirect searches for sterile neutrinos at a high-luminosity Z-factory	De Romeri, Valentina
13.10	17:15	Global fit to right-handed neutrino mixing at 1 loop	Hernandez, Josu
13.11	17:30	Radiative Origin of Majorana Neutrino Masses	Aristizabal, Diego
13.12	17:45	Neutrino mass generation in connection with Dark Matter	Rivera, Maximiliano

14 | TH 23-07-15 | 14:30-18:00 | HS42 | Heavy Ion Physics

14.1	14:30	Inclusive and Semi-Inclusive Jet measurements in Au+Au collisions at $\sqrt(s_{NN})$ = 200 GeV at STAR	Rusnak, Jan
14.2	14:50	Jet results in heavy ion collisions with the ATLAS experiment at the LHC	Perepelitsa, Dennis Vadimovich
14.3	15:15	Jet results in heavy ions with CMS	Lai, Yue Shi
14.4	15:40	Transverse momentum spectra of charged particles and identified hadrons in p-Pb collisions at the LHC	Otwinowski, Jacek Tomasz
14.5	16:30	Flow and correlations results from CMS	Devetak, Damir
14.6	16:50	Results on angular correlations with ALICE	Grosse-Oetringhaus, Jan Fiete
14.7	17:10	Latest results from the NA61/SHINE beam energy scan with p+p and Be+Be collisions	Mackowiak-Pawlowska, Maja Katarzyna
14.8	17:30	Hadronic resonances as probes of the fireball evolution in heavy-ion collisions at the LHC	Fragiacomo, Enrico

15 | FR 24-07-15 | 09:00-13:30 | HS33 | Astroparticle Physics, Cosmology, Gravitation

15.1	09:00	Recent results from the ANTARES neutrino telescope + outlook for KM3NeT	Biagi, Simone
15.2	09:30	Underground Physics with DUNE	Paolone, Vittorio
15.3	09:50	Baikal-GVD: first cluster Dubna	Suvorova, Olga
15.4	10:05	Methods for Detection of Astrophysical Tau Neutrinos in IceCube	Palczewski, Tomasz
15.5	10:20	Measurement of Atmospheric Neutrino Oscillations with the IceCube/DeepCore Detector	Vehring, Markus
15.6	10:35	Towards survey of astronomical tau neutrino sources	Hou, George W.s.
15.7	11:30	Dark matter signals from the gamma-ray sky	Calore, Francesca
15.8	11:45	Searches for Dark Matter with the Fermi Large Area Telescope	Caputo, Regina
15.9	12:00	Electron and Positron Fluxes in Primary Cosmic Rays Measured with the Alpha Magnetic Spectrometer on the International Space Station	Zimmermann, Nikolas
15.10	12:15	Thermal transport of the solar captured dark matter and its impact on the indirect dark matter search	Lin, Yen-Hsun
15.11	12:30	A description of the Galactic Center excess in the Minimal Supersymmetric Standard Model	Caron, Sascha
15.12	12:45	Sensitivity of CTA to dark matter annihilations in the galactic centre	Sessolo, Enrico Maria

16 | FR 24-07-15 | 09:00-13:00 | HS41 | Flavour Physics and Fundamental Symmetries

16.1	09:00	Vub and Vcb determinations: recent results and prospects	Gambino, Paolo
16.2	09:20	Measurements of Vub and Vcb at LHCb	Artuso, Marina
16.3	09:35	nclusive electron spectrum from B-meson decays and determination of |Vub|	Skovpen, Yuri
16.4	09:50	Measurement of the D -> pi- e+ nu partial branching fraction and form factor, and implications for Vub.	Oyanguren, Arantza
16.5	10:05	Semileptonic B and Bs decays at Belle	Glattauer, Robin
16.6	10:20	B–>D*$\tau\nu$ at LHCb	Calvi, Marta
16.7	10:35	Tree-level new physics searches in B decays to τ leptons at Belle	Hamer, Philipp

16.8	10:50	Exclusive semileptonic B decays to a D or D* meson and one or two pions	Lueck, Thomas
16.9	11:30	Kaon Theory News	Buras, Andrzej
16.10	11:50	KL –> pi0 nu nu(bar) Beyond the Grossman-Nir Bound	Hou, George W.s.
16.11	12:05	Prospects for K+ ->pi+ nu nu observation at CERN in NA62	Palladino, Vito
16.12	12:20	First observation of K->pi+pi0e+e- decay at NA48	Fantechi, Riccardo
16.13	12:35	epsilon' / epsilon from the lattice and its implications	Soni, Amarjit
16.14	12:50	$B \to K^{(*)}\nu\bar{\nu}$ decays in the Standard Model and beyond	Niehoff, Christoph

17 | FR 24-07-15 | 09:00-13:00 | Grosser Festsaal | Higgs and New Physics

17.1	09:00	Higgs and heavy Higgs bosons phenomenology	Weiglein, Georg
17.2	09:15	Searches for neutral and charged Higgs bosons in the context of the MSSM and more general 2HDMs at ATLAS and CMS	Davignon, Olivier
17.3	09:40	Search for a Higgs boson decaying to a pair of Higgs bosons (hh or hA) or for a Higgs boson decaying to Zh/ZA at CMS	Lane, Rebecca Charlotte
17.4	09:55	Search for light CP-odd Higgs decay with a charm tag at BABAR	Vasseur, Georges
17.5	10:10	Higgs lepton flavour violation	Herrero Garcia, Juan
17.6	10:25	Searches for exotic Higgs boson decays with the ALTAS and the CMS experiment	Lagouri, Theodota
17.7	11:30	The global electroweak fit at NNLO and constraints on new physics	Peiffer, Thomas
17.8	11:55	Constraints on new phenomena through Higgs coupling measurements with the ATLAS detector	Carrillo-Montoya, G.
17.9	12:10	Tevatron constraints on models of the Higgs boson with exotic spin and parity using decays to bottom-antibottom quark pairs	Davies, Gavin
17.10	12:25	Searches for invisible Higgs boson decays with ATLAS and CMS	Calfayan, Philippe
17.11	12:40	Search for low mass Higgs-boson like resonances at CMS	Mohammadi, Abdollah

18 | FR 24-07-15 | 09:00-13:00 | HS32 | QCD and Hadronic Physics

18.1	09:00	Combined Measurement of Inclusive ep Scattering Cross Sections at HERA	Turkot, Oleksii
18.2	09:15	Combination of D* Differential Cross-SectionMeasurements in Deep-Inelastic ep Scattering at HERA	Hladky, Jan
18.3	09:30	PDF constraints and alpha_s from CMS	Kokkas, Panos
18.4	09:45	Determination of strangeness using the data from neutrino experiments and hadron collider	Lohwasser, Kristin
18.5	10:00	New DIS results from COMPASS	Kabuss, Eva-Maria
18.6	10:15	Impact of heavy-flavour production cross sections measured by the LHCb experiment on parton distribution functions at low x	Lipka, Katerina
18.7	10:30	Determination of Charm Mass Running from an Analysis of Combined HERA Charm Data	Geiser, Achim
18.8	10:45	3-Loop Corrections to the Heavy Flavor Wilson Coefficients in Deep-Inelastic Scattering	Bluemlein, Johannes
18.9	11:30	MMHT 2014 PDFs	Thorne, Robert Samuel
18.10	11:45	Parton Distributions for the LHC Run II	Rojo Chacon, Juan
18.11	12:00	HERAFitter project and its related studies	Placakyte, Ringaile
18.12	12:15	QCD Analysis HERAPDF2.0 of the combined HERA structure function data	Radescu, Voica Ana Maria
18.13	12:30	QCD Analysis of the combined HERA inclusive data together with HERA jet and charm data	Wichmann, Katarzyna
18.14	12:45	The role of intrinsic charm in the proton via photon production in association with a charm quark	Khorramian, Ali

19 | FR 24-07-15 | 09:00-13:00 | HS31 | Top and Electroweak Physics

19.1	09:00	Flavour-changing top decays in the aligned two-Higgs-doublet model	Abbas, Gauhar
19.2	09:18	Z'-induced FCNC Decays of Top, Beauty and Strange Quarks	Kohda, Masaya
19.3	09:36	Searching for anomalous top quark couplings and decays with the ATLAS detector	Boudreau, Joseph
19.4	09:54	Hadroproduction of a charged vector boson pair in association with a b-quark pair at NLO accuracy matched with parton shower	Trocsanyi, Zoltan Laszlo

19.5	10:12	Matching NLO QCD Corrections in WHIZARD with the POWHEG scheme	Chokoufe, Bijan
19.6	10:30	Subleading P-wave, Higgs and nonresonant contributions to top-pair production near threshold	Rauh, Thomas
19.7	11:30	CMS Measurements of the top quark mass	Kirschenmann, Henning
19.8	11:48	Measurements of the top quark mass with the ATLAS detector	Brandt, Oleg
19.9	12:06	Measurement of the top quark mass and spin correlations with the D0 detector	Tuchming, Boris
19.10	12:25	New approaches in determining mtop: alternative techniques and differential measurements	Kieseler, Jan

20 | FR 24-07-15 | 09:00-13:00 | HS42 | Detector R&D and Data Handling

20.1	09:00	The CMS muon system in Run2: preparation, status and first results	Abbiendi, Giovanni
20.2	09:15	ATLAS Muon Spectrometer Upgrades for the High Luminosity LHC	Valderanis, Chrysostomos
20.3	09:30	Physics motivations and expected performance of the CMS muon system upgrade with triple-GEM detectors	Venditti, Rosamaria
20.4	09:45	Upgrade of the ATLAS Calorimeters for Higher LHC Luminosities	Korolkov, Ilya
20.5	10:00	Development of technologies for highly granular calorimeters and their performance in beam tests	Balagura, Vladislav
20.6	10:15	Detailed studies of hadronic showers and comparison to GEANT4 simulations with data from highly granular calorimeters	Van Der Kolk, Naomi
20.7	10:30	Hadron Calorimeters for the future High Energy Physics Nuclear Experiments	Mikhaylov, Vasily
20.8	10:45	Development of the electromagnetic calorimeter waveform digitizers for the Fermilab Muon g-2 experiment	Chapelain, Antoine
20.9	11:30	Perfomance of novel and upgraded instrumentation for luminosity and beam conditions measurements in CMS	Leonard, Jessica Lynn
20.10	11:45	The CMS Level-1 Trigger for the LHC Run 2	Fountas, Costas
20.11	12:00	The ATLAS Trigger System: Ready for Run 2	Czodrowski, Patrick
20.12	12:15	Novel real-time calibration & alignment and tracking performance for LHCb Run II	Seyfert, Paul
20.13	12:30	Hardware-based Tracking at Trigger Level for ATLAS: The Fast TracKer (FTK) Project	Gramling, Johanna
20.14	12:45	FTK AMchip05: an Associative Memory Chip Prototype for Track Reconstruction at Hadron Collider Experiments	Crescioli, Francesco

21 | FR 24-07-15 | 09:00-13:00 | HS7 | Neutrino Physics

21.1	09:00	GERDA Phase II and the future of Ge-76 experiments	Agostini, Matteo
21.2	09:15	Status of SuperNEMO experiment and last results of NEMO3	Remoto, Alberto
21.3	09:30	Neutrinoless double beta decay results from CUORE-0 and status of the CUORE experiment	Terranova, Francesco
21.4	09:45	Neutrinoless double beta decay, nuclear environment and structure	Simkovic, Fedor
21.5	10:15	NEXT: Searching for the bb0n decay in the Canfranc Underground Laboratory	Novella, Pau
21.6	10:30	Status of the SNO+ Experiment	Prior, Gersende
21.7	10:45	Impact of Neutrinoless Double Beta Decay on Models of Baryogenesis	Harz, Julia
21.8	11:30	Status of the neutrino mass experiments KATRIN and Project 8	Fraenkle, Florian
21.9	11:45	The Electron Capture in 163Ho experiment	Scholl, Stephan
21.10	12:00	Borexino: recent solar and terrestrial neutrino results	Maneschg, Werner
21.11	12:15	Future prospects of neutrino oscillation experiments	Raut, Sushant
21.12	12:30	An Experimental Program in Neutrinos, Nucleon Decay and Astroparticle Physics Enabled by the Fermilab Long-Baseline Neutrino Facility	Habig, Alec
21.13	12:45	Neutrino oscillation physics potential of Hyper-Kamiokande	Cremonesi, Linda

22 | FR 24-07-15 | 09:00-13:00 | HS30 | Heavy Ion Physics

22.1	09:00	Precision measurement of the mass difference between light nuclei and anti-nuclei with ALICE at the LHC	Colocci, Manuel
22.2	09:20	Nuclear collisions at the LHeC	Armesto Perez, Nestor
22.3	09:40	Prospects for dense baryonic matter research at NICA	Sorin, Alexander

22.4	10:00	Progress towards A Fixed-Target ExpeRiment at the LHC: AFTER@LHC	Trzeciak, Barbara
22.5	10:20	Double-scattering mechanism of production of two ρ^0 mesons in ultraperipheral, ultrarelativistic heavy ion collisions	Szczurek, Antoni
22.6	10:40	Lightening-like interactions in nuclear collisions at CERN large hadron collider	Abdel-Waged, Khaled
22.7	11:30	New results on flow and correlations in pPb and PbPb collisions from ATLAS at the LHC	Arratia Munoz, Miguel Ignacio
22.8	11:50	Triangular flow in relativistic heavy-ion collisions within HYDJET++	Crkovska, Jana
22.9	12:10	Spectra and elliptic flow of charmed hadrons in HYDJET++ model	Eyyubova, Gyulnara
22.10	12:30	Recent developments in hydrodynamics and collectivity in small systems	Niemi, Harri

23 | FR 24-07-15 | 14:30-18:00 | HS33 | Astroparticle Physics, Cosmology, Gravitation

23.1	14:30	The CRESST dark matter search - Status and Perspectives	Reindl, Florian
23.2	15:00	Recent results from the EDELWEISS-III WIMP search experiment	Cazes, Antoine
23.3	15:15	The XENON Project for Direct Dark Matter Detection	Kish, Alexander
23.4	15:30	Direct Detection of Dark Photon Dark Matter	Pradler, Josef
23.5	15:45	Phenomenological aspects of flavoured dark matter	Blanke, Monika
23.6	16:30	Study of Majorana Fermion Dark Matter	Wong, Gwo-Guang
23.7	16:45	Impact of Dark Matter Direct and Indirect Detection on simplified Dark Matter Models	Arcadi, Giorgio
23.8	17:00	Halo-independent tests of dark matter direct detection signals	Herrero Garcia, Juan
23.9	17:15	Looking forward: DARWIN-LXe, another step beyond XENON1T	Ferella, Alfredo Davide

24 | FR 24-07-15 | 14:30-18:05 | HS41 | Flavour Physics and Fundamental Symmetries

24.1	14:30	A Critical Examination of SU(3) in D to P P Decays	Paul, Ayan
24.2	14:45	Searches of CP violation in two-body charm decays	Alexander, Michael Thomas
24.3	15:00	Searches of CP violation in multibody charm decays	Martinelli, Maurizio
24.4	15:15	UTfit Collaboration Average of D meson mixing data.	Derkach, Denis
24.5	15:30	Charmed hadron decays at BESIII	Dong, Liaoyuan
24.6	15:45	Recent studies of CP violation in bottom and charm meson decays at Belle	Vanhoefer, Pit
24.7	16:30	Theory of Lepton Flavour Violation	Paradisi, Paride
24.8	16:50	The MEG experiment: status and upgrade.	Grigoriev, Dmitry
24.9	17:05	The Mu2e Experiment at Fermilab	Roehrken, Markus
24.10	17:20	COMET Experiment - A search for muon-to-electron conversion at J-PARC	Nishiguchi, Hajime
24.11	17:35	The Fermilab Muon g-2 Experiment	Venanzoni, Graziano
24.12	17:50	Study of the radiative tau decays, tau -> gamma l nu nubar with the BABAR detector	Barlow, Roger

25 | FR 24-07-15 | 14:30-18:00 | Grosser Festsaal | Higgs and New Physics

25.1	14:30	Impact of electroweak precision measurements for dark matter constraints	Moortgat-Pick, Gudrid
25.2	14:45	Searches for Dark Matter in ATLAS and CMS	Zerwas, Dirk
25.3	15:00	Status of the Inert Doublet Model of dark matter after Run-1 of the LHC	Goudelis, Andreas
25.4	15:15	New probes for bino dark matter with coannihilation at the LHC	Otono, Hidetoshi
25.5	15:30	Searches for electroweak SUSY in ATLAS and CMS	Kalsi, Amandeep Kaur
25.6	15:45	A light singlino in the NMSSM: Challenges for SUSY searches at the LHC	Ellwanger, Ulrich
25.7	16:30	Composite resonances and their impact on the low-energy EW chiral Lagrangian	Sanz-Cillero, Juan Jose
25.8	16:45	Searches for highly ionizing particles in ATLAS and CMS	Policicchio, Antonio
25.9	17:00	Searches for long-lived, weakly interacting particles in ATLAS and CMS	Hart, Andrew Evan
25.10	17:15	Search for long-lived particles at BABAR, Belle and LHCb	Arnaud, Nicolas
25.11	17:30	MoEDAL: Seeking magnetic monopoles and more at the LHC	Mitsou, Vasiliki
25.12	17:45	SHiP: a new facility with a dedicated detector to search for new long-lived neutral particles	Graverini, Elena

26 | FR 24-07-15 | 14:30-18:00 | HS32 | QCD and Hadronic Physics

26.1	14:30	Fully differential VBF Higgs production at NNLO	Karlberg, Alexander
26.2	14:45	First LHCb results from the 13 TeV LHC data	Komarov, Ilya
26.3	15:00	Matching the Nagy-Soper parton shower at next-to-leading order	Kraus, Manfred
26.4	15:15	Fully differential decay rate of a standard model Higgs boson into a b-quark pair at NNLO accuracy	Trocsanyi, Zoltan Laszlo
26.5	15:30	Numerical Implementation of the Loop-Tree Duality	Buchta, Sebastian
26.6	15:45	From dimensional regularization to NLO computations in four dimensions	Sborlini, German
26.7	16:30	Photon and photon+jet production measurements with the ATLAS detector	Bessner, Martin
26.8	16:45	Di-vector Boson Production in Association with Multiple Jets at the LHC	Ita, Harald
26.9	17:00	Drell-Yan and vector boson plus jets measurements with the ATLAS detector	Zinser, Markus
26.10	17:15	Jet measurements from CMS	Roy, Debarati
26.11	17:30	Studies of jet production properties and the strong coupling constant with the ATLAS detector	Starovoitov, Pavel
26.12	17:45	Vector boson production in association with jets and heavy flavor quarks from CMS	Peruzzi, Marco

27 | FR 24-07-15 | 14:30-18:00 | HS31 | Top and Electroweak Physics

27.1	14:30	Subleading processes in production of W^+W^- pairs in proton-proton collisions	Szczurek, Antoni
27.2	14:48	Measurement of anomalous triple and quartic gauge couplings at CMS	Duric, Senka
27.3	15:06	Di-boson production measurements with the ATLAS detector	Chevalier, Laurent
27.4	15:24	Multiboson production at CMS	Dudero, Phillip Russell
27.5	15:42	The Inclusive four-lepton lineshape measurement from pp collisions at 8 TeV with ATLAS	Xu, Lailin

28 | FR 24-07-15 | 14:30-18:15 | HS42 | Detector R&D and Data Handling

28.1	14:30	CMS Tracker Upgrades: R&D Plans, Present Status and Perspectives	Vormwald, Benedikt
28.2	14:45	The upgraded Pixel detector and the commissioning of the Inner Detector tracking of the ATLAS experiment for Run-2 at the Large Hadron collider	Potamianos, Karolos
28.3	15:00	Inner tracking devices at the Belle II experiment	Casarosa, Giulia
28.4	15:15	Upgrade of the LHCb VELO detector	Williams, Mark Richard James
28.5	15:30	LHCb Upgrade – The Scintillating Fibre Tracker	Leverington, Blake Dean
28.6	15:45	Test of MPGD modules with a large prototype Time Projection Chamber	Bhattacharya, Deb Sankar
28.7	16:30	The WAGASCI experiment at JPARC to measure neutrino cross-sections on water	Noah Messomo, Etam
28.8	16:45	First results from the NA62 straw spectrometer	Palladino, Vito
28.9	17:00	The LHeC detector	Newman, Paul Richard
28.10	17:15	Performance of a Large 1 m^2 Micromegas Detector Using Ar and Ne based Drift Gases	LÖsel, Philipp
28.11	17:30	Characterization of n ew crystals for X rays detection	Bonesini, Maurizio
28.12	17:45	Particle identification devices at the Belle II experiment	Pestotnik, Rok
28.13	18:00	Test Beam Results of a 3D Diamond Detector	Dunser, Marc

29 | FR 24-07-15 | 14:30-18:00 | HS7 | Neutrino Physics

29.1	14:30	LBNO-DEMO (WA105): a large demonstrator of the Liquid Argon double phase TPC	Galymov, Vyacheslav
29.2	14:45	Stokes-shift engineered colloidal quantum dots as wavelength downshifters for detection of VUV light in Lar and LXe detectors	Bonesini, Maurizio
29.3	15:00	Predicting the Leptonic Dirac CP Violation Phase from Sum Rules	Titov, Arsenii
29.4	15:15	Neutrino CP violating phase from μ decay at rest	Ciuffoli, Emilio
29.5	15:30	Neutrino Super Beam for lepton CP violation discovery based on the European Spallation Source	Baussan, Eric
29.6	15:45	Probing non-standard neutrino interactions at ESSnuSB	Raut, Sushant
29.7	16:30	Statistical issues in future neutrino oscillation experiments	Tonazzo, Alessandra

29.8	16:45	The Jiangmen Underground Neutrino Observatory	Wang, Wei
29.9	17:00	The PINGU detector	Ehrhardt, Thomas
29.10	17:15	KM3NeT/ORCA: Measuring the neutrino mass hierarchy in the Mediterranean sea	Pradier, Thierry
29.11	17:30	Status of the neutrinos from STORed Muons (nuSTORM) facility	Bross, Alan
29.12	17:45	SHiP: a new facility with a dedicated detector for studying ν_τ properties and nucleon structure functions	De Lellis, Giovanni

30 | SA 25-07-15 | 09:00-13:00 | HS32 | Non-Perturbative Field Theory and String Theory

30.1	09:00	Recent Progress on the Gauge Theory Sector of F-Theory	Klevers, Denis
30.2	09:15	Non-supersymmetric heterotic model building	Groot Nibbelink, Stefan
30.3	09:30	A class of 2D non-abelian gauged linear sigma models	Gerhardus, Andreas
30.4	09:45	Entanglement entropy and far-from-equilibrium energy flow	Megias, Eugenio
30.5	10:00	Thermalization in a confining Gauge Theory at strong coupling	Kiritsis, Elias
30.6	10:15	FRG Approach to Nuclear Matter in Extreme Conditions	PÓsfay, Péter
30.7	11:30	Tensor networks for gauge field theories	Van Acoleyen, Karel
30.8	11:45	Error reduction using the covariant approximation averaging	Shintani, Eigo
30.9	12:00	Renormalization of the energy-momentum tensor on the lattice	Pepe, Michele
30.10	12:15	Universal aspects in the equation of state for Yang-Mills theories	Nada, Alessandro
30.11	12:30	The low-lying spectrum of N=1 supersymmetric Yang-Mills theory	Giudice, Pietro
30.12	12:45	Volume dependence in SU(N) gauge theories with twisted boundary conditions	Koren, Mateusz

31 | SA 25-07-15 | 09:00-13:20 | HS41 | Flavour Physics and Fundamental Symmetries

31.1	09:00	Measurement of the CKM angle γ at LHCb	Garra Tico, Jordi
31.2	09:15	Dalitz analyses with B–>Dh decays	Qian, Wenbin
31.3	09:30	NP models with extended gauge groups: Impact on flavour observables	De Fazio, Fulvia
31.4	09:45	An MCMC study of non-minimal flavour violation in the MSSM	Herrmann, Björn
31.5	10:00	Test of the Standard model and search for new physics using Unitarity triangle fits	Martinelli, Guido
31.6	10:20	The Belle II experiment at the SuperKEKB collider	Wiechczynski, Jaroslaw Pawel
31.7	10:35	B Physics at CMS with Run2 and beyond	Chen, Kai-Feng
31.8	10:50	Flavours at a high luminosity e+e- collider (FCC-ee)	Monteil, Stephane
31.9	11:30	Electric Dipole Moments - A Window for New Physics	Stroeher, Hans
31.10	11:50	NoMoS: Beyond the Standard Model Physics in Neutron Decay	Konrad, Gertrud
31.11	12:05	Toward a hyperfine splitting measurement of antihydrogen	Simon, Martin
31.12	12:20	PERC - A clean, bright and versatile source of neutron decay products	Maerkisch, Bastian
31.13	12:35	A new high sensitivity search for neutron-antineutron oscillations at the ESS	Milstead, David Anthony
31.14	12:50	Study of B -> K pi pi gamma decays	Eigen, Gerald

32 | SA 25-07-15 | 09:00-13:00 | Grosser Festsaal | Higgs and New Physics

32.1	09:00	Searches for resonant and non-resonant new phenomena in ATLAS	Fedorko, Wojtek
32.2	09:15	Searches for resonant and non-resonant new phenomena in CMS	Clerbaux, Barbara
32.3	09:30	Four-Quark Effective Operators at Hadron Colliders	De Vries, Maikel
32.4	09:45	Searches for top/bottom partners and new phenomena in top/bottom quark pair signatures in ATLAS and CMS	Marchesini, Ivan
32.5	10:00	Searches for new phenomena in multilepton final states in ATLAS and CMS	Jain, Shilpi
32.6	10:15	Discovery potential for T' -> tZ in the trilepton channel at the LHC	Basso, Lorenzo
32.7	10:30	Search for new phenomena in diboson final states in ATLAS and CMS	Cavaliere, Viviana
32.8	10:45	Asymmetries at the LHC as tools to discover Z' bosons	Millar, Declan Andrew
32.9	11:30	A Cosmological Solution to the Electroweak Hierarchy Problem	Kaplan, David
32.10	11:55	Prospects of the high luminosity LHC from CMS and ATLAS	Tricomi, Alessia
32.11	12:10	Higgs Physics at CLIC	Redford, Sophie
32.12	12:30	The Higgs Physics Program at the International Linear Collider	Duerig, Claude
32.13	12:45	Higgs Physics at the Future Circular Colliders (FCC)	Klute, Markus

33 | SA 25-07-15 | 09:00-13:00 | HS31 | Top and Electroweak Physics

33.1	09:00	Physics with jets at LHCb	Barlow, Roger
33.2	09:18	Top properties measurements with the ATLAS detector	Neep, Tom
33.3	09:36	Measurements of the top quark properties in ttbar production at the LHC (includes charge asymmetry, top quark polarization, spin correlations and tt+V)	Roscher, Frank Sebastian
33.4	09:54	Measurements of forward-backward asymmetries and top quark polarization with the D0 detector	Husemann, Ulrich
33.5	10:13	Measurement of the properties of top quarks in decays (includes W polarization, top quark charge and couplings)	Piedra Gomez, Jonatan
33.6	10:31	Measurement of top quark properties in single top production	Tiko, Andres
33.7	11:30	Precision Electroweak measurements at the Future Circular Colliders	Dam, Mogens
33.8	11:50	Top and EW physics at the LHeC	Zhang, Zhiqing Philippe
33.9	12:10	Top Quark Physics at a Future Linear Collider	Poeschl, Roman
33.10	12:30	Precision measurements of the top quark couplings at the FCC	Janot, Patrick

34 | SA 25-07-15 | 09:00-13:00 | HS7 | Education and Outreach

34.1	09:00	Stepping Outside: A Perspective on Outreach	Kaplan, David
34.2	09:20	Accelerating Public Engagement	Zollinger, Silke
34.3	09:35	LECTURING ON SILICON SENSORS USING THE EDUCATIONAL ALIBAVA SYSTEM	Lacasta Llacer, Carlos
34.4	09:50	Involving other communities through challenges and cooperation	Nellist, Clara
34.5	10:05	ATLAS and CMS Virtual Visits: Bringing Cutting Edge Science into the Classroom and Beyond	Lapka, Marzena
34.6	10:20	Inspiring students through masterclasses	Leney, Katharine
34.7	10:35	Outreaching Particle Physics to Developing Countries	Shaw, Kate
34.8	10:50	Adversity in life, sharing science	Blossier, Benoit
34.9	11:30	LHC discoveries and particle physics concepts for education	Ould-Saada, Farid
34.10	11:45	Education and Outreach Activities in Astroparticle Physics offered by Netzwerk Teilchenwelt	Bretz, Hans-Peter
34.11	12:00	Virtual Research and Learning Communities in Latin America: the CEVALE2VE case	Rangel Smith, Camila Jose
34.12	12:10	Cascade projects competition - a way to build on Masterclass success	Melo, Ivan
34.13	12:20	Involving students in HEP research with the help of the “Inspiring Science Education” and “Go-lab” European outreach projects	Kourkoumelis, Christine
34.14	12:30	Education and outreach through building blocks	Adam Bourdarios, Claire
34.15	12:40	IPPOG: Experts in bringing new discoveries to the public	Kobel, Michael
34.16	12:50	Connecting Science and Society through Creative Education and Outreach	Alexopoulos, Angelos

35 | SA 25-07-15 | 09:00-11:00 | HS42 | Detector R&D and Data Handling

35.1	09:00	Offline performance of the CMS Tracker during early Run II	Francois, Brieuc Arnaud L
35.2	09:15	The ATLAS Distributed Computing project for LHC Run-2 and beyond.	Di Girolamo, Alessandro
35.3	09:30	The LHCb Higher Level Trigger in Run II	Stahl, Sascha
35.4	09:45	LHCb upgrade: plans and potential	Muheim, Franz
35.5	10:00	The data acquisition and trigger system of the Belle II experiment	Li, Chunhua
35.6	10:15	HistFitter: a flexible framework for statistical data analysis	Lorenz, Jeanette Miriam
35.7	10:30	Track Fitting in Belle II: the GENFIT Library and its Performance	SchlÜter, Tobias
35.8	10:45	Prototyping a coherent framework for full, fast and parameteric detector simulation for the FCC project	Hrdinka, Julia

36 | SA 25-07-15 | 09:00-13:00 | HS33 | Accelerators

36.1	09:00	Crystal Ball : On the Future High Energy Colliders	Shiltsev, Vladimir
36.2	09:30	Latest results on critical-path R&D towards the Compact Linear Collider (CLIC) and related high-gradient linac applications	Burrows, Philip
36.3	10:00	Awake, Advanced Proton-Driven Plasma Wakefield Experiment at CERN	Gschwendtner, Edda
36.4	10:30	The LBNF Beamline	Paolone, Vittorio

36.5	11:30	Strategy for Superconducting Magnet Development for a Future Hadron-Hadron Circular Collider at CERN	Schoerling, Daniel
36.6	11:50	The RF system for FCC-ee	Butterworth, Andy
36.7	12:10	The ILC Positron Source	Moortgat-Pick, Gudrid
36.8	12:30	Accelerator physics challenges in Electric Dipole Moment measurements	Bai, Mei

37 | SA 25-07-15 | 14:30-18:00 | Audi Max | ECFA / EPS session

37.1	14:30	The particle physics / cosmology connection	Flauger, Raphael
37.2	15:00	The Higgs field and the early universe	Bezrukov, Fedor
37.3	15:30	The future of observational cosmology / prospects for understanding dark energy	Pain, Reynald
37.4	16:30	Gravitational waves	Van Den Broeck, Chris
37.5	17:00	The neutrino mass scale: Where do we go?	Weinheimer, Christian
37.6	17:30	Novel accelerator techniques	Muggli, Patric

38 | MO 27-07-15 | 09:00-13:00 | Audi Max | Plenary

38.1	09:00	Welcome	
38.2	09:30	EPS HEPP Prize award and talks by recipients	
38.3	09:40	Address by the Prize Winners	
38.4	10:05	Cocconi Prize award	
38.5	10:10	Address by the Prize Winner	
38.6	10:20	Gribov, YEPP, Outreach prize award	
38.7	10:30	Status of the LHC and HL-LHC	Bordry, Frederick
38.8	11:00	Press Conference	Schieck, Jochen
38.9	11:30	First results from LHC run 2: CMS	Borras, Kerstin
38.10	12:00	First results from LHC run 2: ATLAS	Hoecker, Andreas
38.11	12:30	Experimental status of the scalar sector	Savard, Pierre

39 | MO 27-07-15 | 14:30-18:00 | Audi Max | Plenary

39.1	14:30	The scalar sector (SM and beyond, theory)	Wulzer, Andrea
39.2	15:00	Electroweak physics (experimental)	Gouzevitch, Maxime
39.3	15:30	SM theory for collider physics	Grazzini, Massimiliano
39.4	16:30	Top quark physics	Hadley, Nicholas
39.5	17:00	Developments in string & field theory	Cachazo, Freddy
39.6	17:30	Lattice gauge theory	Van De Water, Ruth

40 | TU 28-07-15 | 08:30-12:30 | Audi Max | Plenary

40.1	08:30	Dark matter theory	Volansky, Tomer
40.2	09:00	Direct searches for dark matter	Monroe, Jocelyn
40.3	09:30	High energy cosmic rays: Photons and charged particles (incl. antimatter)	Hofmann, Werner
40.4	10:00	Neutrino astrophysics (incl. dark matter searches)	Halzen, Francis
40.5	11:00	Cosmic microwave background	Ganga, Ken
40.6	11:30	Observational cosmology (beyond CMB, including lensing)	Lahav, Ofer
40.7	12:00	Cosmology: theory	Binetruy, Pierre

41 | TU 28-07-15 | 14:30-17:30 | Audi Max | Plenary

41.1	14:30	Circular accelerators: future machines and R&D	Chou, Weiren
41.2	15:00	Linear accelerators: future machines and R&D	Seryi, Andrei
41.3	16:00	Results on QCD (including W/Z+jets)	Tricoli, Alessandro
41.4	16:30	Jets and correlations in heavy ion collisions (+ALICE news from run 2)	Bielcikova, Jana
41.5	17:00	Flavour production and QGP in heavy ion collisions	Granier De Cassagnac, Raphael

42 | WE 29-07-15 | 09:00-13:00 | Audi Max | Plenary

42.1	09:00	Neutrinos: theory and phenomenology	Hernandez, Pilar

42.2	09:30	Experimental neutrino physics I (natural beams, LBL, reactors)	Caccianiga, Barbara
42.3	10:00	Experimental neutrino physics II (SBL, β-decay, ν-less 2β-decay)	Gomez Cadenas, Juan Jose
42.4	10:30	Flavour physics: theory	Hiller, Gudrun
42.5	11:30	Announcement of Poster Prizes	
42.6	11:35	CP violation and CKM physics (incl. LHCb news from run 2)	Koppenburg, Patrick
42.7	12:05	Rare decays and exotic states in quark flavour physics	Trabelsi, Karim
42.8	12:35	Searches for SUSY	Sfyrla, Anna

43 | WE 29-07-15 | 14:30-18:00 | Audi Max | Plenary

43.1	14:30	Searches for exotic phenomena beyond the SM	Mikulec, Ivan
43.2	15:00	BSM theory after LHC run 1	Weiler, Andreas
43.3	15:30	Fundamental symmetry tests at low energy high precision experiments	Gabrielse, Gerald
43.4	16:30	Highlights from EPS HEP 2015	Zeppenfeld, Dieter
43.5	17:00	Outlook: physics prospects at high-energy colliders	Gianotti, Fabiola
43.6	17:30	Closing	

Posters

Astroparticle Physics, Cosmology, Gravitation

44.1	LHC signatures and cosmological implications of the E6 inspired SUSY models	Nevzorov, Roman
44.2	A new type of the inflaton effective potential	Balitsky, Jaroslaw
44.3	Measurement of the cosmic ray (e^++e^-) flux with AMS	Vagelli, Valerio
44.4	Vacuum Persistence in Fierz-Pauli Theory on a Curved Background	Hwang, Sungmin
44.5	Problematic aspects of extra dimensions	Eingorn, Maxim
44.6	Complementary Test of the Dark Matter Self-Interaction by Direct and Indirect Detections	Chen, Chian-Shu

Flavour Physics and Fundamental Symmetries

44.7	Confirmation of the $f_0(500)$ existence by pion scalar form factor and also the correct values of $f_0(500)$ mass and width from it	Dubnicka, Stanislav
44.8	Accurate decay-constant ratios f_{B^*}/f_B and $f_{B_s^*}/f_{B_s}$ from QCD sum rules	Melikhov, Dmitri
44.9	Observation and measurements of the production of prompt and non-prompt J/ψ mesons in association with a Z boson in pp collisions at $\sqrt{}$s = 8 TeV with the ATLAS detector.	Katzy, Judith
44.10	Measurement of the weak mixing phase phi_s through time-dependent CP violation in Bs0—>J/psi phi decay in ATLAS	Katzy, Judith
44.12	Tasting the SU(5) nature of Supersymmetry at the LHC	Herrmann, Björn
44.13	Search for a violation of the Pauli Exclusion Principle with electrons	Pichler, Andreas
44.14	Electron-antineutrino angular correlation coefficient a measurement in neutron beta-decay with the spectrometer aSPECT	Maisonobe, Romain
44.15	Hint of Lepton Flavor Violation at the LHC	Biswas, Sanjoy
44.16	Search for diboson resonances with jets in 20 fb-1 of pp collisions at sqrt(s) = 8 TeV with the ATLAS detector	Picazio, Attilio
44.17	Correlating Bq0 –> μ+μ- and KL –> $\pi 0 \nu\nu$ Decays with Four Generations	Xu, Fanrong
44.18	Strong decay of scalar B meson	Blossier, Benoît
44.19	Anomaly-free chiral fermion sets and gauge coupling unification	Simoes, Catarina
44.20	New-physics signals of a model with a vector-singlet up-type quark	Umasankar, Sankagiri
44.21	b-flavour tagging in pp collisions	Birnkraut, Alex
44.22	Test of lepton universality in the ratio of branching fractions BF(Y(3S)-> tau+tau-)/BF(Y(3S)->mu+mu-) at BABAR	Anulli, Fabio
44.23	The FCC-ee physics experimental program	Blondel, Alain
44.24	Spin correlations of muons and tau leptons in ee->$\mu\mu$ and ee->tau tau and of leptons in the final state of gg->ee, $\mu\mu$, tau tau	Lyuboshitz, Valery
44.25	Discreteness in particle masses and parameters of the Standard Model	Sukhoruchkin, Sergey
44.26	Probing the $U(1)_{B-L}$ model through the process $e^+e^- \to \nu\bar{\nu}\gamma$	Hernandez-Ruiz, Maria A.
44.27	Enhanced CP violation in the Magnetic Field	Filip, Peter

Higgs and New Physics

44.28	Search for pair production of vector-like partners of the top quark (T), with T –> tH, H–> $\gamma\gamma$	Meyer, Arnd
44.29	Production of charged Higgs boson pairs in the $pp \to ppH^+H^-$ reaction at the LHC and FCC	Szczurek, Antoni
44.30	Flavor Changing Heavy Higgs Interactions at the LHC	Kao, Chung
44.31	Search for squarks and gluinos in final state with jets and missing transverse momentum with the ATLAS detector at the LHC	Ronzani, Manfredi
44.32	ATLAS Higgs physics prospects at the high luminosity LHC	Glaysher, Paul
44.33	Search for exotic Higgs-boson decays in events with at least one photon, missing transverse momentum, and two forward jets produced in 8 TeV pp collisions with the ATLAS detector	Bernius, Catrin
44.34	Limits on the Effective Quark Charge Radius from the QCD Analysis of the Inclusive ep Scattering Cross Sections at HERA	Wing, Matthew
44.35	Search for ttH and tt'H with the D0 detector	D0 Collaboration
44.36	Search for Higgs bosons decaying to aa in the $\mu\mu\ \tau\tau$ final state in pp collisions at $\sqrt{s}$ = 8 TeV with the ATLAS experiment	Katzy, Judith

44.37	Searches for invisibly decaying Higgs bosons at ATLAS	Katzy, Judith
44.38	Search for the Standard Model Higgs boson produced in association with top quarks and decaying into a bbbar-pair in pp collisions at sqrt(s)=8 TeV with the ATLAS detector	Katzy, Judith
44.39	Top associated Higgs production in the ttH to multileptons channel with one hadronic tau in ATLAS	Katzy, Judith
44.40	Determination of the off-shell Higgs boson signal strength in the high-mass ZZ and WW final states with the ATLAS detector	Katzy, Judith
44.41	Search for a high mass particle decaying into two photons or Z + photon using the CMS detector and the LHC Run1 data	Meyer, Arnd
44.42	Search for a low-mass pseudoscalar Higgs boson produced in association with a pair of b-quarks and decaying to tau leptons, at CMS	Meyer, Arnd
44.43	Searches for vector-like quarks with the ATLAS detector at the LHC	Sahinsoy, Merve
44.44	Searches for long-lived particle decays in ATLAS	Salvatore, Daniela
44.45	Search for low-scale gravity signatures in multi-jet final states with the ATLAS detector at $\sqrt{}$s = 8 TeV	Wang, Kuhan
44.46	Elucidating SUSY in the Interplay of LHC and ILC	Simon, Frank
44.47	Measurements of the total and differential cross sections of Higgs boson production	Katzy, Judith
44.48	Quark flavour violation in h∧0 -> b bbar in the MSSM at one-loop level	Ginina, Elena
44.49	Phenomenology of fundamental spinons	Allen, Roland
44.50	Search for new π^0-like particles at BABAR	Anulli, Fabio
44.51	First results on Vector Bilepton production based on LHC data and predictions for Run II	Nepomuceno, Andre
44.52	Study of HH production at CMS	Meyer, Arnd
44.53	Interpreting LHC searches for new physics with SModelS	Laa, Ursula
44.54	Search for the standard model Higgs boson produced by vector boson fusion and decaying to bottom quarks	Meyer, Arnd
44.55	Search for a Higgs boson decaying to a pair of 125 GeV Higgs bosons (hh) or for a Higgs boson decaying to Zh, with tau leptons in the final state	Meyer, Arnd
44.56	The 4 tau signature of resonant H->hh events at the LHC and its interpretation in beyond-standard-model scenarios	Aggleton, Robin
44.57	Precise predictions for Higgs-masses in the Next-to-Minimal Supersymmetric Standard Model (NMSSM)	Drechsel, Peter
44.58	Unitarity, analiticity, dispersion relations and resonances in strongly interacting WLWL, ZLZL and hh scattering	Dobado Gonzalez, Antonio
44.59	A Higgs at 125 GeV and baryon mass spectra derived from a common U(3) framework	Trinhammer, Ole
44.60	The Inert Doublet Model in the light of LHC and astrophysical data	Ilnicka, Agnieszka

QCD and Hadronic Physics

44.61	Dalitz plot analysis of B -> D D K decays	Anulli, Fabio
44.62	Recent results on low-energy e+e- annihilation into hadrons obtained using initial state radiation with the BABAR detector	Anulli, Fabio
44.63	Study of interference effects in the decays of psi mesons into K+K-	Anulli, Fabio
44.64	Measurement of the Collins asymmetries for kaons and pions in e+e- annihilation at BABAR	Anulli, Fabio
44.65	Study of e+e- annihilation into hadrons with the SND detector at the VEPP-2000 collider	Druzhinin, Vladimir
44.66	Ultra low energy scattering of free polarized hadrons.	Adamuscin, Cyril
44.67	Photoproduction of isolated photons, inclusively and with a jet, at HERA	Wing, Matthew
44.68	Inelastic cross section measurements performed with the CMS experiment	Meyer, Arnd
44.69	Photon structure functions at the ILC energy range	Krupa, Beata
44.70	Measurement of Multijet Production in ep Collisions at High Q^2 and Determination of the Strong Coupling α_s	H1, Collaboration
44.71	Measurement of Dijet Production in Diffractive Deep-Inelastic ep Scattering at HERA	H1, Collaboration
44.72	Diffractive Dijet Production with a Leading Proton in ep Collisions at HERA	H1, Collaboration
44.73	Exclusive Photoproduction of ρ^0 Mesons with a Leading Neutron at HERA	H1, Collaboration

44.74	Measurement of Inclusive ep Cross Sections at High Q² at sqrt(s) = 225 and 252 GeV and of the Longitudinal Proton Structure Function F_L at HERA	H1, Collaboration
44.75	Search for QCD Instanton-Induced Processes in DIS at HERA	H1, Collaboration
44.76	Overview of the two component model for hadroproduction	Bylinkin, Alexander
44.77	Strong couplings of charmed mesons and quarkonia	Melikhov, Dmitri
44.78	Study of inclusive charmonium production in e+e- annihilation and B decays at BABAR	Arnaud, Nicolas
44.79	Study of three-body charmonium decays in BABAR.	Anulli, Fabio
44.80	Gauge Invariant Currents and Hadronization	Koshelkin, Andrew
44.82	Study of baryonic decays of B mesons at BABAR	Anulli, Fabio
44.83	Study of the e+e- -> hadron reactions with the CMD3 detector at VEPP2000 collider	Solodov, Evgeny
44.84	Production of exclusive dijets in diffractive deep inelastic scattering at HERA	Wing, Matthew
44.85	Measurement of beauty and charm production in deep inelastic scattering at HERA and measurement of the beauty-quark mass	Wing, Matthew
44.86	Diffractive production of isolated photons at HERA	Wing, Matthew
44.87	Trijet production in deep inelastic sacttering at HERA	Wing, Matthew
44.88	Measurement of the cross-section ratio $\sigma_\psi(2S)/\sigma_J/\psi$ in deep inelastic exclusive ep scattering at HERA	Wing, Matthew
44.89	Production of dilepton pairs via photon-photon fusion with proton dissociation.	Schaefer, Wolfgang
44.90	Hadrons vs. QCD	Hoyer, Paul
44.91	Higher-order QCD corrections to triple collinear splitting functions	Sborlini, German
44.92	Precision PDFs and α_s at the LHeC	Armesto Perez, Nestor
44.93	Charm and bottom masses from QCD sum rules	Mateu Barreda, Vicent
44.94	Exclusive $\chi_{bJ}(1P)$ and $\Upsilon(1,2S)$ decays at Belle	Kwon, Youngjoon
44.95	Measurement of D* photoproduction at three different centre-of-mass energies at HERA	Wing, Matthew
44.96	Deep inelastic cross-section measurements at large y with the ZEUS detector at HERA	Wing, Matthew
44.97	Further studies of the photoproduction of isolated photons with a jet at HERA	Wing, Matthew
44.98	Measurement of neutral current ep cross sections at high Bjorken x with the ZEUS detector	Wing, Matthew
44.99	Automated NLO QCD Corrections with WHIZARD	Weiss, Christian
44.100	Productions of charmed mesons and charmonium states in B decays at Belle	Kwon, Youngjoon
44.101	Measurement of jet production cross sections with the ATLAS detector	Read, Alexander Lincoln
44.102	Unpolarized TMD Quark Distribution Functions at Low Q^2 Scales	Nematollahi, Hoda
44.103	Lowest energy configurations for Near-BPS Skyrme Models	Marleau, Luc
44.104	Light hadron spectroscopy at BESIII	BESIII Collaboration
44.105	Measurement of hadron form factor of pair production cross section in e^+e^- annihilations at BESIII	BESIII Collaboration
44.106	Improving Constraints on Proton Structure using CMS measurements	Meyer, Arnd
44.107	Baryons as polarimeters for ATLAS and CMS	Kats, Yevgeny
44.108	Differences of masses and widths of the charged and neutral $\rho(770)$, $\rho(1450)$, $\rho(1700)$ mesons from data on electro-weak processes	Bartos, Erik
44.109	Gluon and heavy quark perturbative QCD fragmentation functions considering the effects of heavy quarkonium mass	Moosavi Nejad, Seyed Mohammad
44.110	On relevance of triple gluon fusion in J/ψ hadroproduction	Sadzikowski, Mariusz
44.111	Glueball decay patterns in top-down holographic QCD	Rebhan, Anton
44.112	Spin structure of the "forward" nucleon charge-exchange reaction $n + p \to p + n$ and the deuteron charge-exchange breakup	Lyuboshitz, Valery
44.113	Evolution of TMD parton distributions up to NNLO approximation.	Mirjalili, Abolfazl
44.114	Development of a cryogenic x-ray detector and an application for kaon mass measurement.	Phelan, Kevin
44.115	Search for exclusive photoproduction of $Z_c(3900)$ at COMPASS	Guskov, Alexey
44.116	Connecting amplitudes in different gauges beyond perturbation theory: a canonical flow approach	Quadri, Andrea

44.117	Selected decays of heavy hadrons in Covariant quark model	Liptaj, Andrej
44.118	Quark ACM with topologically generated gluon mass	Dutta Choudhury, Ishita

Top and Electroweak Physics

44.119	Preservation of the D0 Wmass measurement to incorporate future PDF and physics models	Cuth, Jakub
44.120	Measurement of the differential top quark pair production cross section in pp collisions at 8 TeV	Aldaya Martin, Maria
44.121	Measurement of the inclusive top pair production cross section using Multivariate analysis techniques	Franc, Jiri
44.122	Measurement of the top quark polarization with the D0 detector	Augsten, Kamil
44.123	Search for FCNC single top-quark production at 8 TeV with the ATLAS detector	Arslan, Ozan
44.124	Search for s-channel single top-quark production in pp collisions	Merola, Mario

Detector R&D and Data Handling

44.125	Performance of the CMS Jets and Missing Transverse Energy trigger for the upgraded LHC	Zhang, Fengwangdong
44.126	Status of vertex and tracking detector R&D at CLIC	Firu, Elena
44.127	Module Production and Qualification for the Phase I Upgrade of the CMS Pixel Detector	Freund, Benedikt
44.128	A comprehensive PMT characterization system	Xia, Jingkai
44.129	Instrumentation of ILC detectors forward region	Schuwalow, Sergej
44.131	Studies on ageing effects of small-Strip Thin Gap Chamber for the ATLAS New Small Wheel Muon Upgrade	Gignac, Matthew
44.132	Luminosity measurement in the CMS experiment	Meyer, Arnd
44.133	The CMS Level-1 Tau algorithm for the LHC Run II	Cadamuro, Luca
44.135	R&D for the upgrade of the CMS muon system	Abbrescia, Marcello
44.136	The ATLAS Upgrade Planar Pixel Sensors R&D Project: Status and Overview	Macchiolo, Anna
44.138	The Barrel TOF detector for PANDA	Steinschaden, Dominik
44.139	Performance of the ATLAS Calorimeters and Commissioning for LHC Run-2	Rossetti, Valerio
44.140	Recovery Time Measurements of Silicon Photomultipliers Using a Pulsed Laser	Gruber, Lukas
44.141	Future physics potential of CMS phase-II detector	Pozzobon, Nicola
44.142	Muon reconstruction performance in ATLAS at Run-II	Herde, Hannah Elizabeth
44.143	Electron and Photon performance in ATLAS at the LHC	Grevtsov, Kirill
44.144	Electron and Photon performance with the upgraded CMS detector for HL-LHC	Meyer, Arnd
44.145	The CMS inner tracker – transition from LHC Run I to Run II and first experience of Run II	Vormwald, Benedikt
44.146	The ATLAS Jet Trigger for LHC Run 2	Goncalves Dos Anjos, Nuno Miguel
44.147	Real-time Flavour Tagging Selection in ATLAS	Hetherly, Jeffrey Wayne
44.148	The Upgrade and Performance of the ATLAS Tau Triggers towards Run 2	Karamaoun, Andrzej Mikolaj
44.149	The Upgrade of the ATLAS Electron and Photon Triggers towards LHC Run 2 and their Performance	Kahn, Sebastien
44.150	The ATLAS Transverse Momentum Trigger Evolution at the LHC towards Run 2	ATLAS Collaboration
44.151	Use of Fibre Bragg Grating sensors for Gas Electron Multiplier HEP detectors	Caponero, Michele
44.152	Upgrade of the ATLAS Muon Barrel Trigger for HL-LHC	Biondi, Silvia
44.153	Precision electromagnetic calorimetry at the energy frontier: The CMS ECAL at the LHC Run 2	Marzocchi, Badder
44.154	Implementation of Level-1 trigger algorithms on the upgraded CMS Global Trigger System	Arnold, Bernhard

44.155	Construction and Performance Studies of Large Resistive Micromegas Quadruplets	Lin, Tai-Hua
44.156	Improvements to ATLAS track reconstruction for Run-2	Oide, Hideyuki
44.157	b-tagging performance for ATLAS in LHC Run II	Calvet, Thomas
44.158	Dedicated Trigger for Highly Ionising Particles at ATLAS	Katre, Akshay
44.159	The ATLAS Muon Trigger Performance: Run 1 and Initial Run 2 Performance	Kasahara, Kota
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Abstracts

Talks of parallel sessions

1 – Astroparticle Physics, Cosmology, Gravitation

TH 23-07-15 09:00-13:00
HS33

1.1 | TH 23-07-15 09:00 | HS33

HESS-II: gamma-ray astronomy from tens of GeV to hundreds of TeV energies | S. Ohm[1] – [1]DESY

Since the commissioning of the fifth, large telescope in December 2012, H.E.S.S. II is the only array of Imaging Atmospheric Cherenkov Telescopes operating telescope of different sizes. Recent years have seen a tremendous effort in the design, implementation and optimisation of analysis techniques as well as improvements to the entire data acquisition scheme to allow for a very fast response to external triggers. With its excellent sensitivity, broad energy coverage, and fast reaction time, H.E.S.S. II provides an unprecedented view of the Universe at very high energies, in a multi-wavelength and multi-messenger approach. In this contribution we will present some highlights of the first data taken with H.E.S.S. II on key Galactic sources such as supernova remnants, gamma-ray binary systems and the Galactic Centre. Additionally, we will also show highlights from ten years of H.E.S.S. phase I observations like the legacy data release of the H.E.S.S. Galactic Plane Survey or the source gamma-ray source population found in the Large Magellanic Cloud.

1.2 | TH 23-07-15 09:30 | HS33

The HAWC Gamma Ray Observatory | A. Sandoval[1] – [1]Instituto de Fisica, UNAM

The High Altitude Water Cherenkov (HAWC) Gamma-Ray Observatory was completed this year at a 4100-meter site on the flank of the Sierra Negra volcano in Mexico. HAWC is a water Cherenkov ground array with the capability to distinguish 100 GeV - 100 TeV gamma rays from the hadronic cosmic-ray background. HAWC is uniquely suited to study extremely high energy cosmic-ray sources, search for regions of extended gamma-ray emission, and to identify transient phenomena. HAWC will play a key role in triggering multi-wavelength and multi-messenger studies of active galaxies, gamma-ray bursts, supernova remnants and pulsar wind nebulae. Observation of TeV photons also provide unique tests for a number of fundamental physics phenomena including dark matter annihilation and primordial black hole evaporation. Operation began mid-2013 with the partially-completed detector. Multi-TeV emission from the Galactic Plane is clearly seen in the first year of operation, confirming a number of known TeV sources, and a number of AGN have been observed. This talk will discuss the science of HAWC, summarize the status of the experiment, and highlight first results from analysis of the data.

1.3 | TH 23-07-15 09:45 | HS33

Investigation of the Galactic Magnetic Field using Ultra-High Energy Cosmic Rays | M. Erdmann[1], G. Mueller[2], M. Urban[3] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE), [2]III. Physikalisches Institut (B)-Rheinisch-Westfaelische Tech. H, [3]RWTH Aachen University

We present a new method of investigating the galactic magnetic field using public data of ultra-high energy cosmic rays. In comparisons of expected and measured arrival directions of the cosmic rays we evaluate the directional characteristics and magnitude of the field. Our analysis provides first experimental verification of the deflection of ultra-high cosmic rays in the galactic magnetic field. It also reveals directions with increased probability for sources of cosmic rays, and therefore opens new possibilities for investigating cosmic particle origin and acceleration.

1.4 | TH 23-07-15 10:00 | HS33

Measurement of Feynman-x Spectra of Photons and Neutrons in the Very Forward Direction in Deep-Inelastic Scattering at HERA | C. H1[1], K. Daum[2], S. Schmitt[3] – [1]DESY, [2]Wuppertal, U./Desy, [3]Deutsches Elektronen-Synchrotron (DE)

Measurements of normalised cross sections for the production of photons and neutrons at very small angles with respect to the proton beam direction in deep-inelastic ep scattering at HERA are presented as a function of the Feynman variable x_F and of the centre-of-mass energy of the virtual photon-proton system W. The data are taken with the H1 detector in the years 2006 and 2007 and correspond to an integrated luminosity of 131 pb^{-1}. The measurement is restricted to photons and neutrons in the pseudorapidity range $\eta > 7.9$ and covers the range of negative four momentum transfer squared at the positron vertex $6 < Q^2 < 100$ GeV², of inelasticity $0.05 < y < 0.6$ and of $70 < W < 245$ GeV. To test the Feynman scaling hypothesis the W dependence of the x_F dependent cross sections is investigated. Predictions of deep-inelastic scattering models and of models for hadronic interactions of high energy cosmic rays are compared to the measured cross sections.

1.5 | TH 23-07-15 10:15 | HS33

Observation of a knee in the cosmic ray p+He energy spectrum below 1 PeV with the ARGO-YBJ experiment | A. Surdo[1], A. D'amone[2], I. De Mitri[2] – [1]INFN - Sezione di Lecce (IT), [2]Università del Salento and INFN - Lecce (IT)

The CR spectrum has been studied by the ARGO-YBJ experiment in a wide energy range (TeV –> PeV). This study is par-

ticularly interesting since it allows a better understanding of the so called "knee" of the energy spectrum and its origin, and also provides a powerful cross-check among very different experimental techniques. The unique detector features (full coverage, time resolution, large dynamic range) and location (4300 m above sea level) allowed both lowering the energy threshold down to the region covered by direct measurements and reaching the all-particle spectrum knee. In addition, the possibility of a detailed study of the particle distribution in the first few meters from the shower core provided a new and efficient way of selecting events initiated by light mass primaries (p and He nuclei) and could give new inputs, in the very forward region, to the hadronic interaction models currently used for the highest energies CR studies. The all-particle spectrum (measured in the range 100 TeV - 10 PeV) is in good agreement with theoretical models and previous measurements, thus validating the selection and reconstruction procedures. The light-component (p + He) spectrum, measured in the range 30 TeV - 5 PeV, while being consistent with highest energy direct measurements, shows a clear indication of a bending below 1 PeV. This is in agreement with other independent analysis of ARGO-YBJ data and provides new important inputs to acceleration models for galactic cosmic rays.

1.6 | TH 23-07-15 10:30 | HS33

High-energy interactions at the Pierre Auger Observatory | R. Da Silva Conceicao[1] – [1]LIP Laboratorio de Instrumentacao e Fisica Experimental de Part

The interaction of Ultra High Energy Cosmic Rays with the atoms of the atmosphere can occur at center-of-mass energies that surpass the 100 TeV, while present man made accelerators go up to 13 TeV. Therefore it provides a unique opportunity to explore hadronic interactions at the highest energies. However, the extraction of hadronic interaction properties from the Extensive Air Showers (EAS) characteristics, which are induced by the UHECR, is intrinsically related to the nature of the primary cosmic ray. As such, to break the degeneracy between hadronic interactions and primary mass composition, a consistent description of the shower observables must be achieved. Such detailed studies have been conducted in the last years at the Pierre Auger Observatory, the largest UHECRs detector in the world. It combines two complementary techniques to measure the EAS characteristics. In this talk, we will present the latest measurements on shower observables, both on the electromagnetic and muonic shower components, and its interpretation in terms of the primary mass composition. Its impact in regarding particle physics will be discussed, in particular the measurement of the proton-air cross section. Finally, through the joint analysis of the different measurements, it will be shown that none of the post-LHC high-energy hadronic interaction models can satisfactorily describe the data.

1.7 | TH 23-07-15 10:45 | HS33

Global dark matter limits from a combined analysis of MAGIC and Fermi-LAT data | J. Rico[1], J. Aleksic[1], M. Wood[2], A. Drlica-Wagner[3] – [1]IFAE, [2]SLAC, [3]FNAL

Gamma-ray instruments like the Fermi-LAT (in space) and the MAGIC telescopes (on the ground) are sensitive to overlapping and complementary ranges of dark matter particle mass, and have dedicated programs to look for dark matter signals coming from the Galactic Center, galaxy clusters, dwarf satellite galaxies and others. The universality of dark matter properties allows the combination of data from different experiments and/or observational targets into a global and sensitive-optimized search. For a given dark matter particle model, a joint likelihood function can be written as the product of the particular likelihood functions for each of the measurements/instruments – the advantage of such an approach is that the details of each experiment do not need to be combined or averaged. We have implemented this analysis framework and applied it to the MAGIC and Fermi-LAT observations of dwarf satellite galaxies. Here we present the analysis method and the obtained results: the most constraining bounds to dark matter properties for masses between 10 GeV and 100 TeV from dwarf galaxies observations. The approach is completely generic and could be used in the future to merge our results with those from other instruments (H.E.S.S., VERITAS, CTA and/or HAWK), sensitive to the same region of the dark matter parameter space.

1.8 | TH 23-07-15 11:30 | HS33

Status of the Advanced Virgo project and near term perspectives | N. Arnaud[1] – [1]LAL (CNRS-IN2P3)

Since fall 2011 the Virgo collaboration has undertaken a major detector upgrade aiming to make the sensitivity of the Advanced Virgo gravitational-wave interferometer a factor 10 better than that of initial Virgo. 2015 should mark the completion of the Advanced Virgo construction and the restart of an intense commissioning activity. This talk will present the status and outlook of Advanced Virgo.

1.9 | TH 23-07-15 12:00 | HS33

Neutrons test Gravity, Dark Matter and Dark Energy: Snapshots of a Quantum Bouncing Ball & Gravity Resonance Spectroscopy | T. Jenke[1], H. Abele[2], G. Cronenberg[2], M. Thalhammer[2], T. Rechberger[2] – [1]Atominstitut TU Wien, [2]TU Wien

This talk focuses on two different kinds of gravity tests at short distances using ultracold neutrons within the qBounce experiments. One class of gravity experiments focuses on the realization of a Quantum Bouncing Ball, i.e. a measurement of the time evolution of a neutron bouncing above a horizontal plane. In 2014, the spatial probability distribution of this Schrödinger wave packet has been measured for different observation times with a spatial resolution of about 1.5μm. Here, we illustrate the role of interference weaving the quantum carpet of several quantum states. The second type of experiments deals with the control and understanding of a gravitationally interacting elementary quantum system using the techniques of resonance

spectroscopy. It offers a new way of looking at gravitation based on quantum interference. The ultra-cold neutron reflects from a mirror in well-defined quantum states in the gravity potential of the earth allowing to apply the concept of gravity resonance spectroscopy (GRS). GRS relies on frequency measurements, which provide a spectacular sensitivity. We present limits on dark energy and dark matter candidates.

1.10 | TH 23-07-15 12:15 | HS33

Dark matter, neutrino masses and LFV processes in the scotogenic model | C. Yaguna[1], A. Vicente[2] – [1]MPIK, Heidelberg, [2]Université de Liège

We study the impact that future lepton flavor violating experiments will have on the viable parameter space of the scotogenic model. Within this model, the dark matter particle is assumed to be the lightest singlet fermion and two cases are considered depending on how its relic density is obtained: via self-annihilations or via coannihilations with the scalars. For each case, a scan over the parameter space of the model is used to obtain a large sample of viable points, which we subsequently analyze. We find that future lepton flavor violating experiments, in particular those searching for μ–>3e and μ-e conversion in nuclei, will probe the parameter space of the scotogenic model in a significant way. They may exclude a large fraction of the models where the dark matter density is determined by coannihilations, and could rule out all the models where it is determined by annihilations.

1.11 | TH 23-07-15 12:30 | HS33

Prospects for SUSY dark matter after the LHC Run 1 | E. Bagnaschi[1] – [1]DESY Hamburg

We present the prospects for searches for dark matter after Run 1 of the LHC, based on a global fit in the phenomenological MSSM with 10 parameters (pMSSM10). Particular care has been taken regarding the implementation of the most important limits obtained from the SUSY searches at Run 1 of the LHC. The information from the observed Higgs signal, limits from Higgs searches, as well as constraints from electroweak precision data, flavour physics, cosmological data and direct searches for dark matter are also taken into account. The prospects for dark matter searches at the upcoming Run 2 of the LHC, at a future e^+e^- collider, and at direct detection experiments. The talk will be based on arXiv:1504.03260 and updates thereof. This talk is submitted on behalf of the MasterCode collaboration. It is not clear yet who will actually give the talk.

2 – Flavour Physics and Fundamental Symmetries

TH 23-07-15 09:00-13:00
HS41

2.1 | TH 23-07-15 09:00 | HS41

Electroweak penguins at LHCb | S. Coquereau[1] – [1]Centre National de la Recherche Scientifique (FR)

Electroweak penguin b-hadron and c-hadron decays are very sensitive to physics beyond the Standard Model. Recent LHCb measurements have shown indications of large unexpected asymmetries in B–>K*$\mu\mu$ and hints of lepton universality violation. Latest results involving new decay modes are presented.

2.2 | TH 23-07-15 09:15 | HS41

Angular analysis of the decay B0 –> K*0 mu mu with CMS | M. Dinardo[1] – [1]INFN Milano-Bicocca

The Flavour Changing Neutral Current decay, B0 -> K*0 mu+mu-, is very sensitive to New Physics through its observables like A_FB (muon forward backward asymmetry), F_L (longitudinal polarisation of K*), and differential branching fraction. So far, these parameters are consistent with the Standard Model prediction. We will report the recent results from CMS on these parameters using the 20 fb∧-1 data collected during 2012.

2.3 | TH 23-07-15 09:30 | HS41

B to K* l+l- decays in the Standard Model: a theoretical reappraisal | A. Paul[1] – [1]INFN, Sezione di Roma

The rare semileptonic B_d –> K⋆μ+μ- decay has been extensively studied within the Standard Model (SM) and beyond. In the last two releases, measurements provided by the LHCb experiment suggested a discrepancy found between the theoretical SM prediction and the experimental value of the angular observable P5 at low q∧2. We critically reassess the theoretical uncertainties in the Standard Model calculation of the B_d –> K⋆l+l- angular observables, focusing on this kinematic region. We point out that even optimized observables are affected by sizable uncertainties coming from several sources. First, departures from the infinite mass limit are numerically sizable and cannot be reduced by redefining the soft functions. Second, hadronic contributions generated by current-current operators with charm are difficult to estimate, especially for q∧2 ≈ 4 mc∧2. Finally, charmonium contributions are not power suppressed and are expected to increase the uncertainties close to the hadronic resonances. Taking these uncertainties into account, we perform a detailed numerical analysis and present both predictions and fit results obtained using different sets of data, showing agreement between theory and experiment.

2.4 | TH 23-07-15 09:45 | HS41

Violation of lepton flavour universality in composite Higgs models | P. Stangl[1], C. Niehoff[1], D. Straub[1] – [1]Excellence Cluster Universe, Munich

We investigate whether the 2.6σ deviation from lepton flavour universality in $B^+ \to K^+\ell^+\ell^-$ decays recently observed at the LHCb experiment can be explained in minimal composite Higgs models. We show that a visible departure from universality is indeed possible if left-handed muons have a sizable degree of compositeness. Constraints from Z-pole observables are avoided by a custodial protection of the muon coupling.

2.5 | TH 23-07-15 10:00 | HS41

A class of Z' models with non-universal couplings and protected flavor-changing interactions | J. Fuentes-Martin[1], A. Celis[2], M. Jung[3], H. Serodio[4] – [1]IFIC, Universitat de València-CSIC, [2]Ludwig-Maximilians-Universität München, [3]TUM Institute for Advanced Study, [4]Korea Advanced Institute of Science and Technology

Motivated by the $b \to s\ell^+\ell^-$ anomalies recently reported by the LHCb collaboration, I will present a class of flavored U(1)$'$ gauge extensions of the Standard Model that naturally accommodate them and present a rich phenomenology. This class of models is characterized by the presence of tree-level flavor-changing Z' couplings in the down-quark sector, protected by the off-diagonal quark-mixing matrix elements. Anomaly cancellation fixes the extension of the symmetry to the lepton sector in a very specific way, giving rise to flavor-conserving family-non-universal Z' couplings. The fermion sector of these models is the same as in the Standard Model while the scalar sector is extended with an extra Higgs doublet and a scalar singlet. These models will be tested in the next run of LHC and present specific correlations in certain flavor observables that allow to clearly discriminate among them and with other new physics signals.

2.6 | TH 23-07-15 10:15 | HS41

Leptonic and Radiative B meson decays at Belle | P. Chang[1], Y. Kwon[2] – [1]National Taiwan University, [2]Yonsei University

We will present new results on leptonic and radiative leptonic decays. Purely leptonic B meson decays, $B \to \ell\nu$, are helicity-suppressed in the Standard Model (SM), and while more challenging for the extraction of the CKM matrix element $|V_{ub}|$, they are excellent probes of models beyond the SM. The decay $B \to \ell\nu\gamma$ is not affected by this suppression and gives access to λ_B, a parameter used to describe charmless hadronic B decays into two mesons in the QCD factorization (QCDF) scheme. We also report new results on exclusive radiative decays, $B_s \to \gamma\gamma$, $B_s \to \phi\gamma$, and $B_d \to \phi\gamma$, which proceed via flavour-changing-neutral-current transitions $b \to s\gamma\gamma$, $b \to s\gamma$ and $b \to d\gamma$, respectively. These modes are highly sensitive to new physics. All results presented are based on the full data sample accumulated by the Belle experiment at the KEKB asymmetric energy e+e- collider at KEK, Japan.

2.7 | TH 23-07-15 11:30 | HS41

Measurements of the photon polarisation in b–>γs decays | P. Ruiz Valls[1] – [1]Instituto de Fisica Corpuscular (ES)

LHCb recently reported the first observation of a non-zero photon polarisation in b–>γs decays. The interpretation of this result in terms of potential right-handed currents is still open. New results from the decays Bs–>$\phi\gamma$ and B0–>K0ee are presented.

2.8 | TH 23-07-15 11:45 | HS41

Charmless B decays | B. Sanmartin Sedes[1] – [1]Universidade de Santiago de Compostela (ES)

Charmless B meson decays proceed via suppressed b–>u tree and b–>s,d penguin diagrams and are thus sensitive to New Physics. We present recent results on angular analyses of B–>VV decays and searches for very suppressed decay modes.

2.9 | TH 23-07-15 12:00 | HS41

Origin of a large CP asymmetry in B+- –> K+- K+ K- decays | L. Lesniak[1], P. Zenczykowski[1] – [1]Henryk Niewodniczanski Institute of Nuclear Physics PAS, Krakow, Poland

Large CP-violating asymmetry effects in the B+- –> K+- K+ K- decays have been predicted in the QCD factorization model [1]. The model includes strong K+ K- final-state long-distance interactions in the S-, P-, and also (in the recent analysis) D-wave two-body states. The S-wave two-body unitarity conditions involve interchannel couplings of the kaon-kaon states with the intermediate states of two pions and four pions. As a result the pion-pion to kaon-kaon rescattering effects are included in the model. It is shown how the weak phase differences together with the existence of two different strong phases of the S-wave decay amplitudes (related to the phases of the kaon scalar strange and non-strange form factors) contribute to the CP-asymmetry in question. The theoretical results are compared with recent experimental data of the LHCb and BABAR Collaborations [2]. References: [1] A. Furman, R. Kaminski, L. Lesniak, P. Zenczykowski, Phys. Lett. B 699 (2011) 102. [2] L. Lesniak, P. Zenczykowski, Phys. Lett. B 737 (2014) 201.

2.10 | TH 23-07-15 12:15 | HS41

Investigation of 3-body Hadronic decays at Belle | M. Wang[1], Y. Kwon[2] – [1]National Taiwan Univ., [2]Yonsei University

We present recent measurements of B mesons to 3-body hadronic final states. These measurements test factorization predictions, search for final-state interactions and measure strong interaction amplitudes using Dalitz-plot analysis techniques. The results employ the full Belle dataset and are our final measurements for these modes.

2.11 | TH 23-07-15 12:30 | HS41

Charmless Two-body Baryonic $B_{u,d,s}$ Decays | C. Chua, H. Cheng[1] – [1]Academia Sinica

We study charmless two-body baryonic B decays using the topological amplitude approach. We extend a previous work to include all ground state octet and decuplet final states with full topological amplitudes. Relations on rates and CP asymmetries are obtained. With the long awaited $\overline{B}^0 \to p\bar{p}$ data, we can finally extract information on the topological amplitudes and predict rates of other modes. We point out some modes that will cascadely decay to all charged final states and have large decay rates. We find that the $\overline{B}^0 \to p\bar{p}$ mode is the most accessible one among octet-anti-octet final states in the $\Delta S = 0$ transition. The predicted $\overline{B}^0_s \to p\bar{p}$ rate is several order smaller than the present experimental result. The analysis presented in this work can be systematically improved when more measurements on decay rates become available. The smallness of the $\overline{B}^0 \to p\bar{p}$ rate is studied as well. We point out that for a given tree operator O_i, the contribution from its Fiertz transformed operator, tends to cancel the internal W-emission amplitude induced from O_i. This explains why most previous model calculations predicted too large rates as the above consideration was not taken into account.

2.12 | TH 23-07-15 12:45 | HS41

Searches for $B^0 \to \eta\pi^0$ and $B_s \to K^0K^0$ at Belle | Y. Kwon[1], M. Chang[2] – [1]Yonsei University, [2]FU JEN CATHOLIC UNIVERSITY

Charmless decays of B and B_s mesons provide nice testing ground for the Standard Model (SM) and excellent probes for physics beyond the SM. The Belle experiment has produced many results in this subject by analyzing the high-statistics event sample of B and B_s meson decays. We present the searches for the two-body charmless rare decays $B^0 \to \eta\pi^0$ and $B_s \to K^0K^0$ using the data samples of 694fb^{-1} and 121.4fb^{-1} collected at the $\Upsilon(4S)$ and $\Upsilon(5S)$ resonances, respectively, with the Belle detector at the KEKB e^+e^- asymmetric-energy collider.

3 – Higgs and New Physics

TH 23-07-15 09:00-13:00
Grosser Festsaal

3.1 | TH 23-07-15 09:00 | Grosser Festsaal

Update of the electroweak precision fit, interplay with Higgs-boson signal strengths and model-independent constraints on new physics | L. Reina[1], S. Mishima[2], M. Pierini[3], L. Silvestrini[2], M. Ciuchini[4], E. Franco[2] – [1]Florida State University (US), [2]INFN Rome, [3]California Institute of Technology (US), [4]Universita di Roma Tre and INFN

The available information on the properties of the observed Higgs signal is assessed in view of the current experimental accuracy and the employed theoretical assumptions. Possible interpretations of the observed signal in scenarios of physics beyond the Standard Model are discussed in view of their phenomenological implications, and the experimental sensitivity for discriminating between different models is investigated. In extended Higgs sectors it is often possible to interpret the observed signal not only in terms of the lightest but also in terms of the second-lightest state of the Higgs sector. The latter scenarios generically predict a light Higgs boson with heavily suppressed couplings to gauge bosons. The current limits and future prospects for accessing such scenarios will be discussed. We also present results of a bayesian fit to the Wilson coefficients of the Standard Model gauge invariant dimension-6 operators involving one or more Higgs fields.

3.2 | TH 23-07-15 09:15 | Grosser Festsaal

The Standard Model as an Effective Field Theory | T. You[1], E. John[2], Q. Jeremie[1], D. Aleksandra[1] – [1]King's College London, [2]CERN

Particle physics in the last century can be described as a series of effective theories, each predicting its own range of validity beyond which a more fundamental theory must take over. This program culminated in the Standard Model (SM), with all its constituent particles now experimentally established following the 2012 discovery of a Higgs boson. The SM is a renormalizable theory valid to arbitrarily high scales but there is evidence new degrees of freedom must exist. If this new physics is decoupled at higher energies, as suggested by null experimental searches so far, then the SM must also be considered as an effective field theory with higher-dimensional operators suppressed by a cut-off scale. The sensitivity to this scale is quantified by the effects of operator coefficients on Higgs physics, triple-gauge couplings, and electroweak precision tests. Limits on these Wilson coefficients can be translated to a particular UV theory by integrating out heavy particles. As an example we illustrate this for a stop in the MSSM using the path integral method to obtain the one-loop effective Lagrangian. A universality in the result facilitates matching to any other model.

3.3 | TH 23-07-15 09:40 | Grosser Festsaal

What we have learned about the Higgs boson from the bosonic decay channels and more inclusive combinations of data | L. Yuan[1], J. Katzy[2] – [1]Kobe University (JP), [2]DESY, HAMBURG

This talk will review the status of what has been learned from LHC run-1 about the properties of the observed Higgs boson mostly from the bosonic decay channels, but also from latest/final inclusive analyses of the coupling structure. As far as considered relevant updates on the analyses in individual bosonic decay channels can be touched, but these discussions should be concise. The focus of the talk should be the measurement of the Higgs boson mass (with focus on the combination of ATLAS and CMS), the status of the spin and CP properties and the analysis of the coupling structure. The talk is aimed to present the

final LHC run-1 results from ATLAS and CMS.

3.4 | TH 23-07-15 10:10 | Grosser Festsaal

Off-shell effects in Higgs processes at a linear collider and the LHC | G. Weiglein[1], G. Moortgat-Pick[2], S. Liebler[3] – [1]Deutsches Elektronen-Synchrotron (DE), [2]University of Hamburg / Desy, [3]DESY

We discuss the importance of off-shell Higgs contributions for a SM-like Higgs boson at a linear collider and the LHC. Possible constraints on the total Higgs width are investigated, the involved theoretical assumptions are analysed, and it is shown that the interference between signal and background limits the sensitivity for a SM-like width. Off-shell contributions and signal-background interference can potentially enhance the sensitivity to an additional heavier Higgs boson with suppressed couplings to gauge bosons. This issue is investigated in the context of a Two-Higgs-Doublet model.

3.5 | TH 23-07-15 10:25 | Grosser Festsaal

Constraining new physics in the Higgs sector using differential and fiducial cross section measurements from the LHC | F. Bernlochner[1], D. Gillberg[2], B. Kowalewski[3], H. Schulz[4], M. Queitsch-Maitland[5], A. Pilkington[6], Y. Huang[7] – [1]Universitaet Bonn (DE), [2]CERN, [3]University of Victoria (CA), [4]Humboldt-Universitaet zu Berlin (DE), [5]University of Manchester (GB), [6]University Of Manchester, [7]Deutsches Elektronen-Synchrotron (DE)

In 2014 ATLAS published a first set of $H \to \gamma\gamma$ and $H \to 4\ell$ differential fiducial cross sections and CMS is finalizing similar results. These measurements are carried out close to the experimental fiducial region and have minimal underlying model dependencies and can be used to constrain beyond the Standard Model physics scenarios coupling to the Higgs sector. Using these published measurements and associated covariances, we characterize possible deviations from the SM with the so-called kappa framework and compare the sensitivity to the official ATLAS results. We then present limits on a range of Spin 2 Higgs impostor scenarios and carry out a reinterpretation of the measured cross sections as production mechanism coupling strengths.

3.6 | TH 23-07-15 10:40 | Grosser Festsaal

Effects of Beyond Standard Model physics on Higgs' p_T spectra in Effective Field Theory approach | A. Ilnicka[1], M. Wiesemann[2], M. Spira[3], M. Grazzini[2] – [1]University of Warsaw, [2]Universitaet Zuerich (CH), [3]Paul Scherrer Institut (CH)

The first run of the LHC has successfully discovered a Higgs boson, however no signs of New Physics were found. This may suggest that the New Physics is beyond reach of current experiments, and may be accessed just by measuring small deviations from SM predictions. Effective Field Theory (EFT) offers a consistent bottom-up approach to parametrise such deviations. In our work we apply the EFT to shed light on the effects of high-scale BSM physics on the Higgs' p_T spectrum, which will become important for the experimental measurements. The SM predictions for Higgs boson production were augmented by three new dimension 6 operators, leading to the modification of the top and bottom Yukawa coupling, and the ggH point-like coupling. We present p_T spectra including these operators at NLO+NLL level and show how BSM effective operators affect them.

3.7 | TH 23-07-15 11:30 | Grosser Festsaal

EFT-naturalness: an effective field theory analysis of Higgs naturalness | S. Bar-Shalom[1], A. Soni[2], J. Wudka[3] – [1]Technion, Israel, [2]BNL, USA, [3]UCR, USA

Assuming the presence of physics beyond the Standard Model with a characteristic scale $M \sim O(10\ TeV)$, we investigate the naturalness of the Higgs sector at scales below M using an effective field theory (EFT) approach. We obtain the leading 1-loop EFT contributions to the Higgs mass with a Wilsonian-like hard cutoff, and determine the constraints on the corresponding operator coefficients for these effects to alleviate the ***little hierarchy problem*** up to the scale of the effective action $\Lambda < M$; a condition we denote by ***"EFT-naturalness"***. We also discuss the types of physics that can lead to ***EFT-naturalness*** and obtain the current experimental constraints on the relevant operator coefficients; it is shown that these types of new physics are best probed in vector-boson and multiple-Higgs production.

3.8 | TH 23-07-15 11:45 | Grosser Festsaal

Differential distributions of Higgs boson in the two-photon channel at the LHC within k_t-factorization approach | A. Szczurek[1], M. Luszczak[2], R. Maciula[3] – [1]Institute of Nuclear Physics, [2]University of Rzeszow, [3]Institute of Nuclear Physics PAN

We present differential cross sections for Higgs boson and/or two-photon production from (virtual) Higgs boson within the formalism of k_t-factorization. The off-shell $g^*g^* \to H$ matrix elements are used. We compare results obtained with infinite top fermion (quark) mass and with finite mass taken into account. The latter effect is rather small. We compare results with different unintegrated gluon distributions. Two methods are used. In the first method first Higgs boson is produced in the $2 \to 1$ $gg \to H$ k_t-factorization approach and then isotropic decay with the Standard Model branching fraction is performed. In the second method we calculate directly two photons coupled to the virtual Higgs boson. The results of the two methods are compared and differences are discussed. The leading order $gg \to H$ contribution is rather small compared to the ATLAS experimental data for all unintegrated gluon distributions. We include also higher-order contribution $gg \to H(\to \gamma\gamma)g$, $gg \to gHg$ and the contribution of the W^+W^- and Z^0Z^0. The $gg \to Hg$ mechanism gives similar cross section as the $gg \to H$ mechanism. We argue that there is almost no double counting when adding $gg \to H$ and $gg \to Hg$ contributions due to different topology of

Feynman diagrams. The final sum is comparable with the ATLAS two-photon data. We discuss related uncertainties.

3.9 | TH 23-07-15 12:00 | Grosser Festsaal
What we have learned about the Higgs boson coupling to fermions (in decay and production) | A. Gilbert[1], A. Meyer[2] – [1]KIT - Karlsruhe Institute of Technology (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
This talk will review the status of what has been learned from LHC run-1 about the coupling of the observed Higgs boson to fermions. The presentation will cover the couplings from the analyses of final states and initial states like production in association with top quark pairs or single top quarks. It may also highlight the role of the fermion analyses in latest coupling fits. The talk is aimed to present the final LHC run-1 results from ATLAS and CMS.

3.10 | TH 23-07-15 12:30 | Grosser Festsaal
Search for Higgs bosons beyond the Standard Model in b-quark final states at CMS | R. Mankel[1], A. Meyer[2] – [1]Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
While the existence of a Higgs boson with a mass near 125 GeV has been clearly established, the detailed structure of the entire Higgs sector is yet unclear. Besides the Standard Model interpretation, well-motivated models with extended Higgs sectors are being considered. Such options include the minimal and next-to-minimal supersymmetric extensions (MSSM and NMSSM) of the Standard Model, as well as more generic Two-Higgs Doublet models (2HDM). Direct searches for additional Higgs bosons in b-quark final states are a promising way to address this question. The talk presents recent results from the CMS experiment.

3.11 | TH 23-07-15 12:45 | Grosser Festsaal
Searches for Higgs boson like high mass resonances in the bosonic decay channels with ATLAS and CMS | F. Lo Sterzo[1], J. Katzy[2] – [1]Academia Sinica (TW), [2]DESY, HAMBURG
In this talk the searches of the ATLAS and CMS experiment for additional Higgs boson like resonances in the WW, ZZ and $\gamma\gamma$ final state, for high masses beyond 125 GeV are summarized. The searches are based on the full LHC run-1 dataset of each experiment. Upper limits are presented in the context of an electro-weak singlet extension of the standard model.

4 – QCD and Hadronic Physics

TH 23-07-15 09:00-13:00
HS32

4.1 | TH 23-07-15 09:00 | HS32
Quarkonium and heavy flavour production in Run-1 and first results with 13 TeV data at CMS | I. Kratschmer[1], A. Meyer[2] – [1]Austrian Academy of Sciences (AT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
This talk presents the CMS quarkonium production results in pp collisions, placing emphasis on the most recent measurements, which include the S-wave Psi(nS) and Y(nS) cross sections up to transverse momenta exceeding 100 GeV with the Run-1 dataset, and reports on the prospects for B physics measurements with high statistics data at CMS, and presents preliminary results obtained with 13 TeV data.

4.2 | TH 23-07-15 09:15 | HS32
Quarkonium and heavy flavour production measurements at ATLAS | S. Leontsinis[1], J. Katzy[2] – [1]National Technical Univ. of Athens (GR), [2]DESY, HAMBURG
We present a large number of detailed measurements of the production of various open and hidden charm (D meson, J/psi, psi(2s), chi_c) states at the ATLAS experiment at centre- of-mass energies of 2.76 TeV, 7 TeV, and 8 TeV. The total charm production cross-section at the LHC is also determined. These measurements extend in reach and precision beyond those currently available, and we compare these measurements to a variety of the latest theoretical predictions. We also present new measurements of the associated production of quarkonium with a vector boson or an additional quarkonium state using the ATLAS Run-1 dataset. These rare processes provide new insight into QCD models of quarkonium production, but also provide new opportunities to study double parton scattering, including cross-section measurements in single and double parton scattering dominated regimes and a precise assessment of the sigma_eff parameter governing the effective spatial area of parton-parton interactions at a variety of energy scales.

4.3 | TH 23-07-15 09:30 | HS32
J/psi polarization measurements in p+p collisions at sqrts = 200 and 500 GeV with the STAR experiment | B. Trzeciak[1] – [1]Czech Technical University in Prague
Despite extensive studies, the J/ψ production mechanism in hadron collisions is not yet exactly known. For many years, mostly J/ψ differential cross-section measurements have been used to test different J/ψ production models. While many models can reasonably well describe the experimental data on the J/ψ cross-section in $p + p$ collisions, they have different predictions for the J/ψ polarization. Therefore, measurements of the J/ψ polarization may allow to discriminate among different models and provide new insight into the J/ψ production mechanism. In this talk, measurements of J/ψ polarization in $p + p$ collisions at $\sqrt{s}$ = 200 and 500 GeV via the dielectron decay channel at mid-rapidity with the STAR experiment will be discussed. At $\sqrt{s}$

= 200 GeV the polarization parameter, λ_θ, related to the polar anisotropy was obtained in the helicity frame as a function of transverse momentum, $2 < p_T < 6$ GeV/c and compared to different model predictions. A new J/ψ polarization measurement at $\sqrt{s}$ = 500 GeV has extended the previous analysis to a wide transverse momentum range of $5 < p_T < 16$ GeV/c. Also, the polarization parameter related to the azimuthal anisotropy, λ_ϕ, was extracted in addition to λ_θ, in two reference frames: helicity and Collins-Soper. This allowed for the frame invariant parameter calculation vs p_T in these two frames.

4.4 | TH 23-07-15 09:45 | HS32

Recent results on exotic quarkonium states from Belle | A. Garmash[1], Y. Kwon[2] – [1]Princeton, [2]Yonsei University

Recent observations of charged charmonium-like states have opened an interesting landscape in the field of hadron spectroscopy. Continuing with its tradition, Belle recently observed a new charged charmonium-like state Zc(4200) and obtained an evidence for Zc(4430) –> J/$\psi\pi$+ in B –> J/$\psi\pi$K decays. Belle also found the first evidence for a new charged state Zc(4020)+ in their updated study of ISR decay, e+e- –> $\pi\pi\psi$(2S). Along with this, we also present the first observation of B0 –> X(3872)K+π- decay mode, the search for X(3872)/χc1(2P) in B+ –> χc1π+π-K+, and the search for X(3872)-like states, Zc(3900)0, X(3915) and Zc(4020)0 in the final states with ηc meson in the B decays. We also report recent results on the spectroscopy of charged and vector bottomonium-like states at Belle. These include new decay channels of the Zb bottomonium-like resonances in the dataset taken at the Υ(10860), studies of resonant substructure in three-body decays at the Υ(11020), and the observation of η transitions from Υ(4S) and Υ(10860) to Υ(1S,2S) and hb(1P,2P) states, as well as Υ(10860) –> η/π+π-Υ(1D). We also investigate the dependence of production rates on the center-of-mass energy in the regions of Υ(10860) and Υ(11020) for several types of b b events, both with bottomonia and open-b states, and consider the implications for the masses and widths of Υ(10860) and Υ(11020).

4.5 | TH 23-07-15 10:00 | HS32

Exotic and Charmonium(-like) states at BESIII | Y. Liang[1], BESIII Collaboration[2] – [1]Giessen University, [2]BESIII

The BESIII Experiment at the Beijing Electron Positron Collider (BEPCII) has accumulated the world's largest samples of e^+e^- collisions in the tau-charm region. From the collected samples, which include e^+e^- annihilations at J/psi, psi(2S), psi(3770) peaks and in the region from 4 GeV to 4.6 GeV, BESIII has produced many new results in the spectroscopy, transitions, and decays of charmonium(-like) states. This talk will review the current status of these analyses, which cover a wide range of topics from radiative and hadronic transitions among charmonium states, the productions and decays of the *XYZ* states. Especially, the analysis of these samples has resulted in a number of surprising discoveries of the electrically charged "Zc" structures, which, if resonant, cannot be accommodated in the traditional charm quark and anti-charm quark picture of charmonium. In this talk, we will review the current status of the analyses of the Zc structures, as well as a number of other interesting features in the new BESIII data samples.

4.6 | TH 23-07-15 10:15 | HS32

Pentaquarks and Tetraquarks at LHCb | S. Stone[1] – [1]Syracuse University (US)

Observations of exotic structures in the $J/\psi p$ channel, that we refer to as pentaquark-charmonium states, in $\Lambda_b^0 \to J/\psi p K^-$ decays are presented. The data sample corresponds to an integrated luminosity of 3 fb^{-1} acquired with the LHCb detector from 7 and 8≈TeV pp collisions. An amplitude analysis is performed on the three-body final state that reproduces all the angular and two-body mass distributions in the decay chain. To obtain a satisfactory fit of the structures seen in the $J/\psi p$ mass spectrum, it is necessary to include two Breit-Wigner amplitudes that each describe a resonant state. We also discuss the related amplitude analysis that measured unambiguously the spin-parity of the $Z_c(4430)^+$ state that decays into $\psi'\pi^+$

4.7 | TH 23-07-15 10:30 | HS32

Measurements of production and decay of exotic mesons at the ATLAS and CMS experiments | J. Walder[1], A. Meyer[2], A. Read[3] – [1]Lancaster University (GB), [2]Rheinisch-Westfaelische Tech. Hoch. (DE), [3]University of Oslo (NO)

Hadronic spectroscopy has experienced a renaissance in the last decade thanks to experiments at B-factories and Tevatron and recently at the LHC. A wide zoology of quarkonium-like states still needs to be understood within a possibly consistent framework that the LHC experiments are now contributing to enrich. The latest results on the production and decay properties of exotic mesons in the charm and beauty sectors at ATLAS and CMS are presented.

4.8 | TH 23-07-15 10:45 | HS32

Measurement of low pT D+ meson production cross section at CDF | L. Marchese[1], L. Ristori[1], A. Appel[1], M. Mussini[2] – [1]Fermilab, [2]INFN - BOLOGNA

We present a measurement of the production cross section of the D+ mesons in proton-antiproton collisions at 1.96 TeV center-of-mass energy, using the full data set collected by the CDF experiment at the Tevatron collider during Run II. The measurement is performed in a yet unexplored low transverse momentum range, down to 1.5 GeV/c, using events collected with the "zero bias" and "minimum bias" triggers. The actual QCD theory cannot predict the behavior of the strong interactions in the low transferred 4-momentum region because in these kinematic conditions the strong coupling constant is of the order of the unity. Thus, a perturbative expansion is no longer permitted. At present, several phenomenological models have been proposed, but they are able to describe only few aspects of the observed physical quantities and not their whole complexity. Experimental

results in this conditions are then crucial to predict new QCD models. The measurement of the differential cross section at low pT plays an important role in this context allowing to refine the actual knowledge. After the shutdown of the Tevatron, this is very likely going to remain a unique measurement because of the initial state (proton-antiproton) and center-of-mass energy.

4.9 | TH 23-07-15 11:30 | HS32

Measurement of Vector boson + heavy flavor jet production rates by D0 | D. Price[1] – [1]University of Manchester (GB)

We present recent results on heavy flavor jet production in association with weak vector bosons using proton-antiproton collision data collected with the D0 detector at center of mass energy of 1.96 TeV. Studies of these processes provide tests of perturbative QCD predictions and non-perturbative effects. They are also important backgrounds to many precision SM measurements as well as searches for new physics. Measurements of W+b/c-jet production cross-sections and the ratio of cross-sections, σ(Z+2b-jet)/σ(Z+2jets), are presented.

4.10 | TH 23-07-15 11:45 | HS32

Heavy flavour production in the forward acceptance at the LHC | I. Polyakov[1] – [1]ITEP Institute for Theoretical and Experimental Physics (RU)

Its forward acceptance puts the LHCb in a unique position at the LHC to measure QCD phenomena at large rapidities and low transverse momenta, where theoretical models often fail to describe the data accurately. We present new studies of the production of the meson of the Λb baryon.

4.11 | TH 23-07-15 12:00 | HS32

Measurements of open heavy-flavour production in pp collisions with ALICE at the LHC | G. Luparello[1] – [1]Universita e INFN, Trieste (IT)

Heavy quarks, i.e. charm and beauty, are produced in hard parton scatterings in the initial stages of hadronic collisions. The study of their production in pp collisions at LHC energies provides, therefore, a test of perturbative QCD calculations at the highest collision energies available. In addition to the heavy-flavour production cross sections, more differential measurements provide further information about the particle-production mechanisms. In particular, the study of heavy-flavour production as a function of charged-particle multiplicity probes the interrelation of hard and soft mechanisms in particle production and the role of multi-parton interactions in charm production. The measurement of angular correlations between heavy-flavour hadrons and charged particles provides information on the heavy-quark fragmentation. Furthermore, the study of the angular correlations between heavy-flavour decay electrons and charged hadrons allows for a statistical separation of the charm and beauty contributions to the yield of heavy-flavour decay electrons. In this contribution, an overview of the most recent ALICE results on the open heavy-flavour production in pp collisions will be given. The open heavy-flavour production cross sections and their dependence on charged-particle multiplicity in pp collisions will be presented. The azimuthal correlations of D mesons and heavy-flavour decay electrons with charged hadrons in pp collisions will be discussed.

4.12 | TH 23-07-15 12:15 | HS32

Heavy flavour production and asymmetry measurements from the D0 experiment | I. Bertram[1], D0 – [1]Lancaster University

We present a first study of the inclusive production of the X(4140) state in hadronic collisions. We report the X(4140) production rate and a new measurement of its mass and width. The results of searches for the Zb(10610) and the Zb(10650) using the decay Zb –> Υ(nS)$\pi\pm$ where Upsilon(nS) –> $\mu\mu$ are also presented. Sensitivity to the production of Zb is demonstrated. We present a measurement of the forward-backward asymmetry in the production of B$\pm$ mesons, Λb baryons and Λ baryons. Nonzero asymmetries would indicate a preference for a particular flavor, e.g., b quark or b antiquark, to be produced in the direction of the proton beam. These measurements provide important constraints on the production mechanisms of heavy quarks at hadron colliders. These studies are based on 10.4 fb-1 of pp$\approx$ collision data collected by the D0 experiment at the Fermilab Tevatron collider.

4.13 | TH 23-07-15 12:30 | HS32

Central exclusive meson production at LHCb | P. Gandini[1] – [1]University of Oxford (GB)

Its forward acceptance puts the LHCb in a unique position at the LHC to measure QCD phenomena at large rapidities and low transverse momenta, where theoretical models often fail to describe the data accurately. We present new exclusive production studies of mesons. A first look at the new Run II data and the performance of the new HERSCHEL forward counters may be presented.

4.14 | TH 23-07-15 12:45 | HS32

Measurement of the charged-pion polarisability at COMPASS | A. Guskov[1] – [1]Joint Inst. for Nuclear Research (RU)

The electric (α_π) and the magnetic (β_π) polarisabilities are fundamental properties of the pion characterising the rigidity of its internal structure as a complex QCD system. They have been precisely measured at the COMPASS experiment at CERN with a π^- beam of 190$\approx$GeV/c assuming $\alpha_\pi + \beta_\pi = 0$. Muons of the same momentum were used for controlling of systematic effects. The obtained result $\alpha_\pi = -\beta_\pi = (2.0 \pm 0.6_{stat.} \pm 0.7_{syst.}) \times 10^{-4} fm^3$ is in agreement with the prediction of the Chiral

Perturbation Theory.

5 – Top and Electroweak Physics

TH 23-07-15 09:00-13:00
HS31

5.1 | TH 23-07-15 09:00 | HS31

Improved prediction for the mass of the W boson in the SM, the MSSM and the NMSSM | G. Weiglein[1], L. Zeune[2] – [1]Deutsches Elektronen-Synchrotron (DE), [2]ITFA, University of Amsterdam

The relation between the mass of the W boson, the Z boson, the fine structure constant and the Fermi constant is one of the most important precision observables, which provides access to the quantum structure of the underlying theory and has a high sensitivity for discriminating between different models. Updated predictions for the W-boson mass in the Standard Model (SM) as well as its minimal and next-to-minimal supersymmetric extensions (MSSM, NMSSM) are presented. In the SM the incorporation of the latest higher-order corrections and the remaining theoretical uncertainties are discussed. In the supersymmetric extensions all available higher-order corrections from SM- and SUSY-type are taken into account. The predictions in the three models are obtained in a coherent framework, so that differences in the prediction for the W-boson mass can directly be related to the different structure and particle content of the three models. The phenomenological consequences of confronting the predictions in the three models with the present experimental result are discussed, and the impact of possible future improvements is investigated.

5.2 | TH 23-07-15 09:25 | HS31

Measurements of *W* charge asymmetry | J. Holzbauer[1], D0 Collaboration[2] – [1]Mississippi University (US), [2]DZero Experiment, Fermilab

We present *W* boson and lepton charge asymmetry measurements from *W* decays in the electron channel, with 9.7 fb^{-1} of RunII data collected by the D0 detector at the Fermilab Tevatron Collider. The electron charge asymmetry is presented as a function of the electron transverse momentum and pseudo-rapidity out to $|\eta| \leq 3.2$; we also give the *W* charge asymmetry as a function of *W* boson rapidity. The asymmetries are compared with next-to-leading order perturbative quantum chromodynamics calculations. These charge asymmetry measurements will allow more accurate determinations of the proton parton distribution functions.

5.3 | TH 23-07-15 09:43 | HS31

Precision measurements of Standard Model parameters with the ATLAS detector | A. Dimitrievska[1], A. Read[2] – [1]Institute of Physics Belgrade (RS), [2]University of Oslo (NO)

The ATLAS Collaboration is engaged in precision measurement of fundamental Standard Model parameters, e.g. the weak-mixing angle and the complete set of coefficients that describe the angular distributions of Drell-Yan production. A measurement of the forward-backward asymmetry for the neutral current Drell Yan process is presented and the results are then used to extract a measurement of the effective weak mixing angle. This measurement shows significant sensitivity to the uncertainties of the parton density functions of the proton. The angular distributions of the Drell-Yan lepton pairs around the Z-boson mass peak probe the underlying QCD dynamic of the Z-boson production mechanisms. We present a measurement of the complete set of angular coefficients describing these distributions using 8 TeV centre-of-mass energy. The measurement is compared with the theoretical predictions and shows discrimination power between different approaches of the QCD modeling.

5.4 | TH 23-07-15 10:01 | HS31

W/Z results from CMS | R. Chatterjee[1], A. Meyer[2] – [1]Tata Inst. of Fundamental Research (IN), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

The production of W and Z bosons is studied in pp collisions at a center-of-mass energy of 8 TeV using data collected in the CMS experiment. W events are selected containing an isolated, energetic electron or muon. Z events are selected containing a pair of isolated, energetic electrons or muons. Data-driven methods are used to estimate reconstruction and triggering efficiencies, and well as the main backgrounds. We present recent results on W/Z production cross sections, discuss the measurements of the lepton charge asymmetry in W events, forward-backward asymmetry in the Drell-Yan process.

5.5 | TH 23-07-15 10:19 | HS31

Measurements of *Z* production distribution and decay asymmetry | A. Garcia-Bellido[1], D0 Collaboration[2] – [1]University of Rochester, [2]DZero Experiment, Fermilab

We present measurements of the $Z\gamma^*$ rapidity and ϕ^* production distributions and the weak mixing angle from *Z* boson decays, with all RunII data collected by the D0 detector at the Fermilab Tevatron Collider. The measurement of $\phi*$ probes the same physical effects as the Z/γ^* boson transverse momentum, but is less susceptible to the effects of experimental resolution and efficiency. Both ϕ^* and rapidity are measured with unprecedented precision. The effective weak mixing angle is extracted from the forward-backward charge asymmetry distribution as a function of dielectron invariant mass around the *Z* pole. The measured value of the weak mixing angle is the most precise from light quark interactions, and comparable to the best LEP

and SLD results.

5.6 | TH 23-07-15 10:37 | HS31

Measurements of Drell-Yan transverse momentum and lepton azimuthal decorrelation with the ATLAS detector | M. Zinser[1], A. Read[2] – [1]Johannes-Gutenberg-Universitaet Mainz (DE), [2]University of Oslo (NO)

The ATLAS Collaboration has performed precision measurements of the transverse momentum of Z/gamma* bosons and their decay lepton angular decorrelation with the phi* observable. Measurements have been performed at 7 and 8 TeV in different di-lepton invariant mass and rapidity regions. These measurements are sensitive to soft resummation effects and hard jet emissions for small and large momentum transfers, respectively, probing QCD in a unique way.

5.7 | TH 23-07-15 11:30 | HS31

Electroweak physics at LHCb | W. Barter[1] – [1]CERN

LHCb's unique forward acceptance allow for complementary measurements of electroweak boson production. Thanks to the precise vertex detector and the gas injection system LHCb has the most precise luminosity calibration at the LHC. New precision W and Z cross-section measurements at 7 and 8 TeV are presented.

5.8 | TH 23-07-15 11:48 | HS31

Light-by-light scattering with intact protons at the LHC: from Standard Model to New Physics | M. Saimpert[1] – [1]CEA/IRFU,Centr d'etude de Saclay Gif-sur-Yvette (FR)

The scheduled installation of forward proton detectors at the LHC nearby the CMS and ATLAS experiments will provide a – somewhat surprising – opportunity to measure the light-by-light scattering with unprecedented precision by taking advantage of the coherent photon flux emitted by the protons. The detection of the intact protons allows to reconstruct the full kinematic of the event which is very powerful to reject background. It is then possible to probe anomalous photon quartic couplings (4γ) with an excellent accuracy whereas very few constraints on those couplings exist at the moment. A large variety of extra-dimension models predicts a significant rise of the 4γ coupling through new productions at tree level and any new electrically charged particle contributes to it through loops. The full 4γ amplitudes generated by any electrically charged particles of spins $1/2$ and 1, including the Standard Model processes are implemented in the Forward Physics Monte Carlo generator. First, a possible measurement of the Standard Model production is examined and then model-independent bounds on massive charged particles, only parametrized by the spin, mass and their "effective charge" Q_{eff} are derived. We also discuss the sensitivities to neutral particles such as a strongly-interacting heavy dilaton and warped Kaluza-Klein gravitons using an effective field theory approach and claim they could be discovered for masses in the multi-TeV range.

5.9 | TH 23-07-15 12:06 | HS31

Measurement of exclusive gamma+gamma -> ll production in proton-proton collisions with the ATLAS detector | M. Przybycien[1], A. Read[2] – [1]AGH Univesity of Science and Technology (PL), [2]University of Oslo (NO)

The measurement of the exclusive gamma+gamma -> ll production cross-section in proton-proton collisions at a centre-of-mass energy of 7 TeV has been carried out by the ATLAS experiment at the LHC, based on an integrated luminosity of 4.6 fb-1. The ratios to the pure QED cross-section predictions are measured in the electron and muon channels and are found to be consistent with the previous measurements at the LHC. When proton absorptive effects due to finite proton size are taken into account in the theory calculation the measured cross-sections are found to be consistent with the prediction.

5.10 | TH 23-07-15 12:24 | HS31

Exclusive W+W- production measured with the CMS experiment and constraints on Anomalous Quartic Gauge Couplings | M. Jeitler[1], A. Meyer[2] – [1]Austrian Academy of Sciences (AT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

A search for exclusive or quasi-exclusive W+W- production induced by photon-photon exchange in pp collisions at sqrt(s)=8 TeV is reported using data corresponding to an integrated luminosity of 19.7/fb. Events are selected by requiring the presence of an electron-muon pair with large transverse momentum pT > 30 GeV and no associated charged particles detected from the same vertex. The observed yields and kinematic distributions are compatible with the Standard Model prediction for exclusive and quasi-exclusive W+W- production. The di-lepton transverse momentum spectrum is studied for deviations from the Standard Model, and the resulting upper limits are compared to predictions assuming anomalous quartic gauge couplings.

5.11 | TH 23-07-15 12:42 | HS31

Measurements of Vector Boson Fusion and Scattering and Multiboson production with the ATLAS detector | N. Lorenzo Martinez[1], A. Read[2] – [1]Indiana University (US), [2]University of Oslo (NO)

The ATLAS collaboration has carried a set of measurements to test self-interactions of the electroweak gauge bosons. Among these measurements are the production of W or Z bosons in the vector-boson fusion channel and two same-charge W bosons in the vector-boson scattering channel. Furthermore, the first evidence for the production of three gauge bosons has been obtained. Cross sections are compared with Standard Model predictions in various fiducial phase spaces, and limits on anomalous couplings between gauge bosons are set, which provide model-independent constraints on new physics.

6 – Neutrino Physics

TH 23-07-15 09:00-13:00
HS7

6.1 | TH 23-07-15 09:00 | HS7

Global fits to neutrino oscillations: status and prospects | A. Marrone[1] – [1]Univ. of Bari

We review the status of the neutrino oscillation parameters, as determined from a global analysis of all available neutrino data, in a the standard three-neutrino mass-mixing framework. We analyse the correlations between the oscillation parameters and we discuss the current status and the prospects for a near future determination of the neutrino mass hierarchy and of the CP-violating phase delta.

6.2 | TH 23-07-15 09:15 | HS7

Status of Double Chooz experiment | E. Chauveau[1] – [1]RCNS Tohoku University

Double Chooz aims to measure the last neutrino mixing angle theta13 with a 10 % precision through the disappearance of reactor electronic anti-neutrinos. The experiment relies on the measurement of neutrino flux and spectrum with two identical detectors at different location: one at 1 km of reactor cores to observe the disappearance of neutrinos around the first minimum, and one around 400 m to measure the flux before any significant oscillation. Neutrinos are detected by inverse beta decay on free proton in a 8.3 tons liquid scintillator target, providing two signal with coincidence in time and space: scintillation and annihilation of positron for the prompt signal and gamma ray following neutron capture on Gd as delayed signal. Double Chooz has been running since 2011 with the far detector only, providing on the scene novel analysis like independent measurement using neutron capture on Hydrogen as delayed signal, reactor rate modulation study providing a background independent measurement of theta13, and new background vetos techniques. Data taking with the near detector has finally started early 2015. The talk will review the most recent measurement of theta13 using Gd and H data set with the far detector only, and discuss first data obtained with the near detector.

6.3 | TH 23-07-15 09:30 | HS7

Recent progress from Daya Bay | X. Ji

Precise determination of the neutrino mixing angle θ_{13} is important for searches of CP violation in the lepton sector. The Daya Bay Reactor Neutrino Experiment (Daya Bay) observed electron antineutrino disappearance and measured a nonzero value of θ_{13} with a significance greater than 5 standard deviations in early 2012. With the final two detectors installed, Daya Bay resumed recording data in its full 8-detector configuration in late 2012. More than 1,000,000 (150,000) electron antineutrino candidates had been collected with the near (far) site detectors by the end of 2013, significantly improving the precision of the θ_{13} measurement. In addition to the precise determination of θ_{13}, Daya Bay is also capable of exploring other neutrino research. In this talk, I will present our recent progress in the measurement of neutrino oscillation parameters $\sin^2 2\theta_{13}$ and $|\Delta m^2_{ee}|$ using neutron capture on gadolinium, the measurement of $\sin^2 2\theta_{13}$ using neutron capture on hydrogen, the search for a light sterile neutrino, and the measurement of the reactor neutrino flux and spectrum.

6.4 | TH 23-07-15 09:45 | HS7

Observation of energy dependent disappearance of reactor neutrinos from RENO & Future RENO-50 | S. Seo[1] – [1]Seoul National University

RENO has been taking reactor neutrino data to measure neutrino mixing angle theta_13 since Aug. 2011 using two identical detectors located in Near and Far sites in Yonggwang, Korea. The data taking has gone smoothly to collect data more than 1 M (0.1 M) neutrino events in the Near (Far) detector as of May 2015. Currently we are at the stage of finalizing our new results based on spectral shape analysis using roughly 800 live days of data. In this talk we will present an updated value of theta13 and our first measurement of oscillation frequency, |dm_ee∧2|. Our future RENO-50 experiment will be briefly mentioned.

6.5 | TH 23-07-15 10:00 | HS7

Antineutrino oscillations with T2K | M. Ravonel[1], K. Scholberg[2] – [1]Universite de Geneve (CH), [2]Duke University

T2K is a long-baseline neutrino oscillation experiment, in which a muon neutrino beam is produced at J-PARC and detected 295 km away at the Super-Kamiokande detector. The T2K experiment observed electron-neutrino appearance in 2012. This observation enables T2K to explore CP violation in the lepton sector by comparing electron-neutrino appearance and electron-antineutrino appearance. Indeed, the number of observed electron neutrino events up to 2012 is, though within statistical fluctuation, larger than the expectation, which suggests maximal CP violation. Since 2013, T2K has been accumulating data with a muon antineutrino beam. If the suggested maximal CP violation is true, electron-antineutrino appearance would be suppressed. The signal is further suppressed by the smaller cross section for antineutrinos compared to neutrinos. Hence the observation of electron-antineutrino appearance is an important next step. Furthermore, the CPT theorem imposes that the muon disappearance rate must be the same for muon neutrinos and muon antineutrinos; therefore the comparison between neutrinos and antineutrinos is a good test of the CPT theorem, or else a probe for new non-standard interactions of neutrinos with matter. We will report the result of the first search for electron-antineutrino appearance in T2K, as well as a new measurement of muon-antineutrino disappearance to compare with muon-neutrino disappearance measurements.

6.6 | TH 23-07-15 10:22 | HS7

Results from the OPERA experiment at the CNGS beam | G. Sirri, A. Longhin[1], C. Opera[2] – [1]INFN, [2]OPERA

The OPERA experiment at the Gran Sasso underground laboratory has been designed to study the nu_mu -> nu_tau oscillation in appearance mode in the CNGS neutrino beam. Four nu_tau candidate events have been confirmed so far, using a sub-sample of data from the 2008-2012 runs. Given the number of analysed events and the low background, nu_mu -> nu_tau oscillations have been established with a significance of 4.2 sigma. In the talk we will present results based on an increased sample of scanned emulsion target units (bricks). The nu_tau data analysis will be updated and discussed, with emphasis on the background constraints obtained by using dedicated data-driven control samples. The analysis of the collected electron neutrino sample and the analysis of the muon charge ratio in the cosmic ray sample will also be covered.

6.7 | TH 23-07-15 10:45 | HS7

The NOvA Experiment | A. Habig

NOvA is an off-axis long-baseline neutrino experiment, looking for ν_e appearance in an upgraded NuMI beam of ν_μ to precisely measure the recently discovered θ_{13} acting in subdominant $\nu_\mu \rightarrow \nu_e$ transitions. As an appearance experiment, NOvA might also be sensitive to CP-violating δ and the neutrino mass hierarchy. To maximize sensitivity to the resulting $\sim$GeV electromagnetic showers, the 14$\approx$kton Far Detector is "totally active", comprised of liquid scintillator contained in 15.7$\approx$m long extruded PVC cells, with the scintillation light piped out in wavelength shifting fibers then digitized by avalanche photodiodes. Both near and far detectors were fully completed last fall and have been taking ever more intense NuMI beam data. This talk will highlight progress towards the first NOvA results.

6.8 | TH 23-07-15 11:30 | HS7

Theoretical models of neutrino-nucleus cross sections | M. Martini[1] – [1]University of Ghent

In the present and future accelerator-based neutrino oscillation experiments nuclear targets (such as C, O, Ar and Fe) are involved. Hence the knowledge of neutrino-nucleus scattering is very important. In particular it is crucial for the determination of the neutrino energy which enters the expression of the oscillation probability, since this energy is reconstructed from the final states of the neutrino-nucleus reaction. The status of the different theoretical approaches treating the open channels in the few-GeV region, i.e. the quasielastic, the pion production and the multinucleon emission, is reviewed. Special emphasis will be devoted to the multinucleon emission channel, which turned to be crucial to explain the unexpected behavior of the charged current quasielastic measurement performed by MiniBooNE. Up to last year, this channel was not included in the generators used for the analyses of the neutrino cross sections and oscillations experiments. The theoretical and experimental interest towards these multinucleon excitations continues to increase.

6.9 | TH 23-07-15 11:45 | HS7

Flux and Neutrino interaction model constraints using the T2K near detectors | L. Zambelli[1], K. Scholberg[2] – [1]KEK, [2]Duke University

Since 2014, the T2K long-baseline neutrino oscillation experiment in Japan has been running with reversed horn current to produce a beam enhanced in muon antineutrinos. Near detectors located 280 meters from the target study the neutrino interactions prior to the onset of neutrino oscillations. By selecting muon (anti)-neutrino charged current interactions in various channels of pion multiplicity, the neutrino flux and interaction model uncertainties are greatly reduced. In particular, the large contamination of neutrino interactions in the antineutrino mode can measured and constrained, a critical handle in the study of antineutrino oscillations at T2K. We present the results of a combined analysis of data from both neutrino-enhanced and antineutrino-enhanced running using an updated neutrino interaction model to incorporate multi-nucleon and other nuclear effects.

6.10 | TH 23-07-15 12:00 | HS7

Neutrino – Nucleus Interaction Measurements at MINERvA | S. Bravar[1] – [1]Universite de Geneve (CH)

MINERvA (Main INjector ExpeRiment v-A) is a neutrino scattering experiment using the high intensity neutrino beam produced by the Main Injector (NuMI) at Fermilab. MINERvA is making precision cross-section measurements of neutrino interactions with various nuclear targets (C, CH, Fe, Pb) at low and medium energy to study nuclear medium effects with a weak probe. This talk will present MINERvA's measurements of charged current (CC) quasi-elastic and CC pion production cross sections with neutrino and antineutrino beams, and measurements of ratios of neutrino CC scattering cross sections on different nuclei. Various methods to estimate the neutrino flux will be also discussed. Future MINERvA measurements will also be presented.

6.11 | TH 23-07-15 12:15 | HS7

Hadron production measurements from NA61/SHINE for LBL neutrino experiments | A. Korzenev[1] – [1]Universite de Geneve (CH)

A precise prediction of the expected neutrino flux is required for a long-baseline accelerator neutrino experiment. The flux is used to measure neutrino cross sections at the near detector, while at the far detector it provides an estimate of the expected signal for the study of neutrino oscillations. Review of recent results of the NA61/SHINE experiment on determination of charged hadron yields in proton-carbon interactions is presented. Values of differential cross sections of $\pi^{\pm}$, $K^{\pm}$, p, K^0_s and

Λ provided by NA61/SHINE are presently used in the T2K ν beam simulation program to reweight hadron yields. They allowed to reduce the flux uncertainty at the neutrino peak energy down to 9%. At the same time, NA61/SHINE results obtained with the T2K replica target, which are used to constrain hadron yields at the surface of the target, will reduce significantly a model dependence of the neutrino beam prediction. Prospects of further improvement of precision of NA61/SHINE measurements in view of the forthcoming runs for energies of the main injector neutrino beamline at FNAL are reviewed.

6.12 | TH 23-07-15 12:30 | HS7

Bimaximal Neutrino Mixing and GUT's | D. Meloni[1] – [1]Dipartimento Matematica e Fisica, Universita' Roma Tre

In this talk I will briefly discuss the present status of models of neutrino mixing, in particular comparing the virtues of Bimaximal Mixing, corrected by terms arising from the charged lepton mass diagonalization in SU(5) and SO(10) contexts, to models based on chance, like Anarchy or U(1)_FN.

6.13 | TH 23-07-15 12:45 | HS7

Non-Zero θ_{13} and δ_{CP} in a Neutrino Mass Model with A_4 Symmetry | S. Umasankar[1], P. Ramadevi[2], A. Dev[1] – [1]Indian Institute of Technology Bombay, [2]Indian Institute of TechnologyBombay

We consider a neutrino mass model based on A_4 symmetry. The spontaneous symmetry breaking in this model is chosen to obtain tribimaximal mixing in the neutrino sector. We introduce $Z_2 \times Z_2$ invariant perturbations in this model which can give rise to acceptable values of θ_{13} and δ_{CP}. Perturbation in the charged lepton sector alone can lead to viable values of θ_{13}, but cannot generate δ_{CP}. Perturbation in the neutrino sector alone can lead to acceptable θ_{13} and maximal CP violation. By adjusting the magnitudes of perturbations in both sectors, it is possible to obtain any value of δ_{CP}.

7 – Heavy Ion Physics

TH 23-07-15 09:00-13:00
HS42

7.1 | TH 23-07-15 09:00 | HS42

Understanding the J/Psi and Y suppression (and enhancement) at LHC and RHIC | E. Gonzalez Ferreiro[1] – [1]Universidade de Santiago de Compostela (ES)

In nucleus-nucleus collisions, quarkonium production is expected to be significantly suppressed as a consequence of the colour screening of the force that binds the ccbar (bb) state. In this scenario, quarkonium suppression should occur sequentially, according to the binding energy of each state. As a consequence, the in-medium dissociation probability of these states can provide an estimate of the initial temperature reached in the hot and dense strongly-interacting Quark-Gluon Plasma (QGP) expected to be formed in these collisions. Moreover, at high energy, a new production mechanism could, to some extent, contrast this suppression in the case of charmonium: the abundance of c and cbar quarks might lead to charmonium production by (re)combination of these quarks. Furthermore, disentangling the hot medium effects requires an accurate study of the so-called cold nuclear matter (CNM) effects, which can be measured in proton-nucleus interactions. Studies performed for thirty years, first at the Super Proton Synchrotron (SPS) at 20 GeV and then at Relativistic Heavy Ion Collider (RHIC) at 200 GeV, have indeed shown a reduction of the J/psi yield beyond the expectations from cold nuclear matter effects. The Large Hadron Collider (LHC), with unprecedented centre-of-mass energies of the order of the TeV in p+Pb and Pb+Pb collisions offers an excellent opportunity to extricate the different effects on J/psi and Y production.

7.2 | TH 23-07-15 09:25 | HS42

Quarkonia results in heavy ions from CMS | L. Benhabib[1] – [1]CERN

Quarkonia are important probes of the quark-gluon plasma since they are produced at early times and propagate through the medium, mapping its evolution. In this talk we present the latest results on quarkonium production in pPb and PbPb collisions from CMS. Selected results from measurements of nuclear modification factors, excited-to-ground state ratios, elliptic flow and forward-backward asymmetries will be shown for the J/psi, Psi(2S) and/or the Upsilon 1S, 2S and 3S.

7.3 | TH 23-07-15 09:45 | HS42

Study of J/Psi and Y production in association with leading hadron at RHIC and LHC energies | M. Sumbera[1], R. Pasechnik[2], J. Nemchik, B. Kopeliovich[3] – [1]Acad. of Sciences of the Czech Rep. (CZ), [2]Lund University, [3]UTFSM

We discuss possible experimental tests of the Color-Singlet model (CSM) in associated J/psi or Y plus leading hadron production in pp collisions at RHIC and LHC energies. Using color dipole approach we calculate several different observables of leading hadron and rapidity/azimuth difference between produced J/psi or Y and the leading hadron in the CSM approach. As a very promising measurement we suggest to study correlations between forward high-pT pion and J/psi or Y produced at mid-rapidity at RHIC energies. Such forward-midrapidity correlations test higher order pQCD in pp collisions at modest energies and also may shed more light on forward high-pT particle production in pA collisions. All suggested variables have a strong potential for better constraining CSM contribution to the J/psi and Y production at RHIC and LHC.

7.4 | TH 23-07-15 10:05 | HS42

Heavy quarkonium production at the STAR experiment | P. Chaloupka[1] – [1]Czech Technical University in Prague
In the collisions of heavy ions the nuclear matter can undergo a phase transition from hadrons to a state of deconfined quarks and gluons, the Quark-Gluon Plasma (QGP). Suppression of heavy quarkonia due to Debye-like screening of the quark-antiquark potential, has been predicted to be a sensitive indicator of the thermodynamical properties of the created QGP. However, cold nuclear effects and secondary production in the QGP via heavy quark recombination could also alter the observed suppression picture. Measurements of J/ψ production at different collision energies, collision systems, and centralities can shed new light on the interplay of these effects on J/ψ production and medium properties. Moreover, Υ production is expected to be less affected by $b-\bar{b}$ recombination and interactions with hadrons in the final state. It hence provides a cleaner probe for studying the interaction of heavy quarkonia with the partonic medium. In this talk I will present recent results from the STAR experiment on J/ψ and Υ production in heavy-ion collisions at various energies. I will discuss the energy dependence of J/ψ production in Au+Au collisions at $\sqrt{s_{NN}}$=39, 62.4 and 200 GeV and in U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV. I will report Υ production in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 and in U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV.

7.5 | TH 23-07-15 10:25 | HS42
Results on J/psi and psi(2S) in p-Pb Collisions at 5.02 TeV with ATLAS Abstract | R. White[1] – [1]Federico Santa Maria Technical University (CL)
The production rates of heavy quarkonia states in A-A collisions provide sensitive probes to the hot and dense QGP. However, a reference for understanding the dissociation in the hot medium is necessary; p-A collisions open the possibility to study heavy quarkonia states in a smaller system. This is an important step in forming a baseline for understanding A-A collisions, as well as an investigation into the nature of modifications of the parton distributions in the nucleus. Using data collected at the LHC in 2013, the ATLAS experiment will show results on the prompt J/psi and psi(2S) nuclear modification factors and the double ratio, psi(2S) divided by J/Psi in p-Pb divided by the same in p-p, in p-Pb collisions at 5.02 TeV. The charmonia states were reconstructed via the dimuon decay channel and the yield will be differentially presented in bins of transverse momentum, rapidity, and event activity.

7.6 | TH 23-07-15 10:45 | HS42
Thermalization of a boost-invariant non Abelian plasma with boundary sourcing | F. De Fazio[1] – [1]INFN Bari
The relaxation towards the hydrodynamic regime of a boost-invariant non Abelian plasma taken out-of-equilibrium is investigated using a holographic approach. In the dual description, the system is driven out-of-equilibrium by boundary sourcing, a deformation of the boundary metric, as proposed by Chesler and Yaffe. The corresponding Einstein equations in the bulk are solved, and the times of restoration of the hydrodynamic regime and of the pressure isotropy are determined. The possible connections with the QGP phenomenology are discussed.

7.7 | TH 23-07-15 11:30 | HS42
Measurements of leptons from open heavy-flavour decays in pp, p-Pb and Pb-Pb collisions with ALICE at the LHC | L. Valencia Palomo[1] – [1]Univ. Blaise Pascal Clermont-Fe. II (FR)
Quantum Chromodynamics (QCD) predicts that at high energy density, ordinary nuclear matter undergoes a phase transition towards a new state of matter called Quark-Gluon Plasma (QGP) that is characterized by deconfined quarks and gluons. High-energy Pb-Pb collisions are used to reach the thermodynamical conditions to create the QGP. As heavy quarks (charm and beauty) are produced in the initial hard scatterings of partons in the collision, they can be used as probes to investigate the properties of the QGP. Measurements in p-Pb collisions are useful to study the cold nuclear matter effects that can affect the particle production by initial or final-state interactions. Also, a precise measurement of open heavy-flavour production cross sections in pp collisions is essential to assess the accuracy of Next to Leading Order perturbative QCD calculations that suffer from large uncertainties. Besides this, open heavy-flavour studies in pp collisions are an essential baseline for the corresponding measurements in p-Pb and Pb-Pb collisions. ALICE is one of the large experiments at the LHC and was designed to study and characterize the QGP. In ALICE, open heavy-flavour hadrons are measured via their hadronic decay at mid rapidity and via their semileptonic decay both at mid (electrons) and forward (muons) rapidity. In this talk the latest results on open heavy-flavour decay leptons in pp, p-Pb and Pb-Pb collisions with the ALICE experiment will be presented.

7.8 | TH 23-07-15 11:50 | HS42
LHCb results in proton-nucleus collisions at the LHC | M. Meissner[1] – [1]Ruprecht-Karls-Universitaet Heidelberg (DE)
LHCb's unique forward acceptance and particle-ID capabilities allow for complementary measurements in proton-ion interactions. Latest results are shown and prospects for ion-ion and ion-gas collisions are presented.

7.9 | TH 23-07-15 12:10 | HS42
Measurements of Non-Photonic Electron Production with STAR Experiment | O. Rusnakova[1] – [1]CTU Prague
The properties of the strongly interacting Quark-Gluon Plasma, created in high energy heavy-ion collisions, can be studied using heavy quarks, such as charm and bottom. Heavy quarks may interact with the medium differently than light quarks. For example, energy losses of the heavy quarks through gluon radiation are expected to be smaller due to the dead cone effect. Therefore, measurements of heavy quarks can improve our understanding of how partons interact with the medium and the

QGP properties. Hot and cold nuclear matter effects, which affect the heavy quark production in heavy ion collisions, could be quantified with the nuclear modification factor, R_{AA}, and azimuthal anisotropy parameter, v_2. Results from p+p collisions can serve as a baseline for R_{AA} as well as to test of the validity of perturbative QCD. At RHIC, heavy quarks could be studied by measuring non-photonic electrons (NPE) which are produced from semi-leptonic heavy flavor D and B meson decays. In this talk, we will present the measurement of NPE production in p+p collisions at $\sqrt{s}$ = 200 GeV in a wide transverse momentum range (0.4< p_T < 12 GeV/c). We will discuss the energy dependence of v_2 in Au+Au collisions at $\sqrt{s_{NN}}$ =39, 62.4 and 200 GeV. The nuclear modification factor R_{AA} in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV and in U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV will also be presented and compared with different model predictions.

7.10 | TH 23-07-15 12:30 | HS42

review of heavy flavour production in AA collisions | D. Stocco[1] – [1]Laboratoire de Physique Subatomique et des Technologies Associe

Heavy-flavour hadrons are effective probes of the Quark-Gluon Plasma which is produced in ultra-relativistic heavy-ion collisions. Heavy quarks (charm and beauty) are produced in the hard scattering processes at the initial stages of the collision and they subsequently traverse the medium, losing energy in the interaction with its constituents. Heavy-flavour measurements are hence sensitive to the mechanisms of transport and energy loss of the heavy-quark in the medium. In this talk, the heavy-flavour measurements performed by experiments at RHIC and at the LHC will be reviewed, and their role in the characterisation of the medium will be discussed.

8 – Astroparticle Physics, Cosmology, Gravitation

TH 23-07-15 14:30-18:30
HS33

8.1 | TH 23-07-15 14:30 | HS33

Precise Prediction of the Dark Matter Relic Density within the MSSM | J. Harz[1], M. Meinecke[2], P. Steppeler[2], B. Herrmann[3], M. Klasen[2], K. Kovarik[2] – [1]University College London, [2]University of Münster, [3]Unite Reseaux du CNRS (FR)

With the latest Planck results the dark matter relic density is determined to an unprecedented precision. In order to reduce current theoretical uncertainties in the dark matter relic density prediction, we have calculated next-to-leading order SUSY-QCD corrections to neutralino (co)annihilation processes including Coulomb enhancement effects. We demonstrate that these corrections can have significant impact on the cosmologically favoured MSSM parameter space and is thus of general interest for parameter studies and global fits.

8.2 | TH 23-07-15 14:45 | HS33

Dulition of axion dark radiation | O. Seto[1], T. Kobayashi[2], H. Hattori[2], N. Omoto[2] – [1]Hokkai-Gakuen University, [2]Hokkaido University

Coherently generated PQ scalar fields could dominate the energy density in the early Universe and decay into relativistic axions, which would confront with the current dark radiation constraints. We study the condition that a thermal inflation driven by a U(1) gauged Higgs field dilutes such axions, in particular, for the case of gauged B-L symetry.

8.3 | TH 23-07-15 15:00 | HS33

Axino and gravitino dark matter with low reheating temperature | S. Trojanowski[1], L. Roszkowski[1], K. Turzynski[2] – [1]National Centre for Nuclear Research, Poland, [2]University of Warsaw, Poland

Possible discovery of supersymmetric particles in the second run of the LHC accompanied by lack of observation of a dark matter particle in direct searches may point towards dark matter candidates being extremely weakly interacting particles with supersymmetric origin. In this talk I will focus on two such candidates that are well motivated theoretically, namely the axino and the gravitino. In particular I will discuss the upper limit on the axino mass assuming that it is the dark matter particle. This issue can be properly treated when low reheating temperature of the Universe after a period of cosmological inflation is taken into account. I will discuss how both thermal and non-thermal production of axino is modified in this regime and how this influences the aforementioned upper limit on the axino mass. I will also discuss constraints on such scenario that could be derived from a possible detection of supersymmetric particles at the LHC and from the Big Bang Nucleosynthesis and Large Scale Structure formation. Similar analysis in the case of gravitino dark matter leads to a lower limit on the reheating temperature in this scenario as will be shown.

8.4 | TH 23-07-15 15:15 | HS33

Leptogenesis in natural low-scale seesaw mechanisms | M. Lucente[1], A. Asmaa, G. Arcadi, V. Domcke[2] – [1]LPT Orsay, [2]SISSA

We consider the possibility of simultaneously explaining Dark Matter and the Baryon Asymmetry of the Universe using different low-scale seesaw realisations involving sterile fermion states (such as right-handed neutrinos), among them minimal realisations of the Inverse seesaw and/or the Linear seesaw. In particular, we discuss the possibility of obtaining a successful leptogenesis in the presence of pseudo-Dirac neutrino pairs, while accommodating all experimental and observational con-

straints (dark matter, neutrino data, laboratory constraints, etc).

8.5 | TH 23-07-15 15:30 | HS33

Dark Matter Self-Interactions via Collisionless Shocks in Cluster Mergers | C. Spethmann, M. Heikinheimo[1], M. Raidal[2], H. Veermae[2] – [1]York University, Toronto and Lapth, Annecy, [2]Nat. Inst. of Chem.Phys. & Biophys. (EE)

While dark matter self-interactions may solve several problems with structure formation, so far only the effects of two-body scatterings of dark matter particles have been considered. We show that, if a subdominant component of dark matter is charged under an unbroken U(1) gauge group, collective dark plasma effects need to be taken into account to understand its dynamics. Plasma instabilities can lead to collisionless dark matter shocks in galaxy cluster mergers which might have been already observed in the Abell 3827 and 520 clusters. As a concrete model we propose a thermally produced dark pair plasma of vectorlike fermions. In this scenario the interacting dark matter component is expected to be separated from the stars and the non-interacting dark matter halos in cluster collisions. In addition, the missing satellite problem is softened, while constraints from all other astrophysical and cosmological observations are avoided.

8.6 | TH 23-07-15 15:45 | HS33

Cosmological models with QGP: DM, DE and scalar perturbations | M. Eingorn[1] – [1]urn:Facebook

The background evolution problem is resolved for the Universe endowed with relic colored objects – quarks and gluons – that survived hadronization either as isolated islands of quark-gluon “nuggets” (QNs), or as a uniform fluid. In the first scenario, QNs can play the role of dark matter. In the second scenario, uniform colored objects can play the role of dark energy providing the late-time acceleration. In addition, we investigate scalar perturbations of the FLRW metric due to inhomogeneities of dustlike matter as well as fluctuations of QNs. The nonrelativistic gravitational potential is determined by the distribution of inhomogeneities of both dustlike matter and QNs. Consequently, QNs can have an influence on the galaxy rotation curves, replacing (at least partially) the dark matter for the solution of the corresponding problem of their flatness.

8.7 | TH 23-07-15 16:30 | HS33

The Dark Energy Survey: Status and First Science Results | J. Aleksic[1] – [1]IFAE

The Dark Energy Survey (DES) is a next-generation large galaxy survey designed to study the origin of the accelerating Universe and the nature of dark energy. These goals are to be achieved through combination of four distinct probes: baryon acoustic oscillations, abundance and spatial distribution of clusters, weak gravitational lensing, and Type Ia supernovae. The main instrument of the survey is DECam - a state-of-the-art 570 mega-pixel CCD camera, with a large, 3 sq. deg. field of view, built by the DES Collaboration and installed at the prime focus of the Victor M. Blanco 4-meter telescope in CTIO, Chile. Over the period of five years, DECam will survey 5000 sq. deg. of the southern sky with unprecedented depth, measuring positions, redshift and shape of almost 300 million galaxies, as well as thousands of clusters and supernovae. Here are presented the status and some of the first DES science results, such as the discovery of new Milky Way dwarf satellite galaxies and the mapping of the dark matter distribution across large areas of the sky.

8.8 | TH 23-07-15 16:45 | HS33

Investigating Dark Energy and Gravitation at cosmological scales | A. Blanchard[1] – [1]IRAP

The acceleration of the expansion of the universe is now a well demonstrated feature of the universe which is almost impossible to bypassed. This leads to a very surprising question: why is gravity repulsive on large scales. By now, it is fair to say that we have no hint about the very reason for the origin of this phenomena (named hereafter dark energy) which can be regarded as one of the major surprises in modern physics. Tightening down the properties of dark energy is therefore a major objective of modern science in order to clarify its very nature. The simplest model of dark energy is a cosmological constant, as introduced by Einstein, equivalent to a (quantum) vacuum contribution to the energy budget of the universe. Alternative options are on one side the existence of a scalar field minimally coupled, named quintessence or with more complexity and on the other side the possibility that gravity is actually not driven by general relativity (GR) but by some modified gravity, which behaves like GR on small scales, but would be different on large scale. Possible test of such theories relies mainly on the behavior of gravity on large scales, beyond galactic scales. These scales are precisely the target of ongoing projects dedicated to dark energy investigation like the ESA space mission EUCLID. Several probes used in combination will allow to constrain dark energy properties with a high accuracy, allowing to test the theory of general relativity on cosmological scales.

8.9 | TH 23-07-15 17:00 | HS33

Holographic reconstruction of scalar field models of dark energy in the background of Brans Dicke cosmology | S. Chattopadhyay[1], A. Pasqua[2] – [1]Pailan College of Management and Technology, Kolkata, [2]Department of Physics, University of Trieste, Via Valerio, 2 34127 Trieste, Italy

Motivated by the work of Yang et al., *Mod. Phys. Lett. A*, **26**, 191 (2011), the present paper reports a study on reconstruction of scalar field dark energy models, namely, quintessence, DBI-essence and tachyon in the framework of chameleon Brans-Dicke cosmology. Firstly, we have reconstructed the Hubble parameter and consequently the density of the new holographic dark energy $\rho_D = \frac{3\phi^2}{4\omega}(\mu H^2 + \nu \dot{H})$ in chameleon Brans-Dicke cosmology. We have tested the weak and strong energy conditions for this reconstruction. Afterwards, considering a correspondence between the reconstructed new holographic dark

energy and the said scalar field models we have reconstructed the corresponding potentials and scalar fields.

8.10 | TH 23-07-15 17:15 | HS33

Dynamically Induced Planck Scale and Inflation | K. Kannike[1], A. Strumia[1], A. Salvio[2], M. Raidal[1], A. Racioppi[1], L. Pizza[3], G. HÜtsi[4] – [1]Nat. Inst. of Chem.Phys. & Biophys. (EE), [2]IFAE, Barcelona, [3]Pisa University, [4]Tõravere Observatory, Estonia

We present a minimal model of inflation where the Planck scale is dynamically generated from dimensionless interactions. The inflaton field ϕ gets a vacuum expectation value via dimensional transmutation. The Planck scale is generated via its non-minimal coupling to gravity $\xi\phi^2 R$. To generate the minimum of the inflaton potential, one needs a singlet scalar and new fermion(s) which can provide a dark matter candidate. The spectral index is predicted to be $n_s \approx 0.96$. The tensor-to-scalar ratio can vary from $r \approx 0.13$ down to $r \approx 0.04$ in presence of large couplings or $r \approx 0.003$ if the Lagrangian contains an R^2 term, interpolating between the quadratic and Starobinsky inflation. These theories relate the smallness of the weak scale to the smallness of inflationary perturbations: both arise naturally because of small couplings, implying a reheating temperature of 10^{7-9} GeV. A measurement of r by Keck/Bicep3 would give us information on quantum gravity in the dimensionless scenario.

8.11 | TH 23-07-15 17:30 | HS33

On the smallness of the cosmological constant in SUGRA models with Planck scale SUSY breaking and degenerate vacua | R. Nevzorov[1], C. Froggatt[2], H. Nielsen[3], A. Thomas[4] – [1]University of Adelaide & ITEP, [2]Glasgow Universitty, [3]The Niels Bohr Institute, University of Copenhagen, [4]University of Adelaide

In $N = 1$ supergravity (SUGRA) supersymmetric (SUSY) and non-supersymmetric Minkowski vacua originating in the hidden sector can be degenerate. This allows for consistent implementation of the multiple point principle (MPP) assumption. We present no–scale inspired SUGRA model where the MPP assumption is realised at the tree–level without extra fine-tuning. In the supersymmetric phase in flat Minkowski space SUSY may be broken dynamically inducing tiny vacuum energy density which can be assigned, by virtue of MPP, to all other phases including the one in which we live. We argue that the measured value of the cosmological constant, as well as the small values of quartic Higgs self–coupling and the corresponding beta function at the Planck scale, which can be obtained by extrapolating the Standard Model (SM) couplings to high energies, can originate from supergravity (SUGRA) models with degenerate vacua. This scenario is realised if there are at least three exactly degenerate vacua. In the first vacuum, associated with the physical one, local supersymmetry (SUSY) is broken near the Planck scale while the breakdown of the $SU(2)_W \times U(1)_Y$ symmetry takes place at the electroweak (EW) scale. In the second vacuum local SUSY breaking is induced by gaugino condensation at a scale which is just slightly lower than Λ_{QCD} in the physical vacuum. Finally, in the third vacuum local SUSY and EW symmetry are broken near the Planck scale.

9 – Flavour Physics and Fundamental Symmetries

TH 23-07-15 14:30-18:00
HS41

9.1 | TH 23-07-15 14:30 | HS41

Searches for low mass dark bosons | A. Mauri[1] – [1]UZH

Many models extending the SM to account for dark matter or explain inflation predict the existence of O(1) GeV mass particles with long lifetimes. LHCb's detection capabilities for detached vertices are exploited to search for particles decaying to muon pairs. New results are presented.

9.2 | TH 23-07-15 14:45 | HS41

Search for the dark photon in π^0 decays | R. Fantechi

A sample of 17 million fully reconstructed π^0 Dalitz decays produced in charged kaon decays in flight collected by the NA48/2 experiment at CERN in 2003-04 is analysed to search for the dark photon (A) via the decay chain $\pi^0 \to \gamma A$, $A \to e^+e^-$. No dark photon signal is observed, and the most stringent limits on the dark photon mixing parameter in the mass range 9-70 MeV are established. Limitations of the method and possible future directions are discussed.

9.3 | TH 23-07-15 15:00 | HS41

Measurements of CP violation in $B^0_{d/s}$ mixing through $B \to J/\Psi X$ decays | G. Cowan[1] – [1]University of Edinburgh (GB)

B mesons provides an ideal laboratory for measurements of CP violation and searches for CPV beyond the Standard Model. Recent measurements of the mixing phases of the B_s and B_d mesons, ϕ_s and $\sin 2\beta$, using decays to $J\Psi$X final states are presented. In view of future improved measurements, a good understanding of pollution from sub-leading penguin topologies in these decays is needed. Those can be probed using suppressed decays like $B_s \to J/\Psi K_S$ and $B_s \to J/\Psi K^*$. Recent results on these decay modes are presented.

9.4 | TH 23-07-15 15:20 | HS41

Phi_s and Delta Gamma_s measurement in B->J/psi Phi using CMS data | P. Eerola[1] – [1]Dept of Physical Sciences, Univ. of Helsinki

The study of CP violation in the decay channel Bs->Jpsi Phi is very important to explore physics beyond Standard Model

in the quark flavour sector. The measurements of Phi_s and the decay width difference (Delta Gamma_s) are key parameters to look for BSM physics. We will report the recent results on these parameters using the 20 fb-1 data set collected in 2012.

9.5 | TH 23-07-15 15:35 | HS41

New physics searches with heavy flavour observables at ATLAS | C. Alpigiani, J. Katzy[1] – [1]DESY, HAMBURG

The large amount of Heavy Flavour data collected by the ATLAS experiment is potentially sensitive to New Physics, which may be found in the mixing of B meson states, or through processes that are naturally suppressed in the Standard Model. We present the new results on the measurement of the decay of the Bs into J/psi phi based on full data collected in LHC Run-1 and with updated flavour tagging techniques improving the accuracy in the CP-violating phase phi_s. We also present the measurement of the decay time difference in the Bd system. ATLAS Run-1 results on the search for the rare decay Bs (B0)->mu+mu- are presented as well as results on the angular distribution parameters AFB and FL describing the decay Bd -> K*mu+mu- -> K+pi-mu+mu-.

9.6 | TH 23-07-15 16:30 | HS41

The Precision of the CKM Angles β and β_s | P. Frings[1], U. Nierste[2], M. Wiebusch[3] – [1]Karlsruhe Institute of Technology, [2]KIT - Karlsruhe Institute of Technology (DE), [3]Durham University

The CKM angle β (β_s) is one of the key *CP*-violation parameters in the SM. It is best determined by the mixing-induced *CP* asymmetry in the decay $B_d \to J/\psi K_S$ ($B_s \to J/\psi\phi$). However, the theoretical precision of this determination has been under discussion for a long time and the estimated uncertainties ranged from negligible to sizable. The possible corrections are due to penguin diagrams that are suppressed parametrically by CKM elements. Nonetheless, QCD long-distance effects may enhance these corrections considerably. In the past, mostly data-driven methods that exploit the $SU(3)$ flavor symmetry have been used to estimate the theoretical corrections. In contrast, we present a genuine first-principles calculation of the penguin pollution. Our approach is based on an operator product expansion (OPE) that exploits the heaviness of charmonia. We show that it is possible to separate long and short-distance effects in decays of B mesons to charmonia. With our simplified Hamiltonian the number of non-perturbative matrix elements is small at leading order in the OPE, we then use $1/N_c$ counting to order these matrix elements. We conclude with predictions for the theoretical precision of β and β_s and the *CP* violation observables C_f and S_f for various final states f that consist of a charmonium and a light meson e.g. $J/\psi\pi^0$, $J/\psi K_S$, $J/\psi\rho$, or $J/\psi\phi$.

9.7 | TH 23-07-15 16:45 | HS41

Precision measurement of Δmd using semi-leptonic decays at LHCb | B. Khanji[1] – [1]Universita & INFN, Milano-Bicocca (IT)

The Bd meson oscillation frequency sets strong contraints on the CKM matrix. A precision measurement using semileptonic decays is presented.

9.8 | TH 23-07-15 17:00 | HS41

Re-examining $\sin 2\beta$ and Δm_d from evolution of B_d^0 mesons with decoherence | S. Umasankar[1], A. Alok[2], S. Banerjee[3] – [1]Indian Institute of Technology Bombay, [2]Indian Institute of Technology Jodhpur, [3]Indian Institute of Technology

In the time evolution of neutral meson systems, a perfect quantum coherence is usually assumed. The important quantities of the B_d^0 system, such as $\sin 2\beta$ and Δm_d, are determined under this assumption. However, the meson system interacts with its environment. This interaction can lead to decoherence in the entangled mesons even before they decay. In our formalism this decoherence is modelled by a single parameter λ. It is desirable to re-examine the procedures of determination of $\sin 2\beta$ and Δm_d in meson systems with decoherence. We find that the present values of these two quantities are modulated by λ. Re-analysis of B_d^0 data from B-factories and LHCb can lead to a clean determination of λ, $\sin 2\beta$ and Δm_d.

9.9 | TH 23-07-15 17:15 | HS41

Study of CP asymmetry in B0-B0bar mixing using inclusive dilepton samples obtained with the BABAR detector | T. Miyashita[1] – [1]Caltech

The asymmetry between same sign inclusive dilepton samples (l∧+l∧+ and l∧-l∧-) from semileptonic B decays in Upsilon(4S) -> B0 B0bar events allows us to compare the B0 mixing probabilities P(B0bar -> B0) and P(B0 -> B0bar), and hence to test T and CP invariance. We present a measurement of CP asymmetry in inclusive dilepton samples using the full BABAR dataset near the Upsilon(4S) resonance, which corresponds to 471 million BBbar pairs.

9.10 | TH 23-07-15 17:30 | HS41

Observation of CP violation in B0->D_CP(⋆)h0 decays in a combined analysis using BABAR and Belle data | M. Roehrken[1], F. Anulli[2] – [1]California Institute of Technology, [2]Universita e INFN, Roma I (IT)

We report on a time-dependent CP violation measurement of B0->D_CP(⋆)h0 decays, where the light neutral hadron h0 is a pi0, eta, or omega meson, and the neutral D meson is reconstructed in decays to two-body CP eigenstates K+ K-, K_S pi0, or K_S omega. The measurement is performed by combining the final data samples of 471 million BBbar pairs collected by the BABAR experiment and 772 million BBbar pairs collected by the Belle experiment. A first observation of CP violation in B0->D_CP(*)h0 decays governed by mixing-induced CP violation in terms of sin(2beta) [sin(2phi_1)] is presented.

9.11 | TH 23-07-15 17:45 | HS41
Search for Violation of CPT and Lorentz invariance in B_s^0 meson oscillations | D0 Collaboration[1] – [1]DZero Experiment, Fermilab
We present the first search for exclusive CPT-violating effects in the mixing of B_s^0 mesons using the full Run II data set with an integrated luminosity of 10.4 fb^{-1} of proton-antiproton collisions collected using the D0 detector at the Fermilab Tevatron Collider. We find no evidence for the CPT-violating effects tested and place limits on CPT- and Lorentz-invariance violating coupling coefficients, Δa_μ.

10 – Higgs and New Physics
TH 23-07-15 14:30-18:00
Grosser Festsaal

10.1 | TH 23-07-15 14:30 | Grosser Festsaal
Prospects for SUSY discovery after the LHC Run 1 | G. Weiglein[1] – [1]Deutsches Elektronen-Synchrotron (DE)
We present the prospects for SUSY searches after Run 1 of the LHC, based on a global fit in the phenomenological MSSM with 10 parameters (pMSSM10). Particular care has been taken regarding the implementation of the most important limits obtained from the SUSY searches at Run 1 of the LHC. The information from the observed Higgs signal, limits from Higgs searches, as well as constraints from electroweak precision data, flavour physics, cosmological data and direct searches for dark matter are also taken into account. The best-fit region indicates good prospects for SUSY searches at the upcoming Run 2 of the LHC and at a future e^+e^- colliders. The talk will be based on arXiv:1504.03260 and updates thereof. This talk is submitted on behalf of the MasterCode collaboration. It is not clear yet who will actually give the talk.

10.2 | TH 23-07-15 14:45 | Grosser Festsaal
Searches for squarks and gluinos in ATLAS and CMS | T. Khoo[1], E. Shabalina[2] – [1]University of Cambridge (GB), [2]Georg-August-Universitaet Goettingen (DE)
Despite the absence of experimental evidence, weak scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarises recent ATLAS and CMS results on inclusive searches for promptly decaying supersymmetric squarks and gluinos in events containing jets, missing transverse momentum with and without light leptons. The results presented utilise 20/fb of 8 TeV pp collision data collected by the ATLAS and CMS detectors at the LHC, and prospects for 13 TeV Run-2 data are also included.

10.3 | TH 23-07-15 15:00 | Grosser Festsaal
Searches for 3rd generation SUSY partners in ATLAS and CMS | M. Tripiana[1], E. Shabalina[2] – [1]IFAE (ES), [2]Georg-August-Universitaet Goettingen (DE)
Naturalness arguments for weak-scale supersymmetry favour supersymmetric partners of the third generation quarks with masses not too far from those of their Standard Model counterparts. Top or bottom squarks with masses of a few hundred GeV can also give rise to large direct pair production rates at the LHC. The talk presents recent ATLAS and CMS results from searches for direct stop and sbottom pair production, using 20/fb of 8 TeV pp collision data, and prospects for 13 TeV Run-2 data are also included.

10.4 | TH 23-07-15 15:15 | Grosser Festsaal
SUSY searches with leptons, photons and taus in ATLAS and CMS | C. Botta[1], A. Meyer[2] – [1]CERN, [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
The talk presents searches for the prompt decay of supersymmetric particles in events containing leptons, photons or taus and large transverse missing momentum, performed by the ATLAS and CMS experiment. The final states considered are particularly motivated in gauge mediated supersymmetry breaking models with a light gravitino as the lightest supersymmetric particle.

10.5 | TH 23-07-15 15:30 | Grosser Festsaal
Searches for R-Parity Violating SUSY at ATLAS and CMS | D. Morse[1] – [1]Northeastern University (US)
The violation of R-parity allows new signatures to be pursued in the search for supersymmetry at the LHC. This talk presents the latest results from the ATLAS and CMS experiment using 20/fb of pp LHC collision data of searches for R-parity violating SUSY scenarios with baryon and lepton number violation. The results presented are for dedicated searches for resonances, as well as a systematic analysis of the constraints placed on R-parity violating models with lepton flavour violation, and in terms of production of squarks, gluinos, charginos, neutralinos, and sleptons within R-parity violating SUSY models.

10.6 | TH 23-07-15 15:45 | Grosser Festsaal
Compressed SUSY searches at ATLAS and CMS | N. Barlow[1], E. Shabalina[2] – [1]University of Cambridge (GB), [2]Georg-August-Universitaet Goettingen (DE)

This talk presents searches for SUSY models that require specific analysis techniques, such as in the case of compressed scenarios. The talk presents recent results from such searches performed with the ATLAS and CMS detector.

10.7 | TH 23-07-15 16:30 | Grosser Festsaal

Proposing a new LHC search for light compressed stop squarks | C. Petersson[1] – [1]ULB-Brussels/Chalmers-Gothenburg

The LHC searches for light compressed stop squarks have resulted in considerable bounds in the case where the stop decays to a neutralino and a charm quark. However, in the case where the stop decays to a neutralino, a bottom quark and two fermions via an off-shell W-boson, there is currently a significant unconstrained region in the stop-neutralino mass plane, still allowing for stop masses in the range 90–140 GeV. In this talk I will propose a new monojet-like search for light stops, optimized for the four-body decay mode, in which at least one b-tagged jet is required. I will show that, already by using the existing 8 TeV LHC data set, such a search would cover the entire unconstrained region.

10.8 | TH 23-07-15 16:45 | Grosser Festsaal

Killing the CMSSM softly | M. Hamer[1], P. Bechtle[2], B. O'leary[3], W. Porod[4], K. Desch[2], B. Sarrazin[2], M. Uhlenbrock[2], P. Wienemann[5], T. Stefaniak[6], J. Camargo-Molina[3], H. Dreiner[7], M. Kramer[8] – [1]CBPF - Brazilian Center for Physics Research (BR), [2]Universitaet Bonn (DE), [3]Institut fur Theoretische Physik und Astrophysik, University of Wurzburg, [4]Julius Maximilians Universitaet Wuerzburg (DE), [5]University of Bonn, [6]Santa Cruz Institute for Particle Physics, [7]Bonn University, [8]Rheinisch-Westfaelische Tech. Hoch. (DE)

The analysis of the data collected by the major LHC experiments during the LHC Run I has put strong constraints on supersymmetric models. We study the parameter space of the constrained Minimal Supersymmetric Standard Model (CMSSM) in a global fit, taking into account the non-observation of supersymmetry at the LHC, Higgs mass and rate measurements, as well as several cosmological and low energy observables. Before the start of the LHC, global fits of the CMSSM showed a favourable goodness-of-fit and indicated a strong preference for the existence of light SUSY particles. This region now has largely been excluded by the LHC. We present the final results of our study of the status of the CMSSM after the LHC Run1, where for the first time we use toy experiments to determine the p-Value of the model. A special emphasis is given on the dependence of the p-value on the choice of the observable set in the fit, where especially the Higgs rate measurements play a crucial role, since they had the potential for sensitivity to the CMSSM, had the Higgs boson been lighter. We find that the CMSSM is softly getting near its exclusion at the 95% CL.

10.9 | TH 23-07-15 17:00 | Grosser Festsaal

pMSSM combination of SUSY searches at the LHC | E. Shabalina[1] – [1]Georg-August-Universitaet Goettingen (DE)

The results of supersymmetric searches at the LHC are typically presented in the context of simplified models, with a single specific production channel and decay mode for the supersymmetric particles. In full SUSY models, several production and decay channels are expected, and the limits on supersymmetric particle masses might be weaker. This talk presents the combination of the results from each of the ATLAS and CMS collaborations to place constraints on the 19-parameter phenomenological MSSM.

10.10 | TH 23-07-15 17:15 | Grosser Festsaal

$h^0(125GeV) \to c\bar{c}$ **as a test case for quark flavor violation in the MSSM** | K. Hidaka[1], A. Bartl[2], H. Eberl[3], E. Ginina[3], W. Majerotto[3] – [1]Tokyo Gakugei University, [2]University of Vienna, [3]HEPHY, Vienna

We compute the decay width of $h^0 \to c\bar{c}$ in the MSSM with quark flavor violation (QFV) at full one-loop level in the $\overline{\text{DR}}$ renormalization scheme. We study the effects of $\tilde{c} - \tilde{t}$ mixing, taking into account the constraints on QFV from the B meson data. We find that the full one-loop corrected decay width $\Gamma(h^0 \to c\bar{c})$ is very sensitive to the MSSM QFV parameters. In a scenario with large $\tilde{c} - \tilde{t}$ mixing, $\Gamma(h^0 \to c\bar{c})$ can differ up to $\sim \pm 35\%$ from its SM value. After estimating the uncertainties of the width, we conclude that an observation of these QFV SUSY effects is possible at a future e^+e^- collider such as ILC. (Published in Phys. Rev. D91 (2015) 015007 [arXiv:1411.2840 [hep-ph]])

10.11 | TH 23-07-15 17:30 | Grosser Festsaal

Discriminating between SUSY and Non-SUSY Higgs Sectors through the Ratio $H \to b\bar{b}/H \to \tau\bar{\tau}$ | E. Arganda[1], W. Hollik[2], S. Penaranda Rivas[1] – [1]Universidad de Zaragoza, [2]Max Planck Gesellschaft

The ratio of branching ratios R = BR($H \to b\bar{b}$)/BR($H \to \tau\bar{\tau}$) of Higgs boson decays is a powerful tool in order to distinguish the MSSM Higgs sector from non-supersymmetric two Higgs doublet models (2HDM). This ratio receives large renormalization-scheme independent radiative corrections in supersymmetric models at large tan β, which are insensitive to the SUSY mass scale and absent in the Standard Model or 2HDM. Making use of the current LHC data and the upcoming new results on Higgs couplings to be reported by ATLAS and CMS collaborations, we develop a detailed and updated study of this ratio R which improves previous analyses and sets lower levels of accuracy to discriminate between models.

10.12 | TH 23-07-15 17:45 | Grosser Festsaal

LHC phenomenology of light pseudoscalars in the NMSSM | N. Bomark, L. Roszkowski[1], S. Munir, S. Moretti[2] – [1]University of Sheffield (GB), [2]STFC - Rutherford Appleton Lab. (GB)

After the discovery of the 125 GeV Higgs boson, the Next-to-Minimal Supersymmetric Standard Model (NMSSM), has become more interesting as a model for new physics since new tree-level contributions to the Higgs mass makes it easier to accommodate the relatively high measured value, as compared to the MSSM. One very distinctive feature of the NMSSM, is the possible existence of a light singlet-like pseudoscalar. As this pseudoscalar may be lighter than the discovered Higgs boson without conflict with data, it may lead to LHC signatures rather different to what is usually searched for in terms of new physics. We will discuss the channels in which light pseudoscalars may be discovered, focusing on cascade decays of heavier scalars as the direct production channels appear too difficult. It is demonstrated that heavier scalars decaying to pairs of pseudoscalars or pseudoscalars and Z bosons may lead to discovery in a large part of parameter space. This is especially important for the non-SM like of the two lightest scalars, as it may have a almost 100% branching ratio for decay into pairs of pseudoscalars. In such a case the discussed channels might be our only means of discovery, also for the scalar.

11 – QCD and Hadronic Physics

TH 23-07-15 14:30-18:00
HS32

11.1 | TH 23-07-15 14:30 | HS32

Colour Reconnection - Models and Tests | J. Christiansen[1] – [1]Lund University (SE)

Recent progress on colour reconnection within the PYTHIA framework is presented. A new model is introduced, based on the SU(3) structure of QCD and a minimization of the potential string energy. The inclusion of the epsilon structure of SU(3) gives a new baryon production mechanism and makes it possible simultaneously to describe hyperon production at both ee and pp colliders. Further comparisons with soft QCD measurements are also presented, as well as a study of the effects on the top mass uncertainty. Here additional toy models are also considered. Finally, predictions for ee colliders, both past and potential future ones, are presented.

11.2 | TH 23-07-15 14:45 | HS32

Measurement of observables sensitive to coherence effects in hadronic Z decays with the OPAL detector at LEP | S. Kluth[1], N. Fischer[2], S. Gieseke, S. Plaetzer[3], P. Skands[4] – [1]Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D, [2]KIT - Karlsruhe Institute of Technology (DE), [3]ITP, Universitaet Karlsruhe, [4]Monash University (AU)

A study of QCD coherence is presented based on a sample of about 397.000 e^+e^- hadronic annihilation events collected at $\sqrt{s}$ = 91 GeV with the OPAL detector at LEP. The study is based on four recently proposed observables that are sensitive to coherence effects in the perturbative regime. The measurement of these observables is presented, along with a comparison with the predictions of different parton shower models. The models include both conventional parton shower models and dipole antenna models. Different ordering variables are used to investigate their influence on the predictions.

11.3 | TH 23-07-15 15:00 | HS32

Measurements of particle production, Bose-Einstein correlations and Underlying Event properties with the ATLAS detector | T. Kuhl[1], Atlas – [1]Deutsches Elektronen-Synchrotron Campus Zeuthen (DE)

The ATLAS collaboration has carried out several measurements of particle production properties and correlations at different pp collisions centre-of-mass energies. The production properties of mesons and baryons at sqrt(s)=7 TeV are presented and compared to predictions. The effects of space-time geometry in the hadronization phase has been studied in the context of Bose-Einstein correlations between charged particles, for determining the size and shape of the source from which particles are emitted and for interpreting of quark confinement effects. Bose-Einstein correlation parameters are investigated in p-p collisions at 900 GeV and 7 TeV, up to very high charged-particle multiplicities. In addition, particle distributions sensitive to the underlying event in proton-proton collisions have also been measured at 7 TeV centre-of-mass energy in different final-state processes.

11.4 | TH 23-07-15 15:15 | HS32

Small-x QCD and forward physics results from CMS | G. Veres[1], Cms – [1]CERN

The CMS Collaboration has a comprehensive program of small-x QCD and forward physics measurements, which is supported by an excellent experimental coverage into the very forward phase space. Some of the highlights in terms of testing QCD at low-pt and at high pseudorapidities with jets and charged particles are summarized. Also extremely rare processes, as the measurement of exclusive W-pair production in photon-photon collisions in pp data are discussed. The range of physics results is complemented with studies of diffractive collisions, as well as of multi-parton interaction and soft-QCD phenomena. The measurement of the underlying event at different center-of-mass energies is another core result that will be presented. An outlook to the prospects at 13 TeV is given.

11.5 | TH 23-07-15 15:30 | HS32

Charged-particle multiplicities at different pp interaction centre-of-mass energies measured with the ATLAS detector at the LHC | A. Morley[1], Atlas – [1]University of Sydney (AU)

Measurements are presented from proton-proton collisions at different centre-of-mass energies in the range of 0.9 to 13 TeV

recorded with the ATLAS detector at the LHC. The charged-particle multiplicity, its dependence on transverse momentum and pseudorapidity, and the relationship between the mean transverse momentum and charged-particle multiplicity are measured. The results are corrected for detector effects and are presented at the particle-level. The results are compared to various Monte Carlo event generator models.

11.6 | TH 23-07-15 15:45 | HS32

Testing QCD with CMS using jets and diffraction | H. Van Haevermaet[1], Cms – [1]University of Antwerp (BE)

Several measurements of jet final states are presented performed at different center-of-mass energies and down to very low pt. The simultaneous observation of several jets in the same event is exploited to study for example the angular correlations of Mueller Navelet jet topologies in order to search for the signature of BFKL parton dynamics. But multi-jet measurements are also used to test higher-order QCD effects, and by lowering the jet pt to the smallest possible values the minijet production close to the factorization limit is studied. Futhermore, diffractive final states are studied identified either by the presence of rapidity gaps or the general feature of central exclusive production. The single- and double-diffractive cross section,. jet-gap-jet events as well as exclusive pi+pi- production are presented.

11.7 | TH 23-07-15 16:30 | HS32

Production of c cbar c cbar in single and double parton scattering in collinear and kt-factorization approaches | R. Maciula[1], A. Szczurek[2], A. Van Hameren[3] – [1]Institute of Nuclear Physics PAN, [2]Institute of Nuclear Physics, [3]IFJ PAN

We present first results for the $2 \to 4$ single-parton scattering $gg \to c\bar{c}c\bar{c}$ subprocess for the first time fully within the k_t-factorization approach. In this calculation we have used the Kimber-Martin-Ryskin unintegrated gluon distribution which effectively includes some class of higher-order gluon emissions, and an off-shell matrix element squared calculated using recently developed techniques. The results are compared with our earlier result obtained within the collinear approach. Only slightly larger cross sections are obtained than in the case of the collinear approach. Inclusion of transverse momenta of gluons entering the hard process leads to a much stronger azimuthal decorrelation between cc and $\bar{c}\bar{c}$ than in the collinear-factorization approach. A comparison to predictions of double parton scattering (DPS) results and the LHCb data strongly suggests that the assumption of two fully independent DPS ($gg \to c\bar{c} \otimes gg \to c\bar{c}$) may be too approximate. 1) A. van Hameren, R. Maciula and A. Szczurek, "Single-parton scattering versus double-parton scattering in the production of two $c\bar{c}$ pairs and charmed meson correlations at the LHC", Phys. Rev. D89 (2014) 094019. 2) A. van Hameren, R. Maciula and a. Szczurek, Production of two charm quark-antiquark pairs in single-parton scattering within the k_t-factorization approach, arXiv:1504.06491, submitted to Phys.Lett.B.

11.8 | TH 23-07-15 16:45 | HS32

Study of fragmentation functions in e+e- annihilation process at Belle | M. Bracko[1] – [1]Jozef Stefan Institute

The e^+e^- annihilation process provides an access to the fragmentation functions due to its clean environment. Using the high-statistics dataset accumulated by the Belle detector at the KEKB asymmetric-energy e^+e^- collider, we report the first measurements of the double differential cross section of identified di-hadrons (pions and kaons) with respect to the two hadron's fractional energies for any charge and hadron combinations. In addition, we also present an extraction of azimuthal correlation between two pairs of charged pions detected in opposite jets from e^+e^- annihilation.

11.9 | TH 23-07-15 17:00 | HS32

Measurements of the elastic, inelastic and total cross sections in pp collisions with ATLAS sub-detectors | P. Grafstrom[1], Atlas – [1]Universita e INFN, Bologna (IT)

The total pp cross section is a fundamental parameter of the strong interaction which cannot be calculated in QCD but still can be measured using the optical theorem, which states that the total cross section can be obtained from the extrapolation to t=0 of the differential elastic cross section measured at small four-momentum transfer t. The ATLAS Collaboration has collected 80 mub-1 of elastic data in a dedicated run with high beta* optics at 7 TeV centre-of-mass energy with the ALFA Roman Pot detector in order to perform this measurement. From the extrapolation of the differential elastic cross section to t=0 using the optical theorem the total cross section is extracted with the luminosity-dependent method. In addition the nuclear slope of the elastic t-spectrum, the total elastic and inelastic cross sections are determined. First LHC Run-2 results will be included for the measurement of the inelastic pp cross-section using minimum bias scintillators, if available.

11.10 | TH 23-07-15 17:15 | HS32

Data-driven approaches to pile-up subtraction at the LHC | H. Van Haevermaet[1], F. Hautmann[2], H. Jung[3] – [1]University of Antwerp (BE), [2]Institute of Theoretical Physics, [3]Deutsches Elektronen-Synchrotron (DE)

Experiments in the upcoming high-luminosity runs at the LHC face the challenges of very large pile-up. Primary techniques to deal with this are based on vertexing by trackers. Outside the detector tracking acceptances, however, lie regions of much interest for a great many aspects of the LHC physics program. Treatments of pile-up in these regions rely more strongly on Monte Carlo simulations. Here, on the other hand, one is also approaching parts of the phase space in which the tuning of the Monte Carlo event generators becomes subject to increasingly large uncertainties. In this work we explore complementary approaches to pile-up corrections, with a view to developing data-driven techniques which treat pile-up and do not spoil the

physics of the signal process. We present numerical illustrations of these approaches for a variety of processes, including Drell-Yan vector boson production, Drell-Yan plus jets, and associated underlying events.

11.11 | TH 23-07-15 17:30 | HS32

Study of multiple parton interactions in diphoton plus dijet events and in double quarkonia production in pbar p interactions | D. Lincoln[1] – [1]Fermilab

We use a sample of diphoton + dijet events, as well as a sample of simultaneous production of two heavy quarkonia (two J/psi or J/psi and Upsilon) collected by the D0 detector at the Fermilab Tevatron collider, to study properties of events with double parton scattering (DPS) in single p¯p collisions at sqrt(s) = 1.96 TeV. We measure the cross sections and extract the effective cross section of double parton interactions in proton-antiproton collisions. Multiple parton interactions are a major background for electroweak precision measurements and new phenomena searches at high energy hadron colliders. These studies provide important information on the parton spatial structure of the nucleon.

11.12 | TH 23-07-15 17:45 | HS32

Measurement of Double Parton Scattering at LHC with the CMS experiment | A. Mehta[1], Cms – [1]Panjab University (IN)

Double parton scattering is measured in different channels using the CMS experiment at the CERN LHC. Data from pp collisions collected at 7 and 8 TeV center-of-mass energy are used. Several final states are investigated to identify and measure the signature of double parton scattering in inelastic events. Parameters are extracted from the data that are suited in an optimal way to distinguish double parton scattering from various backgrounds. Multivariate analysis techniques are exploited to maximise the sensitivity.

12 – Top and Electroweak Physics

TH 23-07-15 14:30-18:00

HS31

12.1 | TH 23-07-15 14:30 | HS31

Measurement of t-channel single top quark production in pp collisions | F. Fabozzi[1] – [1]Universita e INFN, Napoli (IT)

Measurements are presented of t-channel single top quark production in proton-proton collisions at the LHC at centre-of-mass energies of 7 and 8 !TeV, using data collected with the CMS experiment during the years 2011 and 2012. The analyses consider decay channels where the W from the top decays into electron-neutrino or muon-neutrino, and makes use of kinematic characteristics of electroweak single top production for the separation of signal from backgrounds using multivariate methods. The results are compared with the most precise standard model theory predictions. Measurements of top/antitop cross section ratio and of various differential single top quark production cross sections are also presented.

12.2 | TH 23-07-15 14:48 | HS31

Measurement of single top production in the tW-channel and search for s-channel in pp collisions | M. Merola[1] – [1]Universita e INFN, Napoli (IT)

Measurements of single top quark production in the tW-channel in pp collisions are presented. In the tW-channel a top quark is produced in association with a W boson. The data were collected in the years 2011 and 2012 at centre-of-mass energies of 7 and 8 !TeV. The experimental signature is similar to top pair production, and there is interference at higher orders between the two processes. The measurements are perfomed using final states in which the associated W boson as well as the one originating from the top quark decay leptonically. Multivariate methods are used to extract the cross section. The result is compared with current standard model theory predictions. Furthermore, a search for s-channel single top production at 8 TeV is presented.

12.3 | TH 23-07-15 15:06 | HS31

Tevatron combined single top production cross sections | M. Ronzani[1], D0 Collaboration[2] – [1]Albert-Ludwigs-Universitaet Freiburg (DE), [2]DZero Experiment, Fermilab

We present measurements of the cross sections for the two main production modes of single top quarks in ppbar collisions at a center-of-mass energy of 1.96 TeV in the Run II data collected with the CDF and D0 detector at the Fermilab Tevatron Collider. For this measurement the full data set corresponding to an integrated luminosity of up to 9.7 fb^{-1} per experiment is used. We report the first observation of single top quark production in the s-channel with a significance of 6.3 standard deviations. We also present a simultaneous measurement of the production cross section of t- and s+t-channels. Using these measurements we set a lower limit on the CKM matrix element |Vtb| > 0.92 at 95% C.L., assuming mt = 172.5 GeV.

12.4 | TH 23-07-15 15:24 | HS31

Measurement of ttbar production cross section | R. Peters[1], D0 Collaboration[2] – [1]University of Manchester (GB), [2]DZero Experiment, Fermilab

We present the most recent measurements of the cross section for pair and single production of the top quark with the D0 detector at the Tevatron proton-antiproton collider. Measurements use the full D0 Run II data corresponding to an integrated

luminosity of 9.7 fb∧-1. We also discuss the measurements of differential cross section distributions of top quark pairs in the lepton plus jets channel.

12.5 | TH 23-07-15 15:42 | HS31

Top-quark pair production at hadron colliders: differential cross section and phenomenological applications with DiffTop | K. Lipka[1], M. Guzzi[1] – [1]Deutsches Elektronen-Synchrotron (DE)

The results of phenomenological studies of top-quark pair production in proton-proton collisions are presented. Differential cross sections are calculated in perturbative QCD at approximate next-to-next-to-leading order (α_s^4) by using methods of threshold resummation beyond the leading logarithmic accuracy. Predictions for the single-particle inclusive kinematics are presented for transverse momentum and rapidity distributions of final-state top quarks. Uncertainties related to the description of proton structure, top-quark mass and strong coupling constant are investigated in detail. The results are compared to the recent measurements by the ATLAS and CMS collaborations at the LHC at the center of mass energy of 7 TeV. The calculation presented here is implemented in the computer code Difftop and can be applied to the general case of heavy-quark pair production at hadron-hadron colliders. For the first time, a fit of parton distribution functions at NNLO is performed by using the differential cross sections of top-quark pair production together with other data sets. The impact of the top-pair production on the precision of the gluon distribution at high scales is illustrated.

12.6 | TH 23-07-15 16:30 | HS31

Measurements of the top quark pair production cross section in pp collisions | E. Ntomari[1], A. Meyer[2] – [1]Deutsches Elektronen-Synchrotron (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Precision measurements are presented of the top-quark pair inclusive production cross section in proton-proton collisions at the LHC at centre-of-mass energies of 7 !TeV and 8 !TeV. The data are collected with the CMS experiment during the years 2011 and 2012. The analyses include all top quark pair final states with the exception of events with two tau-leptons in the final state. In most analyses b-jet identification is used to increase the purity of the selection. The backgrounds are determined using data-driven techniques. The results are combined with each other and compared with theory predictions. Indirect constraints on both the top quark mass and alpha_s are obtained through their relation to the inclusive cross section.

12.7 | TH 23-07-15 16:48 | HS31

Measurement of differential cross sections in top pair production in pp collisions | U. Husemann[1], A. Meyer[2] – [1]KIT - Karlsruhe Institute of Technology (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Differential top quark pair production cross sections are measured in proton-proton collisions at the LHC at centre-of-mass energies of 7 and 8 !TeV, using data collected by the CMS experiment in the years 2011 and 2012. The differential cross sections are measured as functions of various kinematic observables, including the transverse momentum and rapidity of the (anti)top quark and the top-antitop system and the jets and leptons of the event final state. Multiplicity and kinematic distributions of the jets produced in addition to the top pair are investigated. First measurements of the associate production of top quark pairs with vector bosons and with additional b-quarks in the final state are also presented.

12.8 | TH 23-07-15 17:06 | HS31

Top quark pair production measurements using the ATLAS detector at the LHC | M. Romano[1], J. Katzy[2] – [1]INFN Bologna (IT), [2]DESY, HAMBURG

Measurements of the inclusive and differential topquark pair and singletop production cross sections in protonproton collisions with the ATLAS detector at the Large Hadron Collider are presented. The inclusive measurements reach high precision and are compared to the best available theoretical calculations. Differential measurements of the kinematic properties of the top quark production are also discussed. These measurements, including results using boosted tops, probe our understanding of top pair production in the TeV regime. The results, unfolded to particle and parton level, are compared to Monte Carlo generators implementing LO and NLO matrix elements matched with parton showers and NLO QCD calculations.

12.9 | TH 23-07-15 17:24 | HS31

Measurements of ttbar+X using the ATLAS detector | O. Bessidskaia Bylund[1], J. Katzy[2] – [1]Stockholm University (SE), [2]DESY, HAMBURG

The large integrated luminosity provided by the LHC enables the production significant numbers of top quark pairs in association with addition jets or additional gauge bosons. The production crosssection of topquark pairs in association with jets originating from additional bquarks is presented. This process is an important background to searches for new physics and is compared to the available theoretical calculations. In addition, the production of top quark pairs in association with W and Z bosons is presented. The measurement uses events with multiple leptons and in particular probes the coupling between the top quark and the Z boson. Finally, the crosssection measurement of photons produced in association with top quark pairs is presented. The measurement uses a data driven technique to extract the signal from the background and achieves a significance of greater than 5 standard deviations.

12.10 | TH 23-07-15 17:42 | HS31

t tbar + isolated photon production at NLO accuracy matched with parton shower | Z. Trocsanyi[1], A. Kardos[2] – [1]University of Debrecen (HU), [2]University of Debrecen
We simulate the hadroproduction of a t tbar pair in association with one or two isolated photons at the LHC using the PowHel program. The generated events are stored according to the Les-Houches event format and constitute an almost inclusive event sample (regarding the photons), so that usual experimental photon isolation can be employed. We interface those events to the PYTHIA shower Monte Carlo program, allowing for decays of massive particles, showering and hadronization, and present predictions for differential distributions at the hadron level.

13 – Neutrino Physics

TH 23-07-15 14:30-18:00
HS7

13.1 | TH 23-07-15 14:30 | HS7
Status of Light Sterile Neutrinos | C. Giunti[1] – [1]INFN - National Institute for Nuclear Physics
I review the experimental indications in favor of short-baseline neutrino oscillations. I discuss their interpretation in the framework of neutrino mixing schemes with one or more sterile neutrinos which have masses around the eV scale. I present arguments in favor of 3+1 neutrino mixing with one sterile neutrino at the eV scale. I discuss the implications for neutrinoless double-beta decay and cosmology.

13.2 | TH 23-07-15 14:45 | HS7
Search for sterile neutrinos at Long Baselines | L. Stanco[1], L. Patrizii[2] – [1]Universita e INFN, Padova (IT), [2]Universita e INFN, Bologna (IT)
The OPERA experiment has observed muon neutrino to tau neutrino oscillations in the atmospheric sector. Based on this result new limits on the mixing parameters of a massive sterile neutrino have been set. In this talk the analysis performed in the 3+1 neutrino model is presented. The status of the searches for sterile neutrinos performed on LBL experiments is also recalled and perspectives discussed.

13.3 | TH 23-07-15 15:00 | HS7
STEREO: search for a sterile neutrino at the ILL Grenoble reactor | P. Del Amo Sanchez[1], C. Stereo[2] – [1]LAPP-IN2P3-CNRS / Université Savoie Mont Blanc, [2]CEA-Irfu-Saclay, LAPP-IN2P3-CNRS, LPSC-IN2P3-CNRS, MPIK Heidelberg, ILL, University of Casablanca
Interest in light sterile neutrinos has been recently revived by the so-called Gallium and reactor neutrino anomalies. In both of them, a deficit of detected neutrinos was observed with respect to the expectations. Both anomalies could be explained by the oscillations of a sterile neutrino introducing an additional Δm^2 around 1 eV^2. Such oscillations should cause a tell-tale distortion of the neutrino energy spectrum, with the known L/E dependence of neutrino oscillations. The STEREO experiment has been designed to exploit such a signature at short baselines, thus confirming or refuting the $\Delta m^2 \simeq 1$ eV^2 sterile neutrino hypothesis. The STEREO detector consists of six optically separated cells filled with Gd-loaded liquid scintillator, where reactor anti-neutrinos are detected through their inverse beta decay, surrounded by an external blanket of non-loaded liquid scintillator. The experiment will be placed in early 2016 at the Institut Laue-Langevin (ILL) at Grenoble, next to one of the most compact nuclear reactors in operation, with detector commissioning and data taking starting soon afterwards. We present the experiment design, which has been finalised, its sensitivity, and the status of its preparation.

13.4 | TH 23-07-15 15:15 | HS7
First results of the deployment of a SoLid detector module at the SCK•CEN BR2 reactor | N. Ryder[1], A. Vacheret[2] – [1]University of Oxford (GB), [2]University of Oxford
The SoLid experiment intends to search for active-to-sterile anti-neutrino oscillation at very short baseline of the SCK•CEN BR2 research reactor and provide a precise measurement of a high enriched Uranium core, a key ingredient in the calculation of reactor antineutrino flux. It utilises a novel approach to anti-neutrino detection based on a highly segmented detector design. High experimental sensitivity can be achieved using a combination of high granularity, high neutron-gamma discrimination using 6LiF:ZnS(Ag) and precise localisation of the Inverse Beta Decay products. This relatively compact detector system requires limited passive shielding as it rely on spatial topology to determine the different class of backgrounds. We will describe the principle of detection, detector design with a focus on the performance of the first full scale SoLid module (SM1) that was deployed successfully at BR2 in November 2014. We will conclude on the physics reach of the next phase that will start in the second half of 2016.

13.5 | TH 23-07-15 15:30 | HS7
SOX : Short Distance Neutrino Oscillations with Borexino | M. Agostini[1], C. Borexino[2] – [1]Technische Universität München & Gran Sasso Science Institute, [2]LNGS
The Borexino detector has convincingly shown its outstanding performances in the low energy regime through its accomplishments in the solar and geo neutrinos detection. These performances make it the ideal tool to accomplish a state-of-the-art,

source based experiment able to test the long-standing issue of the existence of a sterile neutrino, as suggested by the several anomalous results accumulated over the past two decades, i.e. the outputs of the LSND and Miniboone experiments, the results of the source calibration of the two Gallium experiments, and the recently hinted reactor anomaly. The SOX project can exploit two sources, based on Chromium and Cerium, respectively, which deployed under the experiment, in a location foreseen on purpose at the time of the construction of the detector, will emit two intense beams of neutrinos (Cr) and anti-neutrinos (Ce). Interacting in the active volume of the liquid scintillator, each beam would create an unmistakable spatial wave pattern in case of oscillation of the nu-e (or anti nu-e) into the sterile state: such a pattern would be the smoking gun proving the presence of the new sterile member of the neutrino family. Otherwise, its absence will allow setting very stringent limit on the existence of the hypothesized sterile state. The talk will outline the project, discuss the sensitivity of both Cerium and Chromium measurements and update about the status of the realization of the first planned measurement based on Cerium.

13.6 | TH 23-07-15 15:45 | HS7

nuMSM: the model, its predictions and experimental tests | D. Gorbunov[1] – [1]Institute for Nuclear Research of the Russian Academy of Sciences / Moscow Institute of Physics and Technology

Supplemented with three right-handed sterile neutrinos the Standard Model can explain neutrino oscillations (active neutrino masses via seesaw type-I mechanism), baryon asymmetry of the Universe (via leptogenesis by sterile-active neutrino oscillations in the primordial plasma) and dark matter phenomenon (by a population of the lightest sufficiently long-lived sterile neutrino). This seems to be the minimal extension of the SM capable of addressing all the major phenomenological issues we have. The lightest sterile neutrino (the dark matter candidate) mass is in 1-50 keV range and the mass scale of the heavier two sterile neutrinos is 0.1-50 GeV. The model predictions for neutrino physics (e.g. low neutrinoless double beta decay rate), particle physics (direct production and decay of heavy sterile neutrinos at beam-dump experiments like SHiP and colliders like ee-FCC) and astophysics (cosmic X-rays due to dark matter sterile neutrino radiative decay) can be tested at the ongoing and future experiments.

13.7 | TH 23-07-15 16:30 | HS7

Heavy neutrinos in particle physics and cosmology | M. Drewes[1] – [1]Technische Universitaet Muenchen (DE)

Neutrinos are the only particles in the Standard Model of particle physics that have only been observed with left handed chirality to date. If right handed neutrinos exist, they would not only explain the observed neutrino oscillations, but could also be responsible for several phenomena in cosmology, including the baryon asymmetry of the universe, dark matter and dark radiation. A crucial parameter in this context is their mass, which in principle could lie anywhere between the eV scale and GUT scale. The implications for experiments and cosmology strongly depend on the choice of the mass scale. I review recent progress in the phenomenology of right handed neutrinos with different masses, focussing on scenarios where they lie at or below the TeV scale. I put special emphasis on the possibility to discover the heavy neutrinos that are responsible for leptogenesis in near future experiments, such as LHC, BELLE II and SHiP.

13.8 | TH 23-07-15 16:45 | HS7

Searches for leptoquarks and heavy leptons with the ATLAS detector at the LHC | S. Grancagnolo[1], E. Shabalina[2] – [1]Humboldt-Universitaet zu Berlin (DE), [2]Georg-August-Universitaet Goettingen (DE)

Leptoquarks are hypothetical particles predicted by extensions of the Standard Model, providing an explanation for the similarity between the quark and lepton sectors. Pair-produced scalar leptoquarks have been searched for using final states including leptons and jets. Similar final states are predicted in decays of heavy leptons/neutrinos including Type III neutral/charged leptons as well as heavy Majorana neutrinos produced in decays of heavy right-handed W or SM W boson. In this talk, recent ATLAS results on searches for Leptoquarks and heavy leptons with similar signatures using LHC Run 1 data are presented. First LHC Run-2 results will be included if available.

13.9 | TH 23-07-15 17:00 | HS7

Indirect searches for sterile neutrinos at a high-luminosity Z-factory | V. De Romeri[1], A. Abada[2], A. Teixeira[3], J. Orloff[4], S. Monteil[5] – [1]CNRS, [2]Laboratoire de Physique Theorique Orsay, [3]LPC Clermont, [4]Université Blaise Pascal - Clermont-Ferrand, [5]Univ. Blaise Pascal Clermont-Fe. II (FR)

A future high-luminosity Z-factory will offer the possibility to study rare Z decays, as those leading to lepton flavour violating final states. Processes such as Z –> l±1 l±2 are potentially complementary to low-energy (high-intensity) observables of lepton flavour violation. We address the impact of new sterile fermions on lepton flavour violating Z decays, focusing on potential searches at FCC-ee (TLEP), and taking into account experimental and observational constraints on the sterile states. We consider a minimal extension of the Standard Model by one sterile fermion state, and one well-motivated framework of neutrino mass generation, the Inverse Seesaw embedded into the Standard Model. The results show that sterile neutrinos can give rise to contributions to BR(Z –> l±1 l±2) within reach of the FCC-ee. We also discuss the complementarity between a high-luminosity Z-factory and low-energy charged lepton flavour violation facilities.

13.10 | TH 23-07-15 17:15 | HS7

Global fit to right-handed neutrino mixing at 1 loop | J. Hernandez[1], E. Fernandez-Martinez[1], J. Lopez[2], M. Lucente[2] –

[1]IFT-CSIC, [2]SISSA
We extend the Standard Model with 3 right-handed neutrinos with an approximate lepton number symmetry, which leads to sizable neutrino mixing while generating the neutrino masses and PMNS matrix measured in oscillation experiments. Constraints on the right-handed neutrino mixing are derived through a global fit to electroweak precision observables. We analyze explicitly the impact of one-loop corrections on these constraints.

13.11 | TH 23-07-15 17:30 | HS7
Radiative Origin of Majorana Neutrino Masses | D. Aristizabal[1] – [1]Universite de Liege
Majorana neutrino masses can originate either at the tree level (type-I, II or III seesaws) or can be radiatively induced. The latter option naturally requires order TeV BSM fields, thus leading to -in principle- testable neutrino mass generation mechanisms. Based on a two-loop systematic classification of the dimension five effective Weinberg operator, in this talk I will discuss the different realizations one can envisage for neutrino mass generation at the two-loop order.

13.12 | TH 23-07-15 17:45 | HS7
Neutrino mass generation in connection with Dark Matter | M. Rivera[1] – [1]Universidad Tecnica Federico Santa Maria
We discuss some extensions of the Standard Model of particle physics that naturally generate small neutrino masses and provide a dark matter candidate. The symmetry that stabilizes the dark matter suppresses neutrino masses to appear first at higher order in perturbation theory (e.g. 2 or 3-loops). Without the need of very heavy new fields or right-handed neutrinos. In the talk we will discuss the impact of this approach on neutrinoless double beta decay experiments, neutrino mass matrix texture, flavor mixing angles and dark matter signal.

14 – Heavy Ion Physics
TH 23-07-15 14:30-18:00
HS42

14.1 | TH 23-07-15 14:30 | HS42
Inclusive and Semi-Inclusive Jet measurements in Au+Au collisions at $\sqrt{(s_{NN})}$ = 200 GeV at STAR | J. Rusnak[1] – [1]Nuclear Physics Institute Prague
Jets represent an important tool to explore the properties of the hot and dense nuclear matter created in heavy-ion collisions. However, their reconstruction presents a challenging task due to the extremely large and fluctuating background that overwhelm the true hard jet population. We present recent measurements of charged jets in Au+Au collisions, by the STAR collaboration at RHIC, where the background is suppressed via a new technique based on event mixing and via a cut on leading hadron transverse momentum. The measured observables are the inclusive jet yield and the semi-inclusive yield of recoil jets from a high pT hadron trigger. These jet measurements allow a direct comparison of jet quenching at RHIC and the LHC and provide new constraints on theoretical calculations of jet quenching.

14.2 | TH 23-07-15 14:50 | HS42
Jet results in heavy ion collisions with the ATLAS experiment at the LHC | D. Perepelitsa[1] – [1]Brookhaven National Laboratory (US)
In relativistic collisions of heavy ions, a hot medium with a high density of unscreened color charges is produced, and jets propagating through this medium are known to suffer energy loss. This results in several distinct effects seen in central heavy ion collisions: the yield of inclusive jets measured via the nuclear modification factor is observed to be strongly suppressed; the yield of events with highly asymmetric dijet pairs is observed to be increased; the jet fragmentation is modified. In proton-lead collisions, the production of hard processes is expected to be modified via a modification of nuclear parton distribution functions. While the theory predicts rather small effects to be observed, the data show interesting unexpected features: the nuclear modification factor exhibits a strong centrality dependence; charged particle spectra show an enhancement at large transverse momenta with respect to the proton-proton reference. In this talk, we will summarize the most recent results by ATLAS involving these striking phenomena.

14.3 | TH 23-07-15 15:15 | HS42
Jet results in heavy ions with CMS | Y. Lai[1] – [1]Massachusetts Inst. of Technology (US)
Collisions of high-energy nuclei create the hottest and densest matter ever produced in laboratory, and it is a ground for studies of QCD in extreme conditions. When compared to collisions of protons, the contrasts of the jets and hadrons observed in PbPb collisions provide signatures of phenomena that appear in such conditions. One such phenomenon is called ‘jet quenching’ which refers to the energy loss of high-momentum partons in dense medium, exhibiting itself in modified jet and hadron cross-sections and correlations. CMS has attained a set of measurements that paint a multidimensional picture of this effect, and has further improved this understanding by adding in the studies of initial-state nuclear effects through studies of pPb collisions. This talk will present selected recent jet results from the CMS heavy-ion program.

14.4 | TH 23-07-15 15:40 | HS42

Transverse momentum spectra of charged particles and identified hadrons in p-Pb collisions at the LHC | J. Otwinowski[1] – [1]Polish Academy of Sciences (PL)
Recent results on particle production in p–Pb collisions at the LHC exhibit features that are similar to those observed in Pb-Pb collisions. This indicates that final-state collective effects might also be present in small collision systems. In order to quantify the effects, the transverse momentum spectra (pT) of charged particles, identified hadrons and jets measured in different multiplicity/centrality intervals in p-Pb collisions at sqrt(sNN)=5.02 TeV are compared with results from pp and Pb-Pb collisions, all measured in the ALICE experiment. The obtained results are compared with theoretical models. Charged-particle tracks are reconstructed at mid-rapidity over a large momentum range 0.15 < pT < 50 GeV/c. Light-flavor hadrons and resonances are identified in the broad momentum range from 0.15 GeV/c up to 15 GeV/c using several particle identification techniques. Jets are reconstructed at mid-rapidity in the momentum range 20 < pT < 120 GeV/c by the anti-kT algorithm with resolution parameter R=0.2–0.4.

14.5 | TH 23-07-15 16:30 | HS42
Flow and correlations results from CMS | D. Devetak[1] – [1]University of Belgrade (RS)
The observation of long-range two-particle correlations in high energy heavy ion collisions opens the opportunities of exploring novel QCD dynamics in quark gluon plasma (QGP), the hot dense matter created in heavy ion collisions. In particular, such correlations are sensitive to the degree of thermalization in the system. We present selected results from non-identified and identified two-particle and multi-particle correlations in PbPb collisions, as well as in lighter systems.

14.6 | TH 23-07-15 16:50 | HS42
Results on angular correlations with ALICE | J. Grosse-Oetringhaus[1] – [1]CERN
Angular correlations of two and more particles are a sensitive probe of the transport properties of the system produced in heavy-ion collisions. In pp and p-Pb collisions, recent results revealed intriguing long-range correlation structures reminiscent of features observed in heavy-ion collisions. We will show recent results from the analysis of two-particle correlations in pp, p-Pb, and Pb-Pb collisions in ALICE. New results involving forward detectors address the question if these long-range correlation structures persist at large rapidities. The talk will discuss what can be learned about the physics processes occurring in small systems and in particular the question if evidence for collective effects exists.

14.7 | TH 23-07-15 17:10 | HS42
Latest results from the NA61/SHINE beam energy scan with p+p and Be+Be collisions | M. Mackowiak-Pawlowska[1] – [1]Warsaw University of Technology (PL)
The NA61/SHINE experiment aims to discover the critical point of strongly interacting matter and study the properties of the onset of deconfinement by measurements of hadron production properties in proton-proton, proton-nucleus and nucleus-nucleus interactions in the CERN SPS energy range. In this contribution results on the energy dependence of hadron spectra and yields as well as on fluctuations and two-particle correlations in p+p and centrality selected Be+Be collisions will be presented. In particular, the energy dependence of the signals of deconfinement, the "horn", "step" and "kink", in p+p interactions will be presented and compared with the corresponding results from central Pb+Pb collisions. Also string-hadronic models will be tested using hadron spectra and correlations measured in p+p interactions. Results on fluctuations (multiplicity and transverse momentum) will be shown as a function of the collision energy and number of wounded nucleons for Be+Be and p+p collisions in search for the critical point of strongly interacting matter.

14.8 | TH 23-07-15 17:30 | HS42
Hadronic resonances as probes of the fireball evolution in heavy-ion collisions at the LHC | E. Fragiacomo[1] – [1]INFN, Trieste (IT)
Hadronic resonances provide valuable observables for the properties of the hot and dense hadronic phase of the fireball created in heavy-ion collisions, since their lifetimes, of the order of few fm/c, are comparable to the time span between the chemical and kinetic freeze-outs, which characterize the latest stage of the fireball evolution. Re-scattering of decay products and regeneration via pseudo-elastic hadron scattering can alter their yields from the values that would be measured in elementary (pp) collisions and those that would be expected from statistical particle-production models. The relative strengths of re-scattering and regeneration, as well as the temperature and lifetime of the hadronic phase, can be studied through measurements of resonance yields and their ratios to the yields of long-lived hadrons. An overview of recent results on resonance production from the ALICE experiment is presented for pp, p-Pb, and Pb-Pb collisions and compared with results at lower energy from the STAR experiment and with statistical model predictions.

15 – Astroparticle Physics, Cosmology, Gravitation

FR 24-07-15 09:00-13:30
HS33

15.1 | FR 24-07-15 09:00 | HS33
Recent results from the ANTARES neutrino telescope + outlook for KM3NeT | S. Biagi[1] – [1]INFN

Neutrinos constitute an alternative to photons and cosmic rays to explore the high-energy sky, as they can emerge from dense media and travel across cosmological distances without being deflected by magnetic fields nor absorbed by ambient matter and radiation. The recent results by IceCube have given a great boost to the efforts towards the detection of high energy astrophysical neutrinos. If the origin of the events observed by IceCube is galactic, the ANTARES detector is well suited for their observation. The ANTARES neutrino telescope is located in the Mediterranean Sea at a water depth of about 2500m, 42 km from Toulon, France, and consists of a three dimensional array of 885 10-inch photomultiplier tubes, distributed along twelve vertical lines. It is optimized to detect neutrinos in the TeV/PeV range. The detector exploits various signatures like a high energy excess over the atmospheric neutrino flux, searches for localized neutrino sources of various extensions and multi-messenger analyses based on time and/or space coincidences with other cosmic probes. As a successor to Antares, the KM3NeT Collaboration aims at building a cubic kilometre scale neutrino telescope in the depths of the Mediterranean Sea. The detector technology has been validated with prototypes operating at a depth of 2500m and 3500m. KM3NeT phase-1 has been funded and will be deployed by 2016. Following this phase, a project called KM3NeT 2.0 is proposed with an upgraded physics program including the measurement of the neutrino mass hierarchy off-shore Toulon (ORCA). A high energy part called KM3NeT/ARCA will allow to study the the neutrino sky, including the region of the galactic centre. The characteristics of sea water allow to measure the neutrino direction with very good angular resolution also for cascade events. The KM3NeT/ARCA sensitivity will allow to detect the flux measured by IceCube within less than one year of observation, while within about four years of observation KM3NeT/ARCA could give indications at 3-sigma level on some candidate galactic point-like sources.

15.2 | FR 24-07-15 09:30 | HS33

Underground Physics with DUNE | V. Paolone[1] – [1]University of Pittsburgh

DUNE - Deep Underground Neutrino Experiment - plans on using a 34-kton (fiducial mass) liquid argon time projection chamber to be sited at 4850 ft depth at the Sanford Underground Research Facility in South Dakota. The significant overburden at this site gives DUNE significant physics reach for several non-beam physics topics. These include neutrino oscillation studies with atmospheric neutrinos, for which the LAr TPC enables precision reconstruction, baryon number violation searches, for which detection of kaon modes has particularly high efficiency, and detection of neutrino bursts from core-collapse supernovae, for which the electron-neutrino flavor sensitivity will be unprecedented. This talk will discuss the unique underground physics capabilities of DUNE.

15.3 | FR 24-07-15 09:50 | HS33

Baikal-GVD: first cluster Dubna | O. Suvorova[1] – [1]Russian Academy of Sciences (RU)

In April 2015 the deep underwater neutrino telescope Dubna was deployed and started to take data in Lake Baikal. This array is a first cluster of the cubic kilometer scale Gigaton Volume Detector (Baikal-GVD), which is constructed in Lake Baikal. In this contribution we will review the design and status of the neutrino telescope Dubna.

15.4 | FR 24-07-15 10:05 | HS33

Methods for Detection of Astrophysical Tau Neutrinos in IceCube | T. Palczewski[1] – [1]The University of Alabama

Neutrinos are expected to be produced in hadronic acceleration processes at the sources of extremely high-energy cosmic rays. These high-energy neutrinos should be produced in astrophysical sources like the Gamma Ray Bursts (GRBs), type I b/c supernovae, and Active Galactic Nuclei (AGNs). The expectation for the neutrino flavor ratio at the source is 1: 2: 0 (nu e : nu mu : nu tau). The flavor ratio of astrophysical neutrinos measured by ground-based detectors is modified due to neutrino oscillations averaged over astronomical distances. In particular, tau neutrinos should appear in the astrophysical neutrino flux and be detectable at Earth. Thus, tau neutrino searches are crucial to better determine the flavor composition. Methods to identify high-energy tau neutrino interactions in IceCube, a cubic-kilometer neutrino detector deployed in the glacial ice at the geographical South Pole will be described. An algorithm will be presented for detecting double pulse signature in the IceCube sensor signal, which can be an indication of the tau neutrino interaction and subsequent decay of the tau lepton inside the detector. The recent results for astrophysical tau neutrinos with three years of IceCube data will be shown. Future prospects for tau neutrino detection in IceCube will be discussed.

15.5 | FR 24-07-15 10:20 | HS33

Measurement of Atmospheric Neutrino Oscillations with the IceCube/DeepCore Detector | M. Vehring

With its low-energy extension DeepCore, the IceCube Neutrino Observatory, located at the geographic South Pole, measures neutrinos with energies above about 10 GeV. With this low energy threshold high statistics of about 150000 triggered atmospheric muon neutrinos are recorded per year. This enables the measurement of neutrino oscillations. The oscillation probability depends on the energy and propagation distance of the neutrino. The oscillation is visible by the energy and zenith dependent disappearance in the recorded muon neutrino rate. Recently, an analysis using three years of data of the completed 86-string detector taken from 2011 to 2014 has achieved a sensitivity approaching that of dedicated oscillation experiments (e.g. MINOS, T2K and Super-Kamiokande-IV). To further improve the sensitivity, this analysis has been extended with data taken from 2010 to 2011 in the 79-string detector configuration, which increases the live time from 953 to 1266 days. Results of this extended muon neutrino disappearance measurement with IceCube/DeepCore will be presented.

15.6 | FR 24-07-15 10:35 | HS33

Towards survey of astronomical tau neutrino sources | G. Hou[1], M. Sasaki[2] – [1]National Taiwan University, [2]The University of Tokyo

The recent IceCube astrophysical PeV neutrino events motivate the planning of the Neutrino Telescope Array (NTA) observatory, which will have three site stations watching the air mass surrounded by Mauna Loa, Mauna Kea, and Hualalai on Hawaii Big Island, plus a site station at the center watching the lower night sky. By separating nu_tau -> tau conversion from tau-shower generation, the Earth-skimming nu_tau method allows for huge target mass and detection volume simultaneously. With the mountains both as target and shield, this method for PeV-EeV neutrino search is almost background-free. With design based on experience from the operating Ashra-1 detector, sensitivities reaching beyond 100 cubic-km water equivalent can be achieved with Cherenkov-fluorescence stereoscopic observation, with pointing accuracy of 0.2 deg or less. With the goal of clear discovery and identification of astronomical nu_tau sources achievable, a new International Collaboration is called for to probe such cosmic proton accelerators.

15.7 | FR 24-07-15 11:30 | HS33

Dark matter signals from the gamma-ray sky | F. Calore[1] – [1]University of Amsterdam

Unveiling the nature of dark matter is one of the biggest challenges of particle physics and cosmology. Beside direct detection and collider experiments, it is possible to look for a dark matter signal through indirect searches whose goal is to disentangle the signal from particle dark matter annihilation or decay from the large astrophysical background. I will discuss messengers and targets for indirect dark matter searches and I will then focus on gamma rays, the golden channel for dark matter indirect searches. Since its launch in 2008, the Fermi-LAT is taking snap-shots of the whole gamma-ray sky with unprecedented accuracy. Besides astrophysical processes, the gamma rays collected by the Fermi-LAT offer the unique possibility to probe dark matter at the center of the Milky Way. Recently, a spatially extended excess of gamma rays collected by the Fermi-LAT from the inner region of the Milky Way has been claimed by different and independent groups. I will review previous analyses claiming the discovery of a spatially extended excess of gamma rays above standard astrophysical backgrounds. I will then characterise the spatial and spectral properties of such an extended diffuse emission in light of background model systematics. Finally, I will scrutinise the most promising interpretations - among others, the possibility that the signal originates from dark matter annihilation - in order to shed light onto the origin of this yet unknown extra-emission at the Galactic Center.

15.8 | FR 24-07-15 11:45 | HS33

Searches for Dark Matter with the Fermi Large Area Telescope | R. Caputo[1] – [1]University of California, Santa Cruz

The era of precision cosmology has revealed that $\approx$80% of the total amount of matter in the universe is dark. Cosmic microwave background measurements, galactic rotation curves, and gravitational lensing each provide strong evidence for the existence of dark matter. One promising candidate, motivated by both Particle Physics and Astrophysics, is the Weakly Interacting Massive Particle (WIMP). WIMPs are predicted to produce gamma rays via annihilation or decay which are detectable by the Fermi Large Area Telescope (Fermi-LAT). A detection of gamma rays from dark matter would provide evidence of physics beyond the Standard Model. I present several recent results from the Fermi-LAT Collaboration from a variety of WIMP-like dark matter searches including the extragalactic gamma-ray background, gamma-ray excesses in dwarf spheroidal galaxies, and gamma-ray spectral lines.

15.9 | FR 24-07-15 12:00 | HS33

Electron and Positron Fluxes in Primary Cosmic Rays Measured with the Alpha Magnetic Spectrometer on the International Space Station | N. Zimmermann[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

Precision measurements by the Alpha Magnetic Spectrometer on the International Space Station of the primary cosmic-ray electron flux in the range 0.5 to 700 GeV and the positron flux in the range 0.5 to 500 GeV are presented. The electron flux and the positron flux each require a description beyond a single power-law spectrum. Both the electron flux and the positron flux change their behavior at 30 GeV but the fluxes are significantly different in their magnitude and energy dependence. Between 20 and 200 GeV the positron spectral index is significantly harder than the electron spectral index. The results show, for the first time, that neither e+ nor e- can be described by a single power law above 27.2 and 52.3 GeV, respectively. The determination of the differing behavior of the spectral indices versus energy is a new observation and provides important information on the origins of cosmic-ray electrons and positrons.

15.10 | FR 24-07-15 12:15 | HS33

Thermal transport of the solar captured dark matter and its impact on the indirect dark matter search | Y. Lin[1], C. Chen[2], G. Lin[1] – [1]Institute of Physics, National Chiao Tung University, Taiwan, [2]Physics Division, National Center for Theoretical Sciences, Taiwan

We study the thermal transport occurring in the system of solar captured dark matter (DM) and explore its impact on the DM indirect search signal. We particularly focus on the scenario of self-interacting DM (SIDM). The energy flows in and out of the system include the gravitational capture via DM-nucleon and DM-DM scatterings, the energy dissipation via DM annihilation, and the heat exchange between DM and solar nucleus. We examine the DM temperature evolution and demonstrate that the DM temperature can be higher than the core temperature of the Sun if the DM-nucleon cross section is sufficiently small such

that the energy flow due to DM self-interaction becomes relatively important. We argue that the correct DM temperature should be used for accurately predicting the DM annihilation rate and consequently the signal for the indirect detection.

15.11 | FR 24-07-15 12:30 | HS33

A description of the Galactic Center excess in the Minimal Supersymmetric Standard Model | S. Caron[1], R. Ruiz De Austri[2], S. Amoroso[3], C. Weniger[4], L. Hendriks[5], A. Achterberg[5] – [1]Nikhef National institute for subatomic physics (NL), [2]IFIC, [3]Albert-Ludwigs-Universitaet Freiburg (DE), [4]University of Amsterdam, [5]RU Nijmegen

Observations with the Fermi Large Area Telescope (LAT) indicate an excess in gamma rays originating from the center of our Galaxy. A possible explanation for this excess is the annihilation of Dark Matter particles. We have investigated the annihilation of neutralinos as Dark Matter candidates within the phenomenological Minimal Supersymmetric Standard Model (pMSSM). An iterative particle filter approach was used to search for solutions within the pMSSM. We found solutions that are consistent with astroparticle physics and collider experiments, and provide a fit to the energy spectrum of the excess. The neutralino is a Bino/Higgsino or Bino/Wino/Higgsino mixture with a mass in the range 84-92≈GeV or 87-97≈GeV annihilating into W bosons. A third solutions is found for a neutralino of mass 174-187≈GeV annihilating into top quarks. The best solutions yield a Dark Matter relic density 0.06<Ωh2<0.13. These pMSSM solutions make clear forecasts for LHC, direct and indirect DM detection experiments. If the MSSM explanation of the excess seen by Fermi-LAT is correct, a DM signal might be discovered soon.

15.12 | FR 24-07-15 12:45 | HS33

Sensitivity of CTA to dark matter annihilations in the galactic centre | E. Sessolo[1], A. Williams[2], L. Roszkowski – [1]NCBJ, Warsaw, [2]NCBJ

We present prospects for detection of WIMP dark matter at the Cherenkov Telescope Array (CTA). We derive a realistic assessment of the sensitivity of CTA to photon fluxes from dark matter annihilation by means of a binned likelihood analysis for the Einasto and Navarro-Frenk-White halo profiles. We use the most up to date instrument response functions and background simulation model provided by the CTA Collaboration. We find that, with 500 hours of observation, under the Einasto profile CTA is bound to exclude at the 95% C.L. realistic and well motivated dark matter candidates, like the 1 TeV higgsino region of the MSSM. CTA will be able to probe the vast majority of cases corresponding to a spin-independent scattering cross section below the reach of 1-tonne underground detector searches for dark matter, in fact even well below the irreducible neutrino background for direct detection and will provide a highly sensitive way of searching for dark matter that will be partially overlapping and partially complementary with 1-tonne detector and collider searches. It will thus be instrumental to, for example, effectively explore the nearly full parameter space of the MSSM.

16 – Flavour Physics and Fundamental Symmetries

FR 24-07-15 09:00-13:00
HS41

16.1 | FR 24-07-15 09:00 | HS41

Vub and Vcb determinations: recent results and prospects | P. Gambino[1] – [1]università di torino

The most precise determinations of Vub and Vcb come from semileptonic B decays. The results of the B factories, analysed in the light of the most recent theoretical calculations, are puzzling. For both Vcb and Vub the determination based on exclusive channels is about 3σ below the one based on inclusive decays. This discrepancy has survived several checks and may be an indication of new physics. I will review recent developments and future prospects of the Vxb determinations and briefly discuss new physics interpretations.

16.2 | FR 24-07-15 09:20 | HS41

Measurements of Vub and Vcb at LHCb | M. Artuso[1] – [1]Syracuse University (US)

The long standing discrepancies between the measurements of Vub and Vcb in inclusive and exclusive decays are still unresolved. LHCb recently reported the first observation of the baryon decay Λb–>p$\mu\nu$ and the related measurement of Vub. Similarly, Λb–>Λc$\mu\nu$ is used to constrain Vcb and the associated form-factors. Future prospected will also be presented.

16.3 | FR 24-07-15 09:35 | HS41

nclusive electron spectrum from B-meson decays and determination of |Vub| | Y. Skovpen[1] – [1]Budker Institute for Nuclear Physics

The inclusive electron spectrum from B-meson decays is measured using a sample of 467 million BBbar pairs recorded with the BABAR detector. Contributions from CKM-favored and CKM-suppressed semileptonic B decays, from secondary decays of charm hadrons and from continuum e+e- -> qqbar annihilations are evaluated using a simultaneous fit to data collected at the Y(4S) resonance and at collision energies below the BBbar production threshold. The partial branching fraction BF(B -> Xu l nu, E_min*) is evaluated using four different models for the CKM-suppressed decays as a function of the minimum electron energy in the B rest frame, and corresponding values of |Vub| are determined.

16.4 | FR 24-07-15 09:50 | HS41

Measurement of the D -> pi- e+ nu partial branching fraction and form factor, and implications for Vub. | A. Oyanguren[1] – [1]IFIC - Univers. de Valencia
Precision measurements of the D -> pi e+ nu form factor could shed new light on the persistent difference between inclusive and exclusive measurements of Vub. We report the measurement of the partial branching fraction of D -> pi e+ nu in intervals of the four-momentum-transfer squared from D to pi using 347.2 /fb of integrated luminosity of the BaBar data. The D -> pi form factor is extracted with fits to the unfolded partial branching fraction using pole or generalized expansions and the value at zero recoil is determined. These form factors are compared to the current world average, the available lattice predictions, and interpreted with the expectation of a single dominant pole term. The measured form factor is then combined with previous BABAR B -> pi l nu information to determine a value of Vub.

16.5 | FR 24-07-15 10:05 | HS41
Semileptonic B and Bs decays at Belle | R. Glattauer[1], Y. Kwon[2] – [1]Institute of High Energy Physics Vienna, [2]Yonsei University
Semileptonic B meson decays, $B \to X\ell\nu$, are currently the preferred modes for determining the Cabibbo-Kobayashi-Maskawa (CKM) matrix elements $|V_{cb}|$ and $|V_{ub}|$, two fundamental parameters of the Standard Model. At the same time they can also be used to test and refine the theoretical tools used for describing the production of B mesons and their decays. Based on the large data sample accumulated by the Belle experiment at the KEKB asymmetric energy e+ e- collider at KEK, Japan, we present new results on semileptonic decays of B and Bs mesons.

16.6 | FR 24-07-15 10:20 | HS41
B–>D*$\tau\nu$ at LHCb | M. Calvi[1] – [1]Univ. degli Studi Milano-Bicocca
The decay B–>D*$\tau\nu$ is sensitive to new physics and its rate exhibits a hint of deviation from the SM expectation. LHCb presents its first measurement of this mode.

16.7 | FR 24-07-15 10:35 | HS41
Tree-level new physics searches in B decays to τ leptons at Belle | P. Hamer[1] – [1]Goettingen
Semileptonic and leptonic B meson decays involving a heavy τ lepton are sensitive to new physics scenarios with an extended Higgs sector, such as the type-II two-Higgs-doublet model. Decays that have been studied at Belle include $B \to D^{(*)}\tau\nu$, $B \to \tau\nu$ and $B \to \pi\tau\nu$. In this talk we report new and updated results for these modes, based on the large data sample accumulated by the Belle experiment at the KEKB asymmetric-energy e+e- collider at KEK, Japan.

16.8 | FR 24-07-15 10:50 | HS41
Exclusive semileptonic B decays to a D or D* meson and one or two pions | T. Lueck[1] – [1]SLAC
The experimental knowledge of semileptonic B decays to a D or D* meson with one or more pions is limited. These limitations are relevant to two experimental puzzles: the tension between the values of |Vcb| determined from inclusive and exclusive semileptonic decays, and the gap between the sum of the exclusive semileptonic B decays to charm and the inclusive b -> c l nu rate. The full BABAR data set is used to improve the precision on decays involving D(D*) pi l nu and to observe, for the first time, decays of the type D(D*) pi pi l nu. Fully-reconstructed hadronic B decays are used to tag events and provide good resolution on the discriminant variable U = Emiss - Pmiss. A simultaneous fit to charged and neutral B decays to D(npi) and D*(npi) is used to extract relative branching fractions. In addition to studying these high mass charm final states, the data are used to obtain a precise measurement of the ratio of branching fractions BF(B -> D l nu)/BF(B -> D* l nu).

16.9 | FR 24-07-15 11:30 | HS41
Kaon Theory News | A. Buras[1] – [1]Munich
After stressing the importance of kaon physics in searching for new physics I will briefly summarize the status of the parameter ϵ^K in the standard model. The second part of my talk will be the presentation of new analyses of $K^+ \to \pi^+\nu\bar{\nu}$ and $K_L \to \pi^0\nu\bar{\nu}$ in the Standard Model and beyond. Finally, motivated by recent lattice results, I will briefly summarize the status of the Delta I=1/2 rule and of epsilon' /epsilon in the standard model."

16.10 | FR 24-07-15 11:50 | HS41
KL –> pi0 nu nu(bar) Beyond the Grossman-Nir Bound | G. Hou[1] – [1]National Taiwan University
We do not violate the Grossman-Nir (GN) bound per se, but point out that the commonly perceived current GN bound of B(KL –> pi0 nu nu(bar)) < 1.4 x 10∧-9 can be evaded, if a weakly interacting narrow state falls into the windows of kinematic exclusion of the K+ –> pi+ nu nu(bar) experiments. An explicit example is a Z' boson motivated by the muon g-2 anomaly and linked with flavor physics. The model has implications for K+ –> pi+ mu+ mu-, B –> K+ mu+ mu-, K(*) nu nu(bar) studies, the LBNE and Muon g-2 experiments, and possibly even LHC collider physics. But the main point is that the KOTO experiment is already breaking New Physics ground in their search for KL –> pi0 nu nu(bar).

16.11 | FR 24-07-15 12:05 | HS41
Prospects for K+ ->pi+ nu nu observation at CERN in NA62 | V. Palladino[1], C. Lazzeroni[2] – [1]CERN, [2]University of Birming-

ham (GB)
The rare decays K+ ->pi+ nu nu are excellent processes to make tests of new physics at the highest scale complementary to LHC thanks to their theoretically cleaness. The NA62 experiment at CERN SPS aims to collect of the order of 100 events in two years of data taking, keeping the background at the level of 10%. Part of the experimental apparatus has been commissioned during a technical run in 2012. The physics prospects and the status of the experiment will be reviewed after the commissioning run of 2014 and the data taking in 2015.

16.12 | FR 24-07-15 12:20 | HS41
First observation of K->pi+pi0e+e- decay at NA48 | R. Fantechi[1], C. Lazzeroni[2] – [1]INFN - Sezione di Pisa, [2]University of Birmingham (GB)
We report the first observation of the very rare decay K+- -> pi+- pi0 e+ e- by the NA48/2 experiment. From a clean sample of almost 2000 reconstructed signal events, we have determined the branching fraction with high precision and measured the e+ e- invariant mass distribution, which allows to differentiate between different decay models.

16.13 | FR 24-07-15 12:35 | HS41
epsilon' / epsilon from the lattice and its implications | A. Soni[1] – [1]Brookhaven National Lab
Recent publication [arXiv:1505.07863 by RBC and UKQCD Collaborations] of the first lattice QCD calculation of the complex kaon decay amplitude A^0 with physical kinematics, using a single 32^3 x 64 domain wall ensemble is discussed. Approximate agreement with the experimental value for Re(A^0) is obtained.. The calculated value of Im(A^0) is used to compute the direct CP violating ratio Re(epsilon'/epsilon), which is found to be $\approx$2 sigma lower than the experimental value. The outlook for improved determination as well as implications are discussed. The talk is based on the lattice work done by the presenter in collaboration with RBC and UKQCD collaborations and the phenomenological work is being done with Enrico Lunghi and Christoph Lehner.

16.14 | FR 24-07-15 12:50 | HS41
$B \to K^{(*)}\nu\bar{\nu}$ **decays in the Standard Model and beyond** | C. Niehoff[1], A. Buras[2], J. Girrbach[3], D. Straub[1] – [1]Excellence Cluster Universe, Munich, [2]Munich, [3]Technical University Munich
We present an analysis of the rare exclusive B decays $B \to K\nu\bar{\nu}$ and $B \to K^\star\nu\bar{\nu}$ within the Standard Model (SM), in a model-independent manner, and in a number of new physics (NP) models. Combining new form factor determinations from lattice QCD with light-cone sum rule results and including complete two-loop electroweak corrections to the SM Wilson coefficient, we obtain the SM predictions BR($B^+ \to K^+\nu\bar{\nu}$) = $(4.0 \pm 0.5) \times 10^{-6}$ and BR($B^0 \to K^{*0}\nu\bar{\nu}$) = $(9.2 \pm 1.0) \times 10^{-6}$, more precise and more robust than previous estimates. Beyond the SM, we make use of an effective theory with dimension-six operators invariant under the SM gauge symmetries to relate NP effects in $b \to s\nu\bar{\nu}$ transitions to $b \to s\ell^+\ell^-$ transitions and use the wealth of experimental data on $B \to K^{(*)}\ell^+\ell^-$ and related modes to constrain NP effects in $B \to K^{(*)}\nu\bar{\nu}$. We then consider several specific NP models, including Z' models, the MSSM, models with partial compositeness, and leptoquark models, demonstrating that the correlations between $b \to s\nu\bar{\nu}$ observables among themselves and with $B_s \to \mu^+\mu^-$ and $b \to s\ell^+\ell^-$ transitions offer powerful tests of NP with new right-handed couplings and non-MFV interactions.

17 – Higgs and New Physics
FR 24-07-15 09:00-13:00
Grosser Festsaal

17.1 | FR 24-07-15 09:00 | Grosser Festsaal
Higgs and heavy Higgs bosons phenomenology | G. Weiglein[1], F. Domingo[2] – [1]Deutsches Elektronen-Synchrotron (DE), [2]DESY
The available information on the properties of the observed Higgs signal is assessed in view of the current experimental accuracy and the employed theoretical assumptions. Possible interpretations of the observed signal in scenarios of physics beyond the Standard Model are discussed in view of their phenomenological implications, and the experimental sensitivity for discriminating between different models is investigated. In extended Higgs sectors it is often possible to interpret the observed signal not only in terms of the lightest but also in terms of the second-lightest state of the Higgs sector. The latter scenarios generically predict a light Higgs boson with heavily suppressed couplings to gauge bosons. The current limits and future prospects for accessing such scenarios will be discussed.

17.2 | FR 24-07-15 09:15 | Grosser Festsaal
Searches for neutral and charged Higgs bosons in the context of the MSSM and more general 2HDMs at ATLAS and CMS | O. Davignon[1], A. Meyer[2] – [1]Ecole Polytechnique (FR), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
With this talk a review will be given for the searches for charged and neutral Higgs bosons, A, H, h, H^+, in the context of the MSSM and more general 2HDMs. The result of the ATLAS and the CMS experiment will be discussed. The searches will be based on the full LHC run-1 dataset of each experiment.

17.3 | FR 24-07-15 09:40 | Grosser Festsaal

Search for a Higgs boson decaying to a pair of Higgs bosons (hh or hA) or for a Higgs boson decaying to Zh/ZA at CMS | R. Lane[1], A. Meyer[2] – [1]Imperial College Sci., Tech. & Med. (GB), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Searches for Higgs bosons decaying to a pair of Higgs bosons (hh or hA) or for a Higgs boson decaying to Zh/ZA are presented. Different analyses involving Higgs boson decays into bottom-quarks, tau pairs, and diphotons will be summarized in this talk.

17.4 | FR 24-07-15 09:55 | Grosser Festsaal

Search for light CP-odd Higgs decay with a charm tag at BABAR | G. Vasseur[1] – [1]CEA/IRFU,Centre d'etude de Saclay Gif-sur-Yvette (FR)

We present a search for a light CP-odd Higgs boson (A0) in Upsilon(1S) -> gamma A0, A0 -> ccbar decays. The Upsilon(1S) mesons are selected via the dipion transition Upsilon(2S) -> pi+pi- Upsilon(1S), and the A0 -> ccbar final state is tagged through the reconstruction of various D(*) mesons. No significant signal is observed, and limits on the product branching fraction B(Upsilon(1S) -> gamma A0)xB(A0 -> ccbar) are established at the level of 7x10∧-5 - 2x10∧-3 for A0 mass values between 4.0 GeV and 9.25 GeV.

17.5 | FR 24-07-15 10:10 | Grosser Festsaal

Higgs lepton flavour violation | J. Herrero Garcia[1], A. Santamaria, N. Rius[2] – [1]KTH, [2]Valencia University

We study lepton flavor violating Higgs decays in the light of the recent enhancement in the $\tau\mu$ channel, which should be confirmed/excluded with data from the second run of the LHC. From an EFT perspective we study both tree-level and loop-level realizations that can in principle accommodate the excess, being at the same time compatible with other low-energy constraints. We also discuss different HLFV in the context of neutrino mass models. We discuss which are the most promising options that can explain the excess. In particular, we find that loop-level realizations are always too suppressed, while a 2HDM can explain the enhancement.

17.6 | FR 24-07-15 10:25 | Grosser Festsaal

Searches for exotic Higgs boson decays with the ALTAS and the CMS experiment | T. Lagouri[1], J. Katzy[2] – [1]Yale University (US), [2]DESY, HAMBURG

This talk will summarize the searches for exotic Higgs boson decays. It should cover decays of the observed Higgs boson to dark sector bosons, lepton flavor violating and flavor changing decays, and decays to a light pseudoscalar neutral Higgs boson as predicted by the NMSSM. Prospects for the LHC run-2 should be given. The talk should cover the results from ATLAS and CMS.

17.7 | FR 24-07-15 11:30 | Grosser Festsaal

The global electroweak fit at NNLO and constraints on new physics | T. Peiffer[1], R. Kogler[1], J. Haller[1], M. Baak[2], J. Cuth[3], A. Hoecker[2], K. Monig[4], M. Schott[5], J. Stelzer[2] – [1]Hamburg University (DE), [2]CERN, [3]Johannes Gutenberg Universitat Mainz (DE), [4]Deutsches Elektronen-Synchrotron (DE), [5]Johannes-Gutenberg-Universitaet Mainz (DE)

We present an update of the global electroweak fit using electroweak next-to-next-to-leading order (NNLO) calculations for all precision observables that enter the fit. The availability of NNLO corrections allows for the first time the inclusion of realistic estimates of theoretical uncertainties due to missing higher order calculations. The knowledge of the mass of the Higgs boson improves the precision of the predictions in the global electroweak fit considerably and the global fits are used as powerful tools to assess the validity of the Standard Model and to constrain scenarios for new physics. We present updated constraints on a model with modified Higgs couplings to bosons and fermions, two Higgs doublet models, and dimension-6 operators. We show that in many cases the Higgs signal strength measurements give complementary information to constraintes obtained from electroweak precison observables. Future measurements at the LHC and an expected electron-positron collider promise to improve the experimental precision of key observables used in the fit. We assess the influence of present and future experimental and theoretical sources of systematic uncertainties on the fit predictions.

17.8 | FR 24-07-15 11:55 | Grosser Festsaal

Constraints on new phenomena through Higgs coupling measurements with the ATLAS detector | G. Carrillo-Montoya[1], J. Katzy[2] – [1]CERN, [2]DESY, HAMBURG

The discovery of the Higgs boson opens many perspectives to explore physics beyond the Standard Model. This talk describes constraints of new physics in a number of models using the combined measurements of the coupling strength of the 125 GeV Higgs particle using the entire ATLAS run-I data. The various models presented include an additional real electroweak singlet, two Higgs doublet models, a simplified Minimal Supersymmetric Standard Model, and a Higgs portal to dark matter.

17.9 | FR 24-07-15 12:10 | Grosser Festsaal

Tevatron constraints on models of the Higgs boson with exotic spin and parity using decays to bottom-antibottom quark pairs | G. Davies[1], D0 Collaboration[2] – [1]Imperial College Sci., Tech. & Med. (GB), [2]DZero Experiment, Fermilab

Combined constraints from the CDF and D0 Collaborations on models of the Higgs boson with exotic spin J and parity P are

presented and compared with results obtained assuming the standard model value $J^P = 0^+$. Both collaborations analyzed approximately 10 fb^{-1} of proton-antiproton collisions with a center-of-mass energy of 1.96 TeV collected at the Fermilab Tevatron. They combined analyses of the $WH \to \ell\nu bb$, $ZH \to \nu\nu bb$, and $ZH \to \ell\ell bb$ channels. Two models of bosons with $J^P = 0^-$ and $J^P = 2^+$ were tested.

17.10 | FR 24-07-15 12:25 | Grosser Festsaal
Searches for invisible Higgs boson decays with ATLAS and CMS | P. Calfayan[1], A. Meyer[2] – [1]Ludwig-Maximilians-Univ. Muenchen (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
This talk will summarize the latest results of searches for the decay of the observed Higgs boson into invisible and quasi-invisible states. The talk should cover the results of the ATLAS and the CMS experiment based on the full dataset of LHC run-1.

17.11 | FR 24-07-15 12:40 | Grosser Festsaal
Search for low mass Higgs-boson like resonances at CMS | A. Mohammadi[1], A. Meyer[2] – [1]Kansas State University (US), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
A search is performed on the 8 TeV LHC data for additional scalars and pseudoscalar with masses below the newly discovered higgs boson h(125). These searches are motivated within several BSM theories, most significantly extensions of the non mininal extensions of the MSSM like the NMSSM, where additional scalar and pseudoscalar states are expected. The mass range from 350 MeV to 110 GeV is explored with different final states. The current status of these searches will be reviewed and prospects will be given to extend these searches in the Run2 of the LHC

18 – QCD and Hadronic Physics
FR 24-07-15 09:00-13:00
HS32

18.1 | FR 24-07-15 09:00 | HS32
Combined Measurement of Inclusive ep Scattering Cross Sections at HERA | O. Turkot[1] – [1]DESY
A combination is presented of all inclusive deep inelastic cross sections measured by the H1 and ZEUS collaborations in neutral and charged current unpolarised ep scattering at HERA. The data correspond to a luminosity of about 1 fb^{-1} and span six orders of magnitude in negative four-momentum-transfer squared, Q², and Bjorken x. They include data taken at proton beam energies of 920, 820, 575 and 460 GeV. The combination method took the correlations of the systematic uncertainties into account, resulting in improved accuracy.

18.2 | FR 24-07-15 09:15 | HS32
Combination of D* Differential Cross-SectionMeasurements in Deep-Inelastic ep Scattering at HERA | J. Hladky[1] – [1]Acad. of Sciences of the Czech Rep. (CZ)
H1 and ZEUS have published single-differential cross sections for inclusive $D^\star$ meson production in deep-inelastic ep scattering at HERA from their respective final data sets. These cross sections are combined in the common visible phase space region of photon virtuality $Q^2 > 5$ GeV², electron inelasticity $0.02 < y < 0.7$ and the $D^\star$ meson's transverse momentum $p_T(D^\star) > 1.5$ GeV and pseudorapidity $|\eta(D^\star)| < 1.5$. The combination procedure takes into account all relevant correlations yielding significantly reduced experimental uncertainties. To extend the kinematic range down to $Q^2 < 1.5$ GeV², double-differential cross sections are also combined with a subset of earlier $D^\star$ data. Perturbative next-to-leading order QCD predictions are compared to the results.

18.3 | FR 24-07-15 09:30 | HS32
PDF constraints and alpha_s from CMS | P. Kokkas[1] – [1]University of Ioannina (GR)
Recent results on PDF constraints from CMS are presented.

18.4 | FR 24-07-15 09:45 | HS32
Determination of strangeness using the data from neutrino experiments and hadron collider | K. Lohwasser[1] – [1]Deutsches Elektronen-Synchrotron Campus Zeuthen (DE)
Improved determination of the strange sea distribution in the nucleon is presented. Recent charm production data in neutrino-nucleon deep-inelastic scattering by the NOMAD and CHORUS experiments and from charged current inclusive deep-inelastic scattering at HERA are used. The results are consistent with the data from the ATLAS and the CMS experiments on the associated production of $W^\pm$-bosons with c-quarks. The joined QCD analysis of the LHC measurements of W+charm production and of data of CHORUS experiment is performed.

18.5 | FR 24-07-15 10:00 | HS32
New DIS results from COMPASS | E. Kabuss[1] – [1]Johannes Gutenberg-Universitat
The COMPASS experiment at CERN performs a rich program in inclusive (DIS) and semi-inclusive (SIDIS) deep inelastic

scattering of longitudinally polarised muons off longitudinally polarised nucleons. The main topic is the investigation of the spin structure of the nucleon in terms of quark and gluon polarisations. For the extraction of the contribution of the different quarks flavours to the nucleon spin, in addition to the well known spin-averaged quark distributions the fragmentation functions of quarks into hadrons are needed. Especially the information on the strange quark fragmentation is scarce. Thus, COMPASS is also extracting fragmentation functions from the multiplicities of identified hadrons. An overview on recent COMPASS results will be given, including the longitudinal spin structure function and a NLO QCD fit, a verification of the Bjorken sum rule, pion and kaon multiplicities, and the latest results on the gluon polarisation.

18.6 | FR 24-07-15 10:15 | HS32

Impact of heavy-flavour production cross sections measured by the LHCb experiment on parton distribution functions at low x | K. Lipka[1] – [1]Deutsches Elektronen-Synchrotron (DE)

The impact of recent measurements of heavy-flavour production in deep inelastic ep scattering and in pp collisions on parton distribution functions is studied in a QCD analysis in the fixed-flavour number scheme at next-to-leading order. Differential cross sections of charm- and beauty-hadron production measured by LHCb are used together with inclusive and heavy-flavour production cross sections in deep inelastic scattering at HERA. The heavy-flavour data of the LHCb experiment impose additional constraints on the gluon and the sea-quark distributions at low partonic fractions x of the proton momentum, down to $x510^{-6}$. This kinematic range is currently not covered by other experimental data in perturbative QCD fits.

18.7 | FR 24-07-15 10:30 | HS32

Determination of Charm Mass Running from an Analysis of Combined HERA Charm Data | A. Geiser[1] – [1]Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE)

The combined HERA data on charm production in deep inelastic scattering have recently been used to determine the charm quark running mass $m_c(m_c)$ in the $\overline{MS}$ renormalisation scheme. The same data are used differentially as a function of the photon virtuality Q^2 to evaluate the charm quark running mass at different scales to one-loop order. The scale dependence of the mass is found to be consistent with QCD expectations, and a graphical representation of the charm mass running, similar to the representation of the beauty mass running from LEP data, is obtained from data for the first time.

18.8 | FR 24-07-15 10:45 | HS32

3-Loop Corrections to the Heavy Flavor Wilson Coefficients in Deep-Inelastic Scattering | J. Bluemlein[1] – [1]DESY

A survey is presented on the calculation of the 3-loop QCD corrections to the heavy flavor Wilson coefficients in deep-inelastic scattering in the region of large momentum transfer $Q^2 \gg m^2$ and on the 3-loop matching coefficients in the variable flavor number scheme. Results are presented for the flavor non-singlet and pure singlet cases and for contributions due to Feynman diagrams containing internal fermion lines with two different masses, giving analytic results. We also present the mathematical and computer-algebraic methods to derive these results and discuss the numerical results, which are important in analyses measuring the heavy quark masses and the strong coupling constant.

18.9 | FR 24-07-15 11:30 | HS32

MMHT 2014 PDFs | R. Thorne[1] – [1]University College London (UK)

We present the MMHT2014 PDFs, an update of the previous major release in the same framework, i.e. MSTW2008. We discuss the changes in both the central values and uncertainties in the PDFs due to changes in theoretical procedures and the impact of new, largely LHC data-sets. We note, however, that changes in predictions are rather small. We discuss the correlation between the PDFs and the strong coupling constant and the constraint on the latter. We also highlight plans for the future.

18.10 | FR 24-07-15 11:45 | HS32

Parton Distributions for the LHC Run II | J. Rojo Chacon[1] – [1]University of Oxford (GB)

I present NNPDF3.0, the first set of parton distribution functions (PDFs) determined with a methodology validated by a closure test. NNPDF3.0 uses a global dataset including HERA-II deep-inelastic inclusive cross-sections, the combined HERA charm data, jet production from ATLAS and CMS, vector boson rapidity and transverse momentum distributions from ATLAS, CMS and LHCb, $W+c$ data from CMS and top quark pair production total cross sections from ATLAS and CMS. Results are based on LO, NLO and NNLO QCD theory and also include electroweak corrections. To validate our methodology, we show that PDFs determined from pseudo-data generated from a known underlying law correctly reproduce the statistical distributions expected on the basis of the assumed experimental uncertainties. This enables us to determine with confidence PDFs at different perturbative orders and using a variety of experimental datasets ranging from HERA-only up to a global set including the latest LHC results, all using precisely the same validated methodology. I explore some of the phenomenological implications of our results for the upcoming 13 TeV Run of the LHC, in particular for Higgs production cross-sections.

18.11 | FR 24-07-15 12:00 | HS32

HERAFitter project and its related studies | R. Placakyte[1] – [1]Deutsches Elektronen-Synchrotron (DE)

The uncertainties of protons parton distribution functions (PDFs) play a dominant role for the precision tests of the Standard Model (SM) and they also impact substantially the theory predictions of Beyond SM high mass production. We present the

HERAFitter project which provides a unique open-source software framework for the determination of the proton's PDFs and for the interpretation of the physics analyses in the context of Quantum Chromodynamics (QCD). We report here the highlighted results based on the HERAFitter functionalities, as well as novel studies performed by HERAFitter. The latter includes the impact of correlations between uncertainties for PDFs extracted at different perturbative QCD orders as well as the QCD analysis of the recent Drell-Yan production measurements at Tevatron. Reference of studies that the abstract covers are: 1. "HERAFitter Open Source QCD Fit Project", arXiv:1410.4412 [submitted to EPJC] 2. "Parton distribution functions at LO, NLO and NNLO with correlated uncertainties between orders", EPJC (2014) 74:3039, arXiv:1404.4234 3. "QCD analysis of W- and Z-boson production at Tevatron", arXiv:1503.05221 [to be submitted to EPJC]

18.12 | FR 24-07-15 12:15 | HS32

QCD Analysis HERAPDF2.0 of the combined HERA structure function data | V. Radescu[1] – [1]Ruprecht-Karls-Universitaet Heidelberg (DE)

The new combined inclusive HERA cross sections were input to QCD analyses at NNLO, NLO and LO providing a new set of parton distribution functions, HERAPDF2.0. Besides the small experimental uncertainties, model and parameterisation uncertainties were also considered. The consistency of data and the QCD fit was tested for variants of the fit such as the treatment of heavy flavour production and the threshold in Q^2 for including data points in the fit.

18.13 | FR 24-07-15 12:30 | HS32

QCD Analysis of the combined HERA inclusive data together with HERA jet and charm data | K. Wichmann[1] – [1]Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE)

An extendend QCD analysis of the new combined inclusive HERA was performed at NLO, also including HERA data on jet and charm production. This enables the simultaneous measurement of parton distribution functions and the strong coupling using data from HERA alone. The strong coupling is measured to be $\alpha_s(M_Z)$= 0.1182 $\pm$0.0008(exp) $\pm$0.0005(model/param.) $\pm$0.0012(hadronisation) $^{+0.0037}_{-0.0030}$ (scale).

18.14 | FR 24-07-15 12:45 | HS32

The role of intrinsic charm in the proton via photon production in association with a charm quark | A. Khorramian[1] – [1]IPM and Semnan University

We present a comparative analysis of the non-perturbative intrinsic charm quark contribution in the proton, using the inclusive production of γ + *c*-jet in *pp* and $p\bar{p}$ collisions and for the kinematic regions that are sensitive to this contribution. We discuss the Q^2 evolution of intrinsic quark distributions and present a code that provide these distributions as a function of *x* and Q^2 for any arbitrary momentum fraction. For the $p\bar{p}$ collisions at the Tevatron, the results are compared with the recent experimental data of D0 at $\sqrt{s}$ = 1.96 TeV and also predictions for *pp* collisions at $\sqrt{s}$ = 8 TeV and $\sqrt{s}$ = 13 TeV for the LHC.

19 – Top and Electroweak Physics

FR 24-07-15 09:00-13:00
HS31

19.1 | FR 24-07-15 09:00 | HS31

Flavour-changing top decays in the aligned two-Higgs-doublet model | G. Abbas[1] – [1]IFIC, Valencia

We perform a complete one-loop computation of the two-body flavour-violating top decays $t \to ch$ and $t \to cV$ ($V = \gamma, Z$), within the aligned two-Higgs-doublet model. We evaluate the impact of the model parameters on the associated branching ratios, taking into account constraints from flavour data and measurements of the Higgs properties. Assuming that the 125 GeV Higgs corresponds to the lightest CP-even scalar of the CP-conserving aligned two-Higgs-doublet model, we find that the rates for such flavour-violating top decays lie below the expected sensitivity of the future high-luminosity phase of the LHC. Measurements of the Higgs signal strength in the di-photon channel are found to play an important role in limiting the size of the $t \to ch$ decay rate when the charged scalar of the model is light.

19.2 | FR 24-07-15 09:18 | HS31

Z'-induced FCNC Decays of Top, Beauty and Strange Quarks | M. Kohda[1] – [1]Chung-Yuan Christian University

With a large amount of top and anti-top quarks produced at the LHC, rare top quark decays offer a nice probe to search for physics beyond the standard model. In this talk, I will discuss about a flavor-changing neutral current (FCNC) decay of the top quark by emitting a new massive gauge boson Z', namely, t –> c Z', based on a model of gauged L_mu - L_tau (the difference between the muon and tauon numbers). This Z' boson is motivated by the anomalous data in the angular distribution of the B –> K∧* mu∧+ mu∧- decay observed by LHCb, as well as the long-standing muon g-2 anomaly. Taking into account various constraints on the model, especially from rare B and K meson decay data, I will illustrate whether the t –> c Z' branching ratio can be as large as an observable level at the LHC. I will also discuss about collider phenomenology of a new Higgs boson phi for the gauged L_mu - L_tau symmetry breaking, which may show up in a FCNC decay t –> c phi, followed by phi –> Z'Z' –> 4mu.

19.3 | FR 24-07-15 09:36 | HS31

Searching for anomalous top quark couplings and decays with the ATLAS detector | J. Boudreau[1], J. Katzy[2] – [1]University of Pittsburgh (US), [2]DESY, HAMBURG

The top quark is the heaviest known fundamental particle and probing its couplings with the other fundamental particle may open a window to physics beyond the Standard Model. Searches for flavour changing neutral current top quark decays using the full 2012 ATLAS dataset are presented. In addition, single top events are used to probe for anomalous couplings between the top quark and the light quarks and gluons. In addition, a new measurement using the 2011 ATLAS dataset is presented, where measurements of the different topquark pair final states are used to measure the branching ratios of the top quark decay modes.

19.4 | FR 24-07-15 09:54 | HS31

Hadroproduction of a charged vector boson pair in association with a b-quark pair at NLO accuracy matched with parton shower | Z. Trocsanyi[1], M. Garzelli, A. Kardos[2] – [1]University of Debrecen (HU), [2]University of Debrecen

We present the computation of the differential cross section for the process pp -> W+ W- b bbar -> e mu b bbar + X at NLO≈QCD accuracy matched to Shower Monte Carlo. We include all resonant and non-resonant contributions. This is achieved by fully taking into account the effect of off-shell t-quarks and off-shell W-bosons in the complex mass scheme. We also present a program called DECAYER that can be used to let the t-quarks present in the event files for pp -> t tbar +X processes decay including both the finite width of the t-quarks and spin correlations.

19.5 | FR 24-07-15 10:12 | HS31

Matching NLO QCD Corrections in WHIZARD with the POWHEG scheme | B. Chokoufe[1], J. Reuter[1], C. Weiss[1], W. Kilian[2] – [1]DESY, [2]University Siegen

Building on the new automatic subtraction of NLO amplitudes in WHIZARD, we discuss our implementation of the POWHEG scheme to match the radiative corrections consistently with the parton shower. Doing so, we consider also the ambiguities involved in the selection of the terms that are resummed to all orders. Although these ambiguities are of higher order, they can be numerically important. We study these effects at linear collider processes like $e^+e^- \to t\bar{t}H$ or $e^+e^- \to W^+W^-b\bar{b}$. In this context, it is also interesting to see the impact and interplay of the QCD corrections with beamstrahlung and lepton ISR.

19.6 | FR 24-07-15 10:30 | HS31

Subleading P-wave, Higgs and nonresonant contributions to top-pair production near threshold | T. Rauh[1], M. Beneke[1], A. Maier[1], J. Piclum[2] – [1]TU Munich, [2]University of Bern

A threshold scan of top-pair production at a future linear collider allows to determine several standard model parameters with very high precision. The recent completion of the third-order QCD corrections to the inclusive top-pair production cross section demonstrates that strong dynamics are under control. We investigate effects from P-wave production and Higgs contributions at third order and from the nonresonant production of the physical final state $b\bar{b}W^+W^-$ at first order. We discuss the dependence of the cross section on the top mass, width and Yukawa coupling as well as on the strong coupling and implications for possible measurements of these parameters.

19.7 | FR 24-07-15 11:30 | HS31

CMS Measurements of the top quark mass | H. Kirschenmann[1], A. Meyer[2] – [1]CERN, [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Measurements of the top quark mass are presented using data collected by the CMS experiment in proton-proton collisions at the LHC at centre-of-mass energies of 7 and 8 TeV. Analyses in several decay channels of top quark pair events are employed to determine the top quark mass. The results are combined and compared to the world average.

19.8 | FR 24-07-15 11:48 | HS31

Measurements of the top quark mass with the ATLAS detector | O. Brandt[1], J. Katzy[2] – [1]Ruprecht-Karls-Universitaet Heidelberg (DE), [2]DESY, HAMBURG

The top quark mass is one of the fundamental parameters of the Standard Model. The latest ATLAS measurements of the top quark mass are presented. A measurement using lepton+jets events is presented, where a multidimensional template fit is used to constrain the uncertainties on the energy measurements of jets. The measurement is combined with a measurement using dilepton events. In addition, novel measurements aiming to measure the mass in a welldefined scheme are presented. These measurements use precision theoretical QCD calculations for both inclusive ttbar production and ttbar production with an additional jet to extract the top quark mass in the polemass scheme.

19.9 | FR 24-07-15 12:06 | HS31

Measurement of the top quark mass and spin correlations with the D0 detector | B. Tuchming[1], D0 Collaboration[2] – [1]CEA Saclay, [2]DZero Experiment, Fermilab

We report most recent measurements of the mass of the heaviest known standard model particle, the top quark, performed by the D0 experiment at the Fermilab Tevatron Collider. We present measurements in the lepton+jet and dilepton decay channels.

For these measurements the full D0 data set corresponding to an integrated luminosity of 9.7 fb^{-1} is used. We also discuss a measurement of top quark spin correlations using the matrix element technique.

19.10 | FR 24-07-15 12:25 | HS31

New approaches in determining mtop: alternative techniques and differential measurements | J. Kieseler[1], A. Meyer[2] – [1]Deutsches Elektronen-Synchrotron (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Measurements of the top quark mass employing alternative methods are presented using data collected by the CMS experiment in proton-proton collisions at the LHC in the years 2011 and 2012 at centre-of-mass energies of 7 and 8 TeV. The alternative methods include the use of endpoint distributions as well as the study of possible model dependencies of the top mass measurement on the event kinematics. Measurements of the difference between the masses of top and anti-top quarks are also presented. Furthermore, the top quark mass, and also alpha_s are extracted from the measured top quark pair cross section.

20 – Detector R&D and Data Handling

FR 24-07-15 09:00-13:00
HS42

20.1 | FR 24-07-15 09:00 | HS42

The CMS muon system in Run2: preparation, status and first results | G. Abbiendi[1], A. Meyer[2] – [1]Universita e INFN, Bologna (IT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

The CMS muon system has played a key role for many physics results obtained from the LHC Run-1 data. During the Long Shutdown (2013-2014) significant upgrades have been carried out on the muon detectors and on the L1 muon trigger. In parallel the algorithms for muon reconstruction and identification have been improved for both the High-Level Trigger and the offline reconstruction. Results of studies performed on data and Monte Carlo simulations will be presented, with focus on the improvements aiming to ensure an excellent performance in conditions of multiplicity of pileup events and bunch spacing expected during the high-luminosity phase of Run-2. The early muon performance results from LHC Run-2 will be shown.

20.2 | FR 24-07-15 09:15 | HS42

ATLAS Muon Spectrometer Upgrades for the High Luminosity LHC | C. Valderanis[1], ATLAS Collaboration[2] – [1]Johannes-Gutenberg-Universitaet Mainz (DE), [2]ATLAS

The luminosity of the LHC will increase up to 2 and 7x10∧34 cm-2s-1 after long shutdowns in 2019 and 2025 (phase-1 and phase-2 upgrades). In order to cope with the increased particle fluxes, upgrades are envisioned for the ATLAS muon spectrometer. At phase-1, the current innermost stations of the ATLAS muon endcap will be upgraded with 2x4-layer modules of Micromega detectors, sandwiched by 2x4-layer modules of small strip Thin Gap detectors. Each 4-layer module of the New Small Wheels covers a surface of approximately 2-3 m∧2 for a total active area of 1200 m∧2 each. On such large area detectors, the mechanical precision is a key point and must be controlled and monitored along the process of construction and integration. Extensive test-beam campaigns have been carried out on prototype detectors. For phase-2, highly selective first level triggers are essential to exploit the full physics potential. The ATLAS experiment plans to increase the rate and latency of the first two trigger levels. This requires new muon trigger electronics and the replacement of the read-out electronics, which will allow for the inclusion of the precision chambers in the first level trigger. ATLAS plans to reinforce the barrel muon trigger system acceptance by the installation of additional thin resistive plate chambers with a high-rate capability.

20.3 | FR 24-07-15 09:30 | HS42

Physics motivations and expected performance of the CMS muon system upgrade with triple-GEM detectors | R. Venditti[1], A. Meyer[2] – [1]Universita e INFN, Bari (IT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

For the LHC High Luminosity phase (HL-LHC) the CMS GEM Collaboration is planning to install new large size triple-GEM detectors in the forward region of the muon system (1.5<|η|<2.2) of the CMS detector. The muon reconstruction with triple-GEM chambers information included have been successfully integrated in the official CMS software, allowing physics studies to be carried out. The new sub-detector will be able to cope the extreme particle rates expected in this region along with a high spatial resolution.The resulting benefit in terms of triggering and tracking capabilities has been studied:the expected improvement in the performance of the muon identification and track reconstruction as well as the expected improvement coming from the lowering of the muon pT trigger tresholds will be presented.The contribution will review the status of the CMS upgrade project with the usage of GEM detector, discussing the trigger, the muon reconstruction performance and the impact on the physics analyses.

20.4 | FR 24-07-15 09:45 | HS42

Upgrade of the ATLAS Calorimeters for Higher LHC Luminosities | I. Korolkov[1], ATLAS Collaboration[2], Y. Yamazaki[3] – [1]Universitat Autònoma de Barcelona (ES), [2]ATLAS, [3]Kobe University (JP)

The upgrade of the LHC will bring instantaneous and total luminosities which are a factor 5-7 beyond the original design of the ATLAS Liquid Argon (LAr) and Tile Calorimeters and their read-out systems. Due to radiation requirements and a new two-level

hardware trigger concept the read-out electronics will be improved in two phases. In Phase-I, a dedicated read-out of the LAr Calorimeters will provide higher granularity input to the trigger, in order to mitigate pile-up effects and to reduce the background rates. In Phase-II, completely new read-out electronics will allow a digital processing of all LAr and Tile Calorimeter channels at full 40 MHz bunch-crossing frequency and a transfer of calibrated energy inputs to the trigger. Results from system design and performance of the developed read-out components, including fully functioning demonstrator systems already operated on the detector, will be reported. Furthermore, the current Forward Calorimeter (FCal) may suffer from signal degradation and argon bubble formation at highest instataneous luminosities. A high-granularity replacement is thus proposed, improving on reconstruction of jets and missing energy in the presence of pile-up. The corresponding R&D and expected performance results will be presented.

20.5 | FR 24-07-15 10:00 | HS42

Development of technologies for highly granular calorimeters and their performance in beam tests | V. Balagura[1], F. Simon[2] – [1]Ecole Polytechnique (FR), [2]Max-Planck-Institut fuer Physik

The CALICE collaboration is developing highly granular calorimeter prototypes to evaluate technologies for experiments at a future lepton collider optimized for particle flow event reconstruction. These technologies include electromagnetic calorimeters with tungsten absorbers and silicon or scintillator active elements, and hadronic calorimeters with steel and tungsten absorbers with scintillator and gaseous detector active elements, the former with analog and the latter with purely digital and with semi-digital readout. The latest generation of these readout elements are optimised to fulfill the requirements of collider experiments, such as integrated electronics, power-pulsing and strategies for mass production. We will discuss the latest developments towards full highly granular calorimeter systems as well as performance highlights from beam tests.

20.6 | FR 24-07-15 10:15 | HS42

Detailed studies of hadronic showers and comparison to GEANT4 simulations with data from highly granular calorimeters | N. Van Der Kolk[1] – [1]Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D

The highly granular calorimeter prototypes of the CALICE collaboration have provided large data samples with precise three-dimensional information on hadronic showers with steel and tungsten absorbers and silicon, scintillator and gas detector readout. From these data sets, detailed measurements of the spatial structure, including longitudinal and lateral shower profiles and of the shower substructure are extracted. Recent analyses have extended these studies to different particle species in calorimeters with scintillator readout and steel and tungsten absorbers, to energies below 10 GeV in a silicon tungsten calorimeter and have provided first studies of the shower substructure with gaseous readout and unprecedented granularity of 1 x 1 cm^2 over a full cubic meter. These results are confronted with GEANT4 simulations with different hadronic physics models, and present new challenges to the simulation codes and provide the possibility to validate and improve the simulation of hadronic interactions in high-energy physics detectors.

20.7 | FR 24-07-15 10:30 | HS42

Hadron Calorimeters for the future High Energy Physics Nuclear Experiments | V. Mikhaylov[1], V. Kushpil[1], P. Tlusty[2], F. Guber[3], A. Kugler[2], S. Kushpil[2], V. Ladygin[4], A. Ivashkin[5], S. Seddiki[6], I. Selyuzhenkov[6], O. Svoboda[2] – [1]Nuclear Physics Institute of ASCR, [2]Nuclear Physics Institute ASCR, [3]Institute for Nuclear Research of RAS, [4]Joint Institute for Nuclear Research (JINR), [5]Institute for Nuclear Research RAS, [6]GSI Helmholtzzentrum für Schwerionenforschung, Germany

The design and performance of the hadron calorimeters developed for the future high energy nuclear physics experiments at FAIR, NICA, and CERN will be discussed. The Projectile Spectator Detector (PSD) for the CBM experiment at the future FAIR facility, the Forward Calorimeter for the NA61 experiment at CERN and the Multi Purpose Detector at the future NICA facility are reviewed. These detectors are compensating lead-scintillator calorimeters designed to measure the energy distribution of the forward going projectile nucleons and nuclei fragments (spectators) produced close to the beam rapidity. Design of detector modules is presented. Readout electronics is described with an example of PaDiWa frontend board to be used for the PSD CBM. Results of performance study of the centrality and reaction plane determination for the PSD for CBM are reported. Detectors radiation hardness to ionizing and neutral particle fields is discussed with an accent on the radiation hardness properties and investigation methods for detectors exposed to the high neutron radiation. Results of neutron radiation hardness tests for the Avalanche Photodiodes (APDs) used for the light readout in the calorimeter modules are presented.

20.8 | FR 24-07-15 10:45 | HS42

Development of the electromagnetic calorimeter waveform digitizers for the Fermilab Muon g-2 experiment | A. Chapelain[1] – [1]Cornell University

We present the design of the uTCA-based waveform digitizers that will instrument the electromagnetic calorimeters deployed for the E989 Muon g-2 experiment at Fermilab. Each uTCA advanced mezzanine card (AMC) consists of a custom made 5-channel 12-bit 800 MSPS digitizer with dedicated 1Gbit memory buffers. The digitizer communicates with the CMS designed AMC13 module to receive the synchronous triggers and the 40 MHz master clock that will be up-converted for the sampling clock. The AMC13 also collects the digitized data and transfers it to the data acquisition system.

20.9 | FR 24-07-15 11:30 | HS42

Perfomance of novel and upgraded instrumentation for luminosity and beam conditions measurements in CMS | J. Leonard[1] – [1]Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE)
The beam monitoring and luminosity systems of the CMS experiment are enhanced by several new and upgraded sub-detectors to match the challenges of the LHC operation and physics program at increased energy and higher luminosity. A dedicated pixelated luminosity telescope is installed for a fast and precise luminosity measurement. This detector measures coincidences between several three-layer telescopes of silicon pixel detectors to arrive at luminosity for each colliding LHC bunch pair. An upgraded fast beam conditions monitor measures the particle flux using single crystalline diamond sensors. It is equipped with a dedicated front-end ASIC produced in 130 nm CMOS technology. The excellent time resolution is used to separate collision products from machine induced background, thus serving as online luminosity measurement. A new beam-halo monitor at larger radius exploits Cerenkov light from fused silica to provide direction sensitivity and excellent time resolution to separate incoming and outgoing particles. The back-end electronics of the beam monitoring systems include dedicated modules with high bandwidth digitizers developed in both VME and microTCA standards for per bunch beam measurements and gain monitoring. All new and upgraded sub-detectors have been taking data from the first day of LHC operation in April 2015 and results on their essential characteristics will be presented.

20.10 | FR 24-07-15 11:45 | HS42
The CMS Level-1 Trigger for the LHC Run 2 | C. Fountas[1], A. Meyer[2] – [1]University of Ioannina (GR), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
The CMS Level-1 Trigger from Run 1 is being replaced with an entirely new system which is based on large FPGAs, 10 Gbps optical links and it is based on the uTCA technology. This platform allows for new trigger algorithms whose sophistication approaches those of higher level triggers. Whilst the new trigger will be operational early in 2016, elements of it will be installed already in 2015. The new algorithms allow for calorimeter and muon trigger objects of substantially higher resolution. Pipe-up subtraction for calorimeter objects is also performed at Level-1 which results to marked improvements for the electron, tau and jet triggers. All these upgrades will improve significantly the background rejection and the efficiency compared to Run 1. Results on the performance of the new trigger based both on Monte Carlo and data are presented.

20.11 | FR 24-07-15 12:00 | HS42
The ATLAS Trigger System: Ready for Run 2 | P. Czodrowski[1], ATLAS Collaboration[2] – [1]University of Alberta (CA), [2]ATLAS
The ATLAS trigger system has been used successfully for data collection in the 2009-2013 Run 1 operation cycle of the CERN Large Hadron Collider (LHC) at center-of-mass energies of up to 8 TeV. With the restart of the LHC for the new Run 2 data-taking period at 13 TeV, the trigger rates are expected to rise by approximately a factor of 5. The trigger system consists of a hardware-based first level (L1) and a software-based high-level trigger (HLT) that reduces the event rate from the design bunch-crossing rate of 40 MHz to an average recording rate of $\approx$ 1kHz. This presentation will give an overview of the upgrades to the ATLAS trigger system that have been implemented during the LHC shutdown period in order to deal with the increased trigger rates while efficiently selecting the physics processes of interest. These upgrades include changes to the L1 calorimeter trigger, the introduction of a new L1 topological trigger module, improvements in the L1 muon system, and the merging of the previously two-level HLT system into a single event filter processing farm. At hand of a few examples the impressive performance improvements of the upgraded system will be demonstrated and the trigger selection strategy for maximal physics coverage in Run-2 will be discussed. Finally the commissioning status of the overall trigger system and its performance in the initial phase of the 2015 data taking campaign will be summarized.

20.12 | FR 24-07-15 12:15 | HS42
Novel real-time calibration & alignment and tracking performance for LHCb Run II | P. Seyfert[1] – [1]Universita & INFN, Milano-Bicocca (IT)
The LHCb detector consists of subsystems designed to perform high efficiency tracking (>95%) with an excellent momentum resolution (0.5% for p<20 GeV). Two Ring Imaging Cherenkov detectors provide precise particle identification. In Run II of the LHC, a new scheme for the LHCb software trigger allows splitting the triggering of the event in two stages, giving room to perform the alignment and calibration in real time. In the novel detector alignment and calibration strategy for Run II, data collected at the start of the fill are processed in a few minutes and used to update the alignment, while the calibration constants are evaluated for each run. This allows identical constants to be used in the online and offline reconstruction. The larger timing budget, available in the trigger, results in the convergence of the online and offline track reconstruction. The same performance of the track reconstruction and PID are achieved online and offline. This offers the opportunity to optimise the event selection in the trigger with stronger constraints and including the hadronic PID. It additionally increases selection efficiencies and purity and reduces systematic uncertainties. The novel real-time alignment and calibration strategy at LHCb is discussed from both the operational and physics performance points of view. The development and improvements in the track reconstruction are highlighted. The overall performances of the LHCb detector on the first data of Run II are presented.

20.13 | FR 24-07-15 12:30 | HS42
Hardware-based Tracking at Trigger Level for ATLAS: The Fast TracKer (FTK) Project | J. Gramling[1], ATLAS Collaboration[2] – [1]Universite de Geneve (CH), [2]ATLAS

Physics collisions at 13 TeV are expected at the LHC with an average of 40-50 proton-proton collisions per bunch crossing. Tracking at trigger level is an essential tool to control the rate in high-pileup conditions while maintaining a good efficiency for relevant physics processes. The Fast TracKer (FTK) is an integral part of the trigger upgrade for the ATLAS detector. For every event passing the Level 1 trigger (at a maximum rate of 100 kHz) the FTK receives data from the 80 million channels of the silicon detectors, providing tracking information to the High Level Trigger in order to ensure a selection robust against pile-up. The FTK performs a hardware-based track reconstruction, using associative memory (AM) that is based on the use of a custom chip, designed to perform pattern matching at very high speed. It finds track candidates at low resolution (roads) that seed a full-resolution track fitting done by FPGAs. Narrow roads permit a fast track fitting but need many patterns stored in the AM to ensure efficient matching, wide roads allow for fewer patterns but combinatorics slow down the track fitting. To optimize this choice, the feature of variable resolution of the roads is implemented via ternary bits in the AM logic. An overview of the FTK system with focus on the pattern matching procedure will be presented. Furthermore, the expected performance and the integration of FTK within the ATLAS trigger system will be discussed.

20.14 | FR 24-07-15 12:45 | HS42

FTK AMchip05: an Associative Memory Chip Prototype for Track Reconstruction at Hadron Collider Experiments | F. Crescioli[1], ATLAS Collaboration[2] – [1]Centre National de la Recherche Scientifique (FR), [2]ATLAS

The Fast TracKer (FTK) trigger project is an upcoming upgrade for the ATLAS trigger system currently under installation. A first reduced-coverage FTK is expected to participate in data taking by the end of 2015, while full detector coverage will be reached in 2016 and more processing power will be added in 2017-2018. The ATLAS FTK is a dedicated supercomputing processor based on FPGAs and a custom ASIC: the Associative Memory chip (AMchip). The AMchip is the core processor in charge of the real-time pattern recognition stage of the FTK algorithm. It is based on Content Addressable Memory elements connected by advanced computation logic that adds the unique feature to look for correlated hits forming tracks. The AMchip05 is the latest AMchip prototype before the final FTK production. It is functionally identical to the upcoming production chip with the only difference of pattern capacity. We will show the AMchip05 architecture, the design, implementation and the in-depth performance analysis under different working conditions (power supply voltage and operating frequency). We will discuss the impact on physics performance enabled by the new features with respect to the previous AMchip generation, in particular the possibility to have variable resolution patterns. We will also address the impact on LHC Phase-2 tracking applications of the current chip and the foreseen developments.

21 – Neutrino Physics

FR 24-07-15 09:00-13:00
HS7

21.1 | FR 24-07-15 09:00 | HS7

GERDA Phase II and the future of Ge-76 experiments | M. Agostini

The GERDA experiment searches for the neutrinoless double-beta decay of Ge-76 by operating an array of Ge detectors directly in liquid argon. After a first successful phase of data taking (Phase I), the apparatus is currently being upgraded to double the target mass (up to 38 kg) and to further reduce the background index (<0.001 cts/keV/kg/yr). Results from the on-going hardware commissioning and perspective for the approaching Phase II of data taking will be presented.

21.2 | FR 24-07-15 09:15 | HS7

Status of SuperNEMO experiment and last results of NEMO3 | A. Remoto[1], F. Piquemal[2], X. Garrido[3] – [1]LAPP, [2]CNRS, [3]LAL

SuperNEMO is a next generation neutrinoless double beta decay experiment with a design capability to reach a half-life sensitivity of 1026 years corresponding to an effective Majorana neutrino mass of ($m\beta\beta$) < 50 - 100 meV. This detector has the unique capability to identify the electrons allowing to reduce drastically the background coming from the natural radioactivity. It measures also all kinematical parameters (individual energy of the ellectrons and angular distribution) and in case of signal it could allow to determine the process leading to neutrinoless double beta decay. We will present the status of SuperNEMO construction and the improvements foreseen compared to NEMO-3. The R&D started in 2007 and today all the requirements are achievable. The collaboration is now equipped with very sensitive complementary detectors (for radon: diffusion apparatus, concentration line and emanation tank and for radiopurity: BiPo, HPGe...). Underground early commissioning of one quarter of tracker and one brick of calorimeter is expected by the end of this year and data takin is expected second semester 2016. We will also present the last last esults from NEMO-3 experiment located in the Modane Underground Laboratory researched the neutrinoless double beta decay from 2003 to 2011. Seven isotopes were studied with the unique tracko-calo technique including the 2 most important in term of sensitivity with 7kg of 100Mo and 1kg of 82Se.

21.3 | FR 24-07-15 09:30 | HS7

Neutrinoless double beta decay results from CUORE-0 and status of the CUORE experiment | F. Terranova[1] – [1]Universita & INFN, Milano-Bicocca (IT)

CUORE (Cryogenic Underground Observatory for Rare Events) is a ton-scale experiment aimed at searching for neutrinoless

double beta decay in ^{130}Te with tellurium oxide bolometers, with a projected sensitivity close to the inverted mass hierarchy region. The CUORE detector design and background budget have been validated by CUORE-0: an array of 52 TeO_2 bolometers built using the same protocols developed for CUORE and running at the Gran Sasso Laboratories since spring 2013. In this talk we will present the latest results on neutrinoless double beta decay from CUORE-0, and show that its performance in terms of background and energy resolution fully supports the expectations for the CUORE sensitivity. In addition, we will summarize the status of CUORE that is now in its final construction stage: all towers have been assembled and are ready for installation in the cryostat, which reached a record temperature of 6 mK on a 1 m^3 volume scale in fall 2014.

21.4 | FR 24-07-15 09:45 | HS7

Neutrinoless double beta decay, nuclear environment and structure | F. Simkovic[1] – [1]Comenius University

The recent progress in theoretical description of the neutrinoless double beta decay ($0\nu\beta\beta$-decay) is briefly reviewed. A possible effect of nuclear medium on exchange of three light neutrinos is addressed. It is shown that non-standard neutrino interaction generates in-medium Majorana neutrino masses, which influences the $0\nu\beta\beta$-decay rate. Nuclear physics is important for extracting useful information from the $0\nu\beta\beta$-decay data. Interpreting existing results as a measurement of effective Majorana neutrino mass depends crucially on the knowledge of the corresponding nuclear matrix elements (NMEs) that govern the decay rate and must be evaluated using tools of nuclear structure theory. To this end, the results of NMEs calculation within sophisticated nuclear structure approaches are presented. Subject of interest are the accuracy and reliability of calculated NMEs. An impact of the quenching of the axial-vector coupling constant on double-beta decay processes is discussed. Further, the $0\nu\beta\beta$-decay with the inclusion of the right-handed leptonic and hadronic currents and by assuming small neutrino masses is revisited. Differential characteristics and phase-space integrals are calculated by using exact Dirac wave function with finite nuclear size and electron screening. The effective lepton number violating parameters are discussed in light of recent progress achieved by the GERDA, EXO and Kamland-Zen experiments.

21.5 | FR 24-07-15 10:15 | HS7

NEXT: Searching for the bb0n decay in the Canfranc Underground Laboratory | P. Novella[1] – [1]IFIC

Although different techniques are used to search for the neutrinoless double beta decay, the common challenges for all the existing or planned experiments are to achieve a good energy resolution and large background rejection factors. The NEXT collaboration addresses these two challenges with a high-pressure gas-Xenon electroluminescent TPC, where the isotope 1 36Xe is used as both the source and the detection medium. The capabilities of this technology have been demonstrated with two small prototypes, NEXT-DBDM and NEXT-DEMO, which were built and operated between 2009 and 2013. The energy resolution has been measured to be below 1% at the Q value of 136Xe, while the reconstruction of the electron tracks provides a powerful background identification handle. A larger prototype containing 10 kg of Xe, NEXT-NEW, is being built in the LSC. This detector will start operation in 2015 with the goal of measuring the bb0n background and the bb2n decay. Given the scalability of the TPC technology, NEXT-NEW will set the grounds for the NEXT-100 detector (100 kg of 136Xe) that will be be operated in the LSC in 2017, searching for the bb0n decay up to a half-life of about 6x1025 years after 3 years of data taking.

21.6 | FR 24-07-15 10:30 | HS7

Status of the SNO+ Experiment | G. Prior[1] – [1]LIP

The SNO+ experiment has multiple physics goals among which the search for neutrinoless double-beta decay, the study of solar neutrinos, measurements of anti-neutrinos from nuclear reactors and the Earth's natural radioactivity, as well as the ability to detect Supernovae neutrinos. Located in the SNOLAB underground physics laboratory (Canada) it will re-use the SNO detector equipped with ≈9000 PMTs and looking at a 12 m diameter spherical volume. The detector will be filled with 780 tons of liquid scintillator to which 130Te at 0.3% loading will be added. The commissioning of the detector at SNOLAB has started, and data with air and partial water fill have been taken. A short phase with the detector completely filled with water is expected to start at the end of the year, before running the detector with scintillator in 2016. The main detector developments and technical challenges inherent to this large volume liquid scintillator and low-energy experiment will be presented. In addition the status of the detector which is in its commissioning phase and the detector and physics plans for the water phase will be described. Finally the neutrinoless double-beta decay sensitivity physics goals that SNO+ aims to achieve in phases with different loadings will be given.

21.7 | FR 24-07-15 10:45 | HS7

Impact of Neutrinoless Double Beta Decay on Models of Baryogenesis | J. Harz[1], F. Deppisch[2], M. Hirsch[3], W. Huang[1], H. Paes[4] – [1]University College London, [2]University College London (UK), [3]IFIC/CSIC, University of Valencia, [4]University of Dortmund

Interactions that manifest themselves as lepton number violating processes at low energies in combination with sphaleron transitions typically erase any pre-existing baryon asymmetry of the Universe. We demonstrate in a model independent approach that the observation of neutrinoless double beta decay would impose a stringent constraint on mechanisms of high-scale baryogenesis, including leptogenesis scenarios. In combination with the observation of lepton flavor violating processes, we can further strengthen this argument, closing the loophole of asymmetries being stored in different lepton flavors. We further discuss the potential of the LHC to model independently exclude high-scale leptogenesis scenarios when observing lepton

number violating processes.

21.8 | FR 24-07-15 11:30 | HS7

Status of the neutrino mass experiments KATRIN and Project 8 | F. Fraenkle[1] – [1]Karlsruhe Institute of Technology

A model independent, direct way to measure the neutrino masses is the investigation of the kinematics of single β-decay via a precise measurement of the β-decay electron energy spectrum close to the endpoint. This talk will present the current status of two experiments intending to use this method by measuring the β-spectrum of tritium. The KArlsruhe TRItium Neutrino (KATRIN) experiment is currently under construction at KIT. The measurement setup consists of a high luminosity windowless gaseous tritium source, a magnetic electron transport system with differential and cryogenic pumping for tritium retention, and an electro-static spectrometer section (pre-spectrometer and main spectrometer) for energy analysis, followed by a segmented detector system for counting transmitted β-electrons. The latest results of a recent commissiong measurement phase aiming to investigate the performance of the main spectrometer will be presented. The Project 8 experiment aims to detect coherent cyclotron radiation emitted by energetic electrons in a magnetic field in order to perform β-spectroscopy. Only recently, a dedicated test experiment was able to successfully detect synchrotron radiation emitted from a single, mildly relativistic electron for the first time, showing the feasability of this approach and allowing for a new method to perform spectroscopy.

21.9 | FR 24-07-15 11:45 | HS7

The Electron Capture in 163Ho experiment | S. Scholl[1], L. Gastaldo[2] – [1]Uni Tuebingen, [2]Heidelberg University

The Electron Capture in 163Ho experiment, ECHo, is designed to investigate the electron neutrino mass in the sub-eV range by means of the analysis of the calorimetrically measured spectrum following the electron capture in 163Ho. Arrays of low temperature metallic magnetic calorimeters (MMCs), read-out using microwave SQUID multiplexing, will be used in this experiment. With a first MMC prototype having the 163Ho source ion-implanted in the absorber, we performed the first high energy resolution measurement of the EC spectrum, which demonstrated the feasibility of such an experiment. In addition to the technological challenges for the development of MMC arrays which preserve the single pixel performance in term of energy resolution and bandwidth, the success of the experiment relies on the availability of large ultra-pure 163Ho samples, on the precise description of the expected spectrum and on the identification and reduction of background. We present the plan for a medium scale experiment, ECHo-1k, in which about 1000 Bq of high purity 163Ho will be ion-implanted into detector arrays. With one year of measuring time we will be able to achieve a sensitivity on the electron neutrino mass below 10 eV/c2 (90% C.L.), improving the present limit by more than one order of magnitude. This experiment will guide the necessary developments to reach the sub-eV sensitivity.

21.10 | FR 24-07-15 12:00 | HS7

Borexino: recent solar and terrestrial neutrino results | W. Maneschg[1], C. Borexino[2] – [1]MPI, [2]LNGS

The Borexino experiment is running at the Laboratori del Gran Sasso in Italy since 2007. Its technical distinctive feature is the unprecedented ultralow background of the inner scintillating core, which is the basis of the outstanding achievements accumulated by the experiment. In this talk, after recalling the main features of the detector, the impressive solar and geo-neutrino data gathered so far by the experiment will be summarized, with special emphasis to the most recent and prominent result concerning the detection of the fundamental pp solar neutrino flux, which is the direct probe of the engine mechanism powering our star. Such a milestone measurement puts Borexino in the unique situation of being the only experiment able to do solar neutrino spectroscopy over the entire solar spectrum; the counterpart of this peculiar status in the oscillation interpretation of the data is the capability of Borexino alone to perform the full validation across the solar energy range of the MSW-LMA paradigm. The talk will be concluded highlighting the perspectives for the final stage of the solar program of the experiment, centered on the goal to fully complete the solar spectroscopy with the missing piece of the CNO neutrinos. If successful, such a measurement would represent the final crowning of the long quest of Borexino to unravel all the properties of the neutrinos from the Sun.

21.11 | FR 24-07-15 12:15 | HS7

Future prospects of neutrino oscillation experiments | S. Raut[1] – [1]KTH Royal Institute of Technology

Standard neutrino oscillation physics has entered the era of precision measurements. With a large value of θ_{13} having been measured, the remaining unknowns yet to be determined are the mass hierarchy, CP violation and the octant of θ_{23}. The main problem in determining these parameters is the problem of parameter degeneracy. T2K, NOvA, SK, IceCube and the reactor experiments are all currently collecting data to resolve this problem. However if the degeneracies are severe, we will need the next set of oscillation experiments that are currently in various stages of planning/construction, such as DUNE, ESSnuSB, ICAL, PINGU and the medium baseline reactor experiments. We discuss the ability of the current and future experiments to measure the unknown parameters.

21.12 | FR 24-07-15 12:30 | HS7

An Experimental Program in Neutrinos, Nucleon Decay and Astroparticle Physics Enabled by the Fermilab Long-Baseline Neutrino Facility | A. Habig, V. Paolone[1] – [1]University of Pittsburgh (US)

A new International Team (DUNE - Deep Underground Neutrino Experiment) has been formed to pursue an accelerator-based long-baseline neutrino experiment, as well as neutrino astrophysics and nucleon decay, with an approximately 40-kt (fiducial)

modular liquid argon TPC (LAr-TPC) detector located deep underground and a high-resolution near detector. Several independent worldwide efforts, developed through years of detailed studies, are converging around the opportunity provided by the megawatt neutrino beam facility planned at Fermilab and by the new significant expansion with improved access at the Sanford Underground Research Facility in South Dakota, 1,300 km from Fermilab. The principle goals of this experiment are: a comprehensive investigation of neutrino oscillations to test CP violation in the lepton sector, determine the ordering of the neutrino masses, and test the three-neutrino paradigm; to perform a broad set of neutrino scattering measurements with the near detector; and to exploit the large, high-resolution, underground far detector for non-accelerator physics topics including atmospheric neutrino measurements, searches for nucleon decay, and measurement of astrophysical neutrinos especially those from a core-collapse supernova.

21.13 | FR 24-07-15 12:45 | HS7

Neutrino oscillation physics potential of Hyper-Kamiokande | L. Cremonesi[1], G. Catanesi[2] – [1]Queen Mary University of London, [2]Universita e INFN, Bari (IT)

Hyper-Kamiokande (HK) is a megaton scale water Cherenkov detector proposed to be built in Japan. HK is the logical continuation of the highly successful program of neutrino physics and proton decay searches using a water Cherenkov technique. HK will study the CP asymmetry in neutrino oscillations using the neutrino and anti-neutrino beams produced at J-PARC. With an exposure of 7.5 MW x 10∧7 seconds, delta can be measured to better than 19 degrees at all values, and CP violation can be detected with more than 3 sigma significance for 76% of values of delta. Studies of the sensitivity of this detector to neutrino oscillation parameters, CP violating phase, matter effect, and mass hierarchy will be presented.

22 – Heavy Ion Physics

FR 24-07-15 09:00-13:00

HS30

22.1 | FR 24-07-15 09:00 | HS30

Precision measurement of the mass difference between light nuclei and anti-nuclei with ALICE at the LHC | M. Colocci[1] – [1]Universita e INFN, Bologna (IT)

In ultra relativistic heavy-ion collisions a large and similar amount of nuclei and anti-nuclei is produced in the central pseudorapidity region allowing one to deeply investigate their properties. Mass and electric charge are expected to be the same in nuclei and anti-nuclei as long as the CPT invariance holds for nuclear force, a remnant of the underlying strong interaction between quarks and gluons. In this talk the measurements of the difference of mass-to-charge ratio between deuteron and anti-deuteron, and ^{3}He and $^3\overline{\text{He}}$ nuclei performed with the ALICE detector at the LHC will be presented for the first time. The measurements improve by one to two orders of magnitude analogous results previously obtained. They are also expressed in terms of binding energy differences. That related to the (anti-)deuteron improves by a factor two the constraints on CPT invariance inferred by existing measurements, while in the case of (anti-)^{3}He it has been determined for the first time.

22.2 | FR 24-07-15 09:20 | HS30

Nuclear collisions at the LHeC | N. Armesto Perez[1] – [1]Universidade de Santiago de Compostela (ES)

The LHeC is a proposed upgrade of the LHC to study ep/eA collisions in the TeV regime, by adding a 60 GeV electron beam through an Energy Recovery Linac. In this talk new results are presented on the physics prospects on energy frontier eA collisions with this machine, with emphasis on the precise determination of nuclear parton densities.

22.3 | FR 24-07-15 09:40 | HS30

Prospects for dense baryonic matter research at NICA | A. Sorin[1], V. Kekelidze[2], A. Kovalenko[3], R. Lednicky[4], V. Matveev[2], I. Meshkov[5], G. Trubnikov[1] – [1]Joint Institute for Nuclear Research, Dubna, [2]Joint Inst. for Nuclear Research (RU), [3]Joint Institute for Nuclear Research, [4]Joint Institute for Nuclear Research, Dubna, Russia, [5]Joint Institute for Nuclear Research (JINR)

The NICA (Nuclotron-based Ion Collider fAcility) project is now under active realization at the Joint Institute for Nuclear Research (JINR, Dubna). The main goal of the project is an experimental study of hot and dense strongly interacting matter in heavy ion (up to Au) collisions at centre-of-mass energies up to 11 GeV per nucleon. Two modes of the operation is foreseen, collider mode and extracted beams, with the two detectors: MPD and BM@N. In the collider mode the average luminosity is 10E27 cm-2 s-1 for Au(79+). The fixed target experiment BM@N at the JINR superconducting synchrotron Nuclotron is in preparation stage. Extracted beams of various nuclei species with maximum momenta 13 GeV/c (for protons) will be available. The NICA project also foresees a study of spin physics with the detector SPD with extracted and colliding beams of polarized deuterons and protons at the energies up to 27 GeV (for protons). The proposed program allows to search for possible signs of the phase transitions and critical phenomena as well as to shed light on the problem of nucleon spin structure. General design, construction status and physics program of the NICA complex will be presented.

22.4 | FR 24-07-15 10:00 | HS30

Progress towards A Fixed-Target ExpeRiment at the LHC: AFTER@LHC | B. Trzeciak[1], J. Lansberg[2] – [1]Czech Technical University in Prague, [2]IPN Orsay, Paris Sud U. / IN2P3-CNRS

The multi-TeV LHC beams offer the possibility to perform the most energetic fixed-target experiments ever, in order to study with high precision pp and pA collisions at $\sqrt{s_{NN}} \simeq 115$ GeV and Pbp and PbA collisions at $\sqrt{s_{NN}} \simeq 72$ GeV. AFTER@LHC – A Fixed-Target ExperRiment – can greatly complement collider experiments, in particular those of RHIC and EIC projects. We thus discuss the possibility of a multi-purpose fixed-target experiment using LHC beams extracted by a bent crystal or using an internal gas target inspired from the LHCb SMOG system. We have evaluated that the instantaneous luminosity achievable with AFTER would surpass that of RHIC by more than 3 orders of magnitude. This provides a quarkonium, prompt photon and heavy-flavour observatory in pp and pA collisions where, by instrumenting the target-rapidity region, gluon and heavy-quark distributions of the proton, the neutron and the nuclei can be accessed at large x. In addition, the fixed-target mode has the advantage to allow for spin measurements with polarized targets over the full backward rapidity domain. The nuclear target-species versatility provides a unique opportunity to study the nuclear matter versus the hot and dense matter formed in heavy-ion collisions. We will show first results of the fast simulations based on a LHCb-like detector used in the fixed-target mode and discuss connections with data from LHCb SMOG, which can be seen as a low-density internal gas target.

22.5 | FR 24-07-15 10:20 | HS30

Double-scattering mechanism of production of two ρ^0 mesons in ultraperipheral, ultrarelativistic heavy ion collisions | A. Szczurek[1], M. Klusek-Gawenda[2] – [1]Institute of Nuclear Physics, [2]Polish Academy of Sciences (PL)

We present, for the first time, differential distributions for two ρ^0 meson production in exclusive ultraperipheral, ultrarelativistic collisions via a double scattering mechanism. The calculations are done in the impact parameter space. The cross section for $\gamma A \to \rho^0 A$ is parametrized based on an existing calculation. Smearing of ρ^0 masses is taken into account. The results of calculations are compared at the RHIC and LHC energies. The cross section for the double scattering mechanism is an order of magnitude larger at $M_{\rho\rho} < 2$ GeV and more than two orders of magnitude at $M_{\rho\rho} > 3$ GeV, than that for the photon-photon mechanism. The double scattering mechanism populates somewhat larger $\rho^0\rho^0$ invariant masses and larger rapidity distances between the two ρ^0 mesons compared to the two-photon mechanism. The mechanism considered gives a significant contribution to the $AA \to AA\pi^+\pi^-\pi^+\pi^-$ reaction. Some observables related to charged pions are presented too. We compare results of our calculation with the STAR collaboration results on four charged pion production. The shape in invariant mass of the four-pion system is very similar to the measured one. We discuss a possibility of identifying the double scattering mechanism at the LHC. Literature: M. Klusek-Gawenda and A. Szczurek, Phys. Rev. C89 (2014) 024912.

22.6 | FR 24-07-15 10:40 | HS30

Lightening-like interactions in nuclear collisions at CERN large hadron collider | K. Abdel-Waged[1], N. Felemban[1] – [1]Physics Department-Umm Al-Qura University- Saudi Arabia

A simple basic model for describing proton-nucleus collisions has been the intra-nuclear cascade model, where the interactions are simulated by a sequence of binary nucleon-nucleon collisions. This model helped to establish many scientific concepts and also creates the foundation for more modern simulation codes, especially at low and intermediate energies. In this paper, we present a new Monte Carlo model for proton-nucleus collisions at high CERN Large Hadron collider energies. The model implements a collective cascade to induce striking light-like effect in a large nucleus. A single collision (lightening) event is shown to be a complex process: Enormous quantities of energies pass through the surrounding nucleons in a large nucleus. This new simulation code is shown to be good to reproduce the Large Hadron collider data, especially p+p and p+Pb collisions.

22.7 | FR 24-07-15 11:30 | HS30

New results on flow and correlations in pPb and PbPb collisions from ATLAS at the LHC | M. Arratia Munoz[1] – [1]University of Cambridge (GB)

The measurement of centrality and pseudorapidity dependence of the p_T-integrated flow harmonics, v_2 up to v_5, in Pb+Pb collisions at $\sqrt{s_{NN}}$=2.76 TeV with the ATLAS detector at the LHC are presented. These measurements give a clear picture of the average geometry as well as fluctuations in it. These measurements are extended to include the correlations between flow harmonics of different order, which are sensitive to quantum fluctuations in the initial geometry and hydrodynamic response in the final state collective expansion. The results include correlations of $v_2 - v_n$ and $v_3 - v_n$ (n=2-5) obtained by varying the event ellipticity in narrow centrality intervals using an event-shape engineering technique. Several unique features in these correlations suggest new sources of geometrical fluctuations in the initial state. Recent measurements of the ridge correlations and associated first five azimuthal harmonics (v_1-v_5) in p+Pb collisions are also presented. The v_n results are shown as a function of pT, η and event activity providing important constraints on the hydrodynamic model of collective flow in small systems. The non-zero double-ridge amplitudes and v_n are found to exist up to pT of $\approx$10 GeV. A simple conformal scaling pattern in the pT dependence is observed for v_2-v_4 between p+Pb and Pb+Pb with similar event activity, suggesting similar hydrodynamic response and non-linear mode-mixing effects in the 2 collision systems.

22.8 | FR 24-07-15 11:50 | HS30

Triangular flow in relativistic heavy-ion collisions within HYDJET++ | J. Crkovska[1], L. Bravina[2], E. Zabrodin[2] – [1]FNSPE CTU Prague, [2]University of Oslo (NO)

The hadronic collective flow was found to be one of the most pronounced signatures of the Quark-Gluon Plasma (QGP), the hot and dense matter created in the collisions of relativistic heavy ions. The azimuthal distribution of detected hadrons can be

expanded into a Fourier series over the azimuthal angle, the flow harmonics are then represented by the Fourier coefficients. In semi-peripheral and peripheral collisions, the anisotropic flow is dominated by elliptic flow, defined by the second Fourier coefficient v_2. On the other hand, the contribution of the third component v_3 becomes more pronounced in central collisions due to the spatial initial state fluctuations. Study of the triangular flow, v_3 in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV and in Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV was performed using HYDJET++ Monte Carlo model. HYDJET++ combines a parametrised hydrodynamics for soft physics with a microscopic jet quenching generator for hard and semi-hard scattering, giving a realistic prediction of the shape of distribution for different hadron species. The model also enables study of influence of final-state interactions on flow of created hadrons. The interplay between soft and hard processes, as well as the influence of the resonance decays on the triangular flow in AA collisions at RHIC and LHC were studied. Reasons for violation of number-of-constituent-quark scaling at LHC for triangular and elliptic flow will be also discussed.

22.9 | FR 24-07-15 12:10 | HS30

Spectra and elliptic flow of charmed hadrons in HYDJET++ model | G. Eyyubova[1], P. Georgij[2], I. Lokhtin[3], A. Belyaev[3], P. Elizaveta[3] – [1]Czech Technical University (CZ), [2]Ostrov Industrial High School (CZ), [3]M.V. Lomonosov Moscow State University (RU)

Heavy-flavour quarks are predominantly produced in hard scattering on a short time-scale and traverse the medium interacting with its constituents, thus they are one of the effective probes of the transport properties of the medium formed in relativistic heavy ion collisions. On the other hand, the thermal production of heavy-flavour quarks in quark-gluon plasma is itself of interest. In this report, the production and elliptic flow of the prompt charmed mesons D∧0, D∧+, and D∧⋆+ and J/psi in PbPb collisions at the center-of-mass energy 2.76 TeV per nucleon pair are described in the frameworks of two-component HYDJET++ model. The model combines thermal and pQCD production mechanisms. The nuclear modification factor and elliptic flow of charmed mesons are presented, the results are compared with LHC data.

22.10 | FR 24-07-15 12:30 | HS30

Recent developments in hydrodynamics and collectivity in small systems | H. Niemi[1] – [1]University of Jyväskylä

One of the main goals in heavy ion collision experiments at relativistic energies is to determine the properties, like viscosity, of nearly thermalized strongly interacting matter. The dynamics of the system formed in these collisions is, however, complex and the matter properties reflect into the experimental observables in a non-trivial way. Therefore, it is essential to have a good understanding of the dynamics, as well as understand how the different stages of the collisions affect the measured particle spectra. Fluid dynamics is a natural framework to use in constraining the transport properties of the matter as the transport coefficients, like shear and bulk viscosity, are direct inputs to the models. While fluid dynamics is a convenient tool, it also has limited applicability, and for system as small as those created in heavy ion collisions it is not at all clear whether it is strictly applicable. However, the system is also strongly interacting, and the comparisons between the experimental data and the predictions of fluid dynamical models show an extremely good agreement, suggesting that we indeed create a small droplet of fluid in these collisions. I will review the current status of describing space-time evolution of the relativistic nuclear collisions with fluid dynamics, and of determining the transport coefficients of strongly interacting matter.

23 – Astroparticle Physics, Cosmology, Gravitation

FR 24-07-15 14:30-18:00
HS33

23.1 | FR 24-07-15 14:30 | HS33

The CRESST dark matter search - Status and Perspectives | F. Reindl[1] – [1]Max-Planck-Insitute for Physics Munich

While the presence of dark matter in the universe was verified by observations on various astronomical scales, the nature of dark matter still remains a puzzling question. The most favored solution is the existence of Weakly Interacting Massive Particles (WIMPs). Experiments around the globe search for WIMPs; one of them is CRESST aiming to directly detect WIMPs scattering off nuclei in $CaWO_4$ target crystals. The main background in CRESST-II phase 1 (2009-2012) originated from alpha decays on, or slightly below non-scintillating materials in the line of sight to the crystal. Thus, we developed new detector designs for phase 2 (2013-now) capable to veto such events. In this contribution we will present a low-threshold analysis of 2013 data of phase 2 from a single upgraded detector module. With 29kg days of exposure we could set a leading limit in the low WIMP-mass region below 3GeV/c^2. While detector performance is the key factor for low WIMP masses, the exposure of the full phase 2 data set (still blinded) will be needed to further improve for higher WIMP masses. Due to low thresholds and a precise energy reconstruction, CRESST detectors are ideal to measure tiny nuclear recoils ($\mathcal{O}$(1 keV)) expected for light WIMPs ($\mathcal{O}$(1GeV/c^2)). Thus, CRESST-III phase 1 will use new upgraded detectors optimized towards the detection of low-mass WIMPs. We will report on the currently ongoing preparations for CRESST-III phase 1 and outlooks beyond.

23.2 | FR 24-07-15 15:00 | HS33

Recent results from the EDELWEISS-III WIMP search experiment | A. Cazes[1] – [1]Université Claude Bernard Lyon I

The EDELWEISS experiment is dedicated to the direct detection of Dark Matter. The current setup – EDELWEISS-III – aims at exploring a spin-independent WIMP-nucleon cross section down to the 10^{-9}pb range, and extend the coverage for masses

below 20 GeV. Since July 2014, the collaboration is taking data with 24 state-of-the-art cryogenic FID800 Germanium detectors installed in the radio pure environment of the Modane underground laboratory - the deepest of its kind in Europe. In this talk I will present the current status of the EDELWEISS-III experiment and show first preliminary results highlighting our new low WIMP mass analysis and the current background budget.

23.3 | FR 24-07-15 15:15 | HS33

The XENON Project for Direct Dark Matter Detection | A. Kish[1] – [1]Physik-Institut UZH

Detectors based on noble gases are a very efficient and promising technology which leads the active field of dark matter searches. The XENON collaboration aims at a direct detection of dark matter with experiments based on liquid xenon. The XENON100 detector, which is being operated at the Gran Sasso Underground Laboratory in Italy, is a dual-phase time-projection chamber with a 62 kg target volume, which has set the best limits on spin-independent WIMP-nucleus scattering at the time of publication. The next step of the research program, the XENON1T experiment is currently under construction, and features 2t of liquid xenon in the target, the $\approx$10m water tank for background reduction via Cherenkov muon veto, and an innovative system for gas storage, liquefaction and purification. In my talk I will explain the technology behind XENON100, analysis routine and science results, including spin-independent and spin-independent WIMP interactions, and more recent searches for axions and axion-like particles, as well as data interpretation in terms of luminous and mirror dark matter, and the annual modulation analysis of the electronic recoil spectrum. The technological advances and status of the construction of the XENON1T experiment will be also presented.

23.4 | FR 24-07-15 15:30 | HS33

Direct Detection of Dark Photon Dark Matter | J. Pradler[1] – [1]Austrian Academy of Sciences (AT)

Dark matter detectors built primarily to probe elastic scattering of WIMPs on nuclei are also precise probes of light, weakly coupled particles that may be absorbed by the detector material. Ensuing constraints on the minimal model of dark matter comprised of long-lived vector states V (dark photons) in the 0.01-100 keV mass range are presented. The absence of an ionization signal in direct detection experiments such as XENON10 and XENON100 places a very strong constraint on the dark photon mixing angle, exceeding the indirect bounds derived from stellar energy loss considerations over a significant fraction of the available mass range; the talk is based on arXiv:1412.8378.

23.5 | FR 24-07-15 15:45 | HS33

Phenomenological aspects of flavoured dark matter | M. Blanke[1] – [1]CERN

Flavour symmetries in the dark sector are a theoretically motivated and phenomenologically appealing possibility. The dark matter particle can be stabilised with the help of flavour symmetries, without the need to introduce an additional discrete symmetry by hand. Apart from the usual searches in direct and indirect detection experiments and high energy colliders, flavoured dark matter generally also gives rise to new flavour violating interactions leading to interesting signatures in rare meson decays. In this talk I introduce a simplified model of flavoured dark matter in which the dark matter coupling to quarks constitutes a new source of flavour violation, so that the model goes beyond Minimal Flavour Violation. Particular emphasis is put on the discussion of its phenomenological implications in flavour, collider and direct detection experiments.

23.6 | FR 24-07-15 16:30 | HS33

Study of Majorana Fermion Dark Matter | G. Wong[1], C. Chua – [1]Chung Yuan Christian University

We construct a generic model of Majorana fermion dark matter (DM). Starting with two Weyl spinor multiplets $\eta_{1,2}$ having quantum numbers $(I, \mp Y)$ coupled to the standard model (SM) Higgs, six additional Weyl spinor multiplets with $(I \pm 1/2, \pm(Y \pm 1/2))$ are needed in general. It has 13 parameters in total, five mass parameters and eight Yukawa couplings. The DM sector of the minimal extension of supersymmetric stand model (MSSM) is a special case of the model with $(I, Y) = (1/2, 1/2)$. Therefore, this model can be viewed as an natural extension of the MSSM case. We consider three cases: MSSM-like, reduced, and extended cases. We study the constraints from the observation of dark matter in relic density, the direct search experiments of XENON, LUX and PICO , and the indirect search experiment of Fermi-LAT. From the constraints we find the allowed range of coupling strength and the distribution of main ingredient which compose a DM particle in mass parameter space. These results are compared with each other.

23.7 | FR 24-07-15 16:45 | HS33

Impact of Dark Matter Direct and Indirect Detection on simplified Dark Matter Models | G. Arcadi, Y. Mambrini[1], M. Pierre[1] – [1]LPT Orsay

We will analyze simple extensions of the Standard Model featuring a (fermionic) stable DM candidate and a mediator, a Z' or a scalar/pseudoscalar state, of its interactions with SM states. These kind of models result particulary manageable, because of the limited number of free-parameters, and offer a broad LHC phenomenology, ranging from mono-object sources to resonances in dileptons/dijets distributions, according to the dominant branching ratio of decay of the mediators. We will discuss the impact Direct and Indirect Dark Matter searches, assuming the latter to be thermal WIMPs. We will show in particular that the combinations of the limits on the DM Spin Independent and Spin Dependent scattering cross-section on nuclei already exclude large portions of the parameter space favored by DM relic density, in particular if, in addition, a DM Indirect signal, like

the Galactic Center gamma-ray excess is required. We will then show how these constraints can provide indication on possible signals which can be tested at the LHC.

23.8 | FR 24-07-15 17:00 | HS33

Halo-independent tests of dark matter direct detection signals | J. Herrero Garcia[1], T. Schwetz-Mangold[2], M. Blennow[3], S. Vogl[4] – [1]KTH, [2]Stockholm University (SE), [3]KTH Royal Institute of Technology, [4]Technical University Munich

I will discuss halo-independent tests of direct detection signals that we have derived in two recent works. In the first part [based on 1502.03342], I will discuss a halo-independent lower bound on the DM capture rate in the Sun from a direct detection signal, with which one can set limits on the branching ratios into different channels from the absence of a high-energy neutrino flux in neutrino telescopes. In the second part [based on 1505.05710], I will discuss a lower bound one can set on the product of the DM-nucleon cross section and the energy density from a direct detection signal that is independent of the velocity distribution, and how this bound can be combined with limits from local density measurements, the LHC and the relic abundance in order to constraint DM models.

23.9 | FR 24-07-15 17:15 | HS33

Looking forward: DARWIN-LXe, another step beyond XENON1T | A. Ferella[1] – [1]Stockholm University

XENON1T has a design sensitivity for spin-independent WIMP-nucleon cross section a factor 100 below the XENON100 best limit, reachable by early 2018. Another order of magnitude can be achieved in a very cost effective and rapid realization building and installing in the same XENON1T vacuum cryostat a new detector with more than twice the liquid xenon mass and with even lower background: XENONnT. However, in order to be able to explore the entire experimentally accessible parameter space for WIMPs, until neutrino interactions become an irreducible background, an initiative to build an even bigger dark matter detector is being taken with the DARWIN-LXe project. Both detectors will be based on a xenon filled dual phase (liquid-gas) time projection chamber, a concept that was successfully realized within the ZEPLIN, XENON, PandaX and LUX programs. The concept and science goals of the DARWIN-LXe project will be presented. The various technical challenges will be discussed and the time scale of the project outlined.

24 – Flavour Physics and Fundamental Symmetries

FR 24-07-15 14:30-18:05

HS41

24.1 | FR 24-07-15 14:30 | HS41

A Critical Examination of SU(3) in D to P P Decays | A. Paul[1], L. Silvestrini[2], M. Ciuchini[3], S. Mishima[2], E. Franco[1] – [1]INFN, Sezione di Roma, [2]INFN Rome, [3]Universita di Roma Tre and INFN

The question of the validity of analyzing charmed meson decays to pairs of hadrons within the SU(3) framework has been long and often debated. While there are convincing arguments that small breaking of this symmetry can accommodate for the current experimental results, the inability to compute QCD effects in these modes render it quite impossible to justify with complete authority the physical interpretations of the parameters extracted from experimental data. In our work we explore the SU(3) framework for its strengths and weaknesses and cross-examine it with arguments derived from a diagrammatic approach. We show that isospin non-universality of QCD should be considered within this framework. We also consider η - η' mixing in our attempt to build a complete analysis of these modes.

24.2 | FR 24-07-15 14:45 | HS41

Searches of CP violation in two-body charm decays | M. Alexander[1] – [1]University of Glasgow (GB)

LHCb has collected the world's largest sample of charmed hadrons. This sample is used to search for direct and indirect CP violation in charm, and to measure D0 mixing parameters. New updated measurements from several decay modes are presented, with complementary time-dependent and time-integrated analyses. We report on recent measurements of CP asymmetries in D–>KK and D–>$\pi\pi$ decays using the full LHCb dataset.

24.3 | FR 24-07-15 15:00 | HS41

Searches of CP violation in multibody charm decays | M. Martinelli[1] – [1]Ecole Polytechnique Federale de Lausanne (CH)

LHCb has collected the world's largest sample of charmed hadrons. Recently many searches for CP violation have focused on analysing the Dalitz phase space. New results and novel techniques are presented.

24.4 | FR 24-07-15 15:15 | HS41

UTfit Collaboration Average of D meson mixing data. | D. Derkach[1], A. Bevan[2], C. Schiavi[3], V. Sordini[4], A. Stocchi[5], C. Tarantino[6], E. Franco[7], V. Lubicz[8], F. Parodi[9], G. Martinelli[10], L. Silvestrini[11], M. Bona[12], M. Ciuchini[13], M. Pierini[14], V. Vagnoni[15] – [1]University of Oxford (GB), [2]University of London (GB), [3]Universita e INFN Genova (IT), [4]Universite Claude Bernard-Lyon I (FR), [5]LAL CNRS Universite Paris Sud, [6]University Roma Tre, [7]INFN Sezione di Roma, [8]University of Roma Tre, [9]Università degli Studi e INFN Genova (IT), [10]SISSA Trieste, [11]INFN Rome, [12]Queen Mary University of London (UK), [13]Universita di Roma Tre and INFN, [14]California Institute of Technology (US), [15]Universita e INFN, Bologna (IT)

We update the analysis of D meson mixing including the latest experimental results as of May 2015. We derive constraints on the parameters M12, Gamma12 and Phi12 that describe D meson mixing using all available data, allowing for CP violation. We also provide posterior distributions for observable parameters appearing in D physics.

24.5 | FR 24-07-15 15:30 | HS41

Charmed hadron decays at BESIII | L. Dong[1] – [1]BESIII

The BESIII Experiment at the Beijing Electron Positron Collider (BEPCII) has accumulated the world's largest samples of e^+e^- collisions in the tau-charm region. Based on the samples taken at ψ(3770) and ψ(4010) peaks, we present the purely leptonic and semi-leptonic decays of D meson, the Dalitz analysis of $D^+ \to K_s\pi^+\pi^0$ and $D^0 \to K_sK^+K^-$, the $K^-\pi^+$ and $K_s\pi^+\pi^-$ strong phases, the D0-D0bar mixing parameter y_{CP}, and D_s decays involving η'. In addition, BESIII collected 506/pb sample at $\sqrt{s}$ = 4.6 GeV, which allows us to perform the double-tag technique to measure the rates in the model-independent way near threshold for the first time. Herein, we present our analysis results on branching fractions for 12 λ_c^+ hadronic decays, including BF($\lambda_c^+ \to pK^-\pi^+$). In addition, we will present the results of the semi-leptonic decay BF($\lambda_c^+ \to \lambda e^+\nu$).

24.6 | FR 24-07-15 15:45 | HS41

Recent studies of CP violation in bottom and charm meson decays at Belle | P. Vanhoefer[1], Y. Kwon[2] – [1]MPI Munich, [2]Yonsei University

We present recent CP violation studies in B decays sensitive to the interior angles of the unitarity triangle in the Kobayashi-Maskawa scheme, $\phi_2(\alpha)$ and $\phi_3(\gamma)$. In addition, we present an updated CP-asymmetry measurement in charm meson decays. All measurements are based on the high statistics data set accumulated by the Belle detector at the KEKB asymmetric-energy e+e- collider.

24.7 | FR 24-07-15 16:30 | HS41

Theory of Lepton Flavour Violation | P. Paradisi[1] – [1]U. di Valencia

Lepton Flavour Violating (LFV) processes remain among the best candidates to unveil NP effects. In this talk, I summarize LFV predictions of well motivated NP scenarios and the perspectives of detecting LFV signals in ongoing and upcoming experiments.

24.8 | FR 24-07-15 16:50 | HS41

The MEG experiment: status and upgrade. | D. Grigoriev[1] – [1]Budker Institute of Nuclear Physics (RU)

Lepton flavour violation (LFV) is currently one of the most exciting branches of particle physics. The flavour violating process of the neutrinoless decay of a positive muon to a positron and a gamma is strongly suppressed in the Standard Model, hence it is a very sensitive probe of new physics beyond the Standard Model. The MEG experiment searches for this process at the Paul Scherrer Institute (PSI), in Switzerland, which provides the most intense continuous muon beams in the world. The current limit on the branching ratio of <5.7x10-13 (90% CL) is based on our data collected between 2009-2011. It is 20 times more stringent than the previous limit obtained by the MEGA experiment. The analysis of our 2012 and 2013 data is currently underway with improved analysis algorithms, this will double the statistics and lead to a further improvement of the sensitivity. At the same time an upgrade of the experiment, known as MEG-II is in progress, with the aim of further increasing the sensitivity by an order of magnitude. The key points of the upgrade are improvements to the liquid Xe calorimeter by increasing the granularity of the front face PMTs by using Multi-Pixel Photon Counters as well as installing a new drift chamber and timing counters. As a result the resolutions will be improved as well as the acceptance of the detector and its rate capability increased. A pre-engineering run is scheduled for the end of 2015.

24.9 | FR 24-07-15 17:05 | HS41

The Mu2e Experiment at Fermilab | M. Roehrken[1] – [1]Cal Tech

The Mu2e Experiment at Fermilab will search for coherent, neutrinoless conversion of muons into electrons in the field of a nucleus with a sensitivity improvement of a factor of 10,000 over previous experiments. Such a lepton flavor-violating reaction probes new physics at a scale inaccessible with direct searches at either present or planned high energy colliders. The experiment both complements and extends the current search for muon decay to electron+gamma at MEG and searches for new physics at the LHC. We will present the physics motivation for Mu2e, the design of the muon beamline and the detector, and the current status of the experiment.

24.10 | FR 24-07-15 17:20 | HS41

COMET Experiment - A search for muon-to-electron conversion at J-PARC | H. Nishiguchi[1] – [1]KEK

The COMET Experiment at J-PARC aims to search for the lepton-flavour violating (LFV) process of muon to electron conversion in a muonic atom, $\mu^-N \to e^-N$, with a branching-ratio sensitivity of 6×10^{-17}, which is 4 orders of magnitude better than the present upper limit. Complemental searches for two kinds of muon LFV decay modes, $\mu^+ \to e^+\gamma$ and $\mu^-N \to e^-N$, are quite important in order to explore the parameter region predicted by most well-motivated theoretical models beyond the Standard Model such as SUSY-GUT, seesaw, little-Higgs, etc. MEG experiment reports the latest result on $\mu^+ \to e^+\gamma$ search at PSI and makes a strong limit on new physics models, i.e. filling in the missing peace of muon LFV, $\mu^-N \to e^-N$, will certainly

play an important role. The need for this sensitivity places several stringent requirements on both the muon beam and the detector system. In order to realise the experiment effectively, a staged approach to deployment is endorsed by the J-PARC Program Advisory Committee and KEK, and the "COMET Phase-I" experiment will commence its engineering runs in 2017. The construction of experimental facility, beam line, magnets and detectors has been already started. The current R & D and construction status and prospects of the experiment are presented in addition to the experimental overview.

24.11 | FR 24-07-15 17:35 | HS41

The Fermilab Muon g-2 Experiment | G. Venanzoni[1] – [1]INFN

The anomalous magnetic dipole moment of the muon can be both measured and computed to very high precision, making it a powerful probe to test the standard model and search for new physics such as SUSY. The previous measurement by the Brookhaven E821 experiment found a ≈3 standard deviation discrepancy from the predicted value. The new g-2 experiment at Fermilab will improve the precision by a factor of four through a factor of twenty increase in statistics and a reduced systematic uncertainty with an upgraded apparatus. The experiment will also carry out an improved measurement of the muon electric dipole moment. Construction at Fermilab is well underway.

24.12 | FR 24-07-15 17:50 | HS41

Study of the radiative tau decays, tau -> gamma l nu nubar with the BABAR detector | R. Barlow[1] – [1]University of Manchester

We present measurements of the branching fraction for the radiative tau leptonic decays: tau -> gamma l nu nubar, where the lepton is either a muon or an electron. The results are obtained from an analysis of the complete BABAR data-set consisting of 430 million tau-lepton pairs, corresponding to an integrated luminosity of 468 fb∧-1, collected at the PEP-II asymmetric energy e+e- collider at SLAC.

25 – Higgs and New Physics

FR 24-07-15 14:30-18:00

Grosser Festsaal

25.1 | FR 24-07-15 14:30 | Grosser Festsaal

Impact of electroweak precision measurements for dark matter constraints | G. Moortgat-Pick[1], G. Weiglein[2], A. Bharucha[3], K. Rolbiecki[4], J. Kalinowski[5] – [1]University of Hamburg/DESY, [2]Deutsches Elektronen-Synchrotron (DE), [3]CNRS Marseille, [4]Institute of Theoretical Physics, Warsaw University, [5]University of Warsaw (PL)

We study SUSY models in the context of LHC searches and LHC exclusion bounds and explore models in the parameter range that may be accessible at future colliders. We study in particular the impact of precision measurements of masses, cross sections and further observables, for instance as forward-backward asymmetries, to determine the fundamental SUSY parameters for dark matter predictions. We focus in particular on the impact of electroweak loop corrections. We perform our dark matter predictions from the model-independent parameter determination at full one-loop order corrections and study which observables are most powerful with regard to the dark matter constraints.

25.2 | FR 24-07-15 14:45 | Grosser Festsaal

Searches for Dark Matter in ATLAS and CMS | D. Zerwas[1], E. Shabalina[2] – [1]Laboratoire de l'Accelerateur Lineaire (FR), [2]Georg-August-Universitaet Goettingen (DE)

CMS and ATLAS search for the presence of dark matter particles in missing energy + X final states, where X signals the production in association with jets, photons and gauge bosons. The results of these searches place stringent limits on on the cross sections of interactions of dark matter with light and heavy flavor quarks and gluons. They are interpreted in terms of simplified models with different structures and mediators, as well as generic effective theory terms from higher mass scales.

25.3 | FR 24-07-15 15:00 | Grosser Festsaal

Status of the Inert Doublet Model of dark matter after Run-1 of the LHC | A. Goudelis[1] – [1]HEPHY - Vienna

The Inert Doublet Model (IDM) is one of the simplest extensions of the Standard Model that can provide a viable dark matter (DM) candidate. Despite its simplicity, it predicts a versatile phenomenology both for cosmology and for the Large Hadron Collider. I will present the status of searches for IDM dark matter in direct DM detection experiments and the LHC, focusing on the impact of the latter on the model's parameter space. In particular, I will discuss the consequences of the Higgs boson discovery as well as those of searches for dileptons accompanied by missing transverse energy during the first LHC Run and comment on the prospects of probing some of the hardest to test regions of the IDM parameter space during the 13 TeV Run.

25.4 | FR 24-07-15 15:15 | Grosser Festsaal

New probes for bino dark matter with coannihilation at the LHC | H. Otono[1], N. Nagata[2], S. Shirai[3] – [1]Kyushu University (JP), [2]University of Minnesota, University of Tokyo, [3]DESY

It has been widely known that bino-like dark matter in the supersymmetric theories in general suffers from over-production. The situation can be drastically improved if gluinos have a mass slightly heavier than bino as they reduce the dark matter

abundance through coannihilation. We consider such a bino-gluino coannihilation in high-scale SUSY models. In this scenario, gluinos have long lifetime due to the limited phase space for the decay and the heavy squark mass indicated by higgs mass. The over-production of the bino-like dark matter can be also mitigated by wino with degenerated mass from bino. Then, the heavy higgsino could make bino long-lived. We study the prospects for exploring the bino-gluino and bino-wino coannihilation scenario at the LHC. We show that the searches for the long-lived particles with displaced vertices offer a strong tool to test these scenario in collider experiments.

25.5 | FR 24-07-15 15:30 | Grosser Festsaal

Searches for electroweak SUSY in ATLAS and CMS | A. Kalsi[1], A. Meyer[2] – [1]Panjab University (IN), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Results for SUSY searches in the electroweak sector are summarized, based on 20 fb-1 of 8 TeV proton-proton collisions collected by the CMS and ATLAS detector. A variety of complementary final state signatures and methods are used to probe gaugino and slepton production, including compressed scenarios. This talk includes the latest CMS results from the first ever search for SUSY production through vector boson fusion processes in a topology of two leptons, two forward jets and missing transverse energy.

25.6 | FR 24-07-15 15:45 | Grosser Festsaal

A light singlino in the NMSSM: Challenges for SUSY searches at the LHC | U. Ellwanger[1], A. Teixeira[2] – [1]LPT, University Paris-Sud, [2]LPC, Clermont-Ferrand

A light singlino in the NMSSM can reduce considerably the missing transverse energy at the end of sparticle decay cascades. This happens when the NLSP (typically bino-like) decays into a light singlino plus a Higgs boson with a mass just below the NLSP mass. This Higgs boson can be the SM-like Higgs, or a lighter NMSSM-specific Higgs boson. When such a scenario is realised, upper bounds on squark and gluino masses from the LHC run I are considerably reduced. Searches for SUSY at the run II should include searches for the remnants of two Higgs bosons per event, with yet unknown masses. Concrete proposals for such searches are made, including signal/background analyses.

25.7 | FR 24-07-15 16:30 | Grosser Festsaal

Composite resonances and their impact on the low-energy EW chiral Lagrangian | J. Sanz-Cillero[1], A. Pich, I. Rosell[2], J. Santos Blanco[3] – [1]Universidad Autonoma de Madrid, [2]Universidad CEU Cardenal Herrera & IFIC, Valencia, [3]Universitat de Valencia

The existence of a spectrum of composite resonances is a common feature of strongly interacting beyond-Standard-Model scenarios. In this talk we compute the contributions from spin-0 and and spin-1 resonances to the low-energy EW non-linear effective theory (with the EW Goldstones non-linearly realized). We study the contributions to both the purely bosonic terms and to higher-dimension operators including also fermion fields. Based on a custodial symmetry pattern we write down the most general resonance Lagrangian contributing to the low-energy EW chiral Lagrangian at NLO. We consider both parity preserving and parity violating terms. Finally, we assume definite UV completion hypotheses in our resonance theory, such as the existence of Weinberg sum-rules and analogous asymptotic high-energy constraints, which allows us to extract predictions for the low-energy couplings. For this, a careful study of the low-energy chiral counting and the structure of the NLO custodial invariant Lagrangian is needed, as we will be explained in the talk.

25.8 | FR 24-07-15 16:45 | Grosser Festsaal

Searches for highly ionizing particles in ATLAS and CMS | A. Policicchio[1], E. Shabalina[2], A. Meyer[3] – [1]INFN Cosenza, [2]Georg-August-Universitaet Goettingen (DE), [3]Rheinisch-Westfaelische Tech. Hoch. (DE)

The latest CMS and ATLAS searches for signatures with anomalously large ionization are presented. The findings are interpreted in terms of the production of new particles with a fractional or multiple value of the charge of the electron, the production of high mass stable charged particles, the presence of magnetic monopoles that lead to unusual ionization interactions with matter or the delayed effect of particles stopping in the detector volume. The HCSP signatures are also reinterpreted in the context of supersymmetric scenarios that predict stable or pseudo-stable charged particles in the final state.

25.9 | FR 24-07-15 17:00 | Grosser Festsaal

Searches for long-lived, weakly interacting particles in ATLAS and CMS | A. Hart[1], A. Meyer[2] – [1]Ohio State University (US), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Searches for long-lived, weakly-interacting particles have been performed with the ATLAS and CMS detectors. The search strategies have been developed to cover a range of lifetime and mass for such particles by exploiting techniques to reconstruct decay vertices in various detector components. This talk summarizes searches for long-lived particles including supersymmetric interpretations and the connection to hidden sectors with LHC Run 1 data. First LHC Run-2 results will be included if available.

25.10 | FR 24-07-15 17:15 | Grosser Festsaal

Search for long-lived particles at BABAR, Belle and LHCb | N. Arnaud[1] – [1]LAL (CNRS-IN2P3)

Searches for new phenomena, including dark photons, long-lived particles and the EDM of the tau lepton, have been performed at the BABAR, Belle and LHCb collaboration. This talk presents these searches, highlighting the most recent results.

25.11 | FR 24-07-15 17:30 | Grosser Festsaal

MoEDAL: Seeking magnetic monopoles and more at the LHC | V. Mitsou[1] – [1]IFIC Valencia (ES)

The MoEDAL experiment (Monopole and Exotics Detector at the LHC) is designed to directly search for magnetic monopoles and other highly ionising stable or metastable particles arising in various theoretical scenarios beyond the Standard Model. Its physics goals –largely complementary to the multi-purpose LHC detectors ATLAS and CMS– are accomplished by the deployment of plastic nuclear track detectors combined with trapping volumes for capturing charged highly ionising particles and TimePix pixel devices for monitoring. This talk focuses on the status of the detectors and the prospects for LHC Run II.

25.12 | FR 24-07-15 17:45 | Grosser Festsaal

SHiP: a new facility with a dedicated detector to search for new long-lived neutral particles | E. Graverini[1] – [1]Universitaet Zuerich (CH)

SHIP is a new general purpose fixed target facility, whose Technical Proposal has been recently submitted to the CERN SPS Committee. In its initial phase, the 400GeV proton beam extracted from the SPS will be dumped on a heavy target with the aim of integrating 2×10^{20} pot in 5 years. A dedicated detector, based on a long vacuum tank followed by a spectrometer and particle identification detectors, will allow probing a variety of models with light long-lived exotic particles and masses below a few GeV/c^2. The main focus will be the physics of the so-called Hidden Sector, i.e. search for Dark Photons, Light scalars and pseudo-scalars, and Heavy Neutrinos. The sensitivity to Heavy Neutrinos will allow for the first time to probe, in the mass range between the kaon and the charm meson mass, a coupling range for which Baryogenesis and active neutrino masses could also be explained. Direct detection of light and long-lived SUSY particles, such as RPV neutralinos and pseudo-Dirac gauginos could also be performed in an unexplored parameter range.

26 – QCD and Hadronic Physics

FR 24-07-15 14:30-18:00

HS32

26.1 | FR 24-07-15 14:30 | HS32

Fully differential VBF Higgs production at NNLO | A. Karlberg[1], M. Cacciari[2], G. Salam[3], F. Dreyer[4], G. Zanderighi[3] – [1]University of Oxford (GB), [2]LPTHE Jussieu, [3]CERN, [4]LPTHE & CERN

I will present fully differential NNLO corrections to vector-boson fusion (VBF) Higgs production at hadron colliders, in the limit in which there is no cross-talk between the hadronic systems associated with the two protons.The result is obtained by combining an inclusive NNLO calculation in the structure-function approach and a suitably factorised NLO VBF Higgs plus 3-jet calculation, supplemented with appropriate Higgs plus 2-parton counter-events. An earlier calculation of the fully inclusive cross section had found small NNLO corrections, at the percent level. In contrast, I will show that the cross section after typical experimental VBF cuts and differential distributions receive larger NNLO corrections.

26.2 | FR 24-07-15 14:45 | HS32

First LHCb results from the 13 TeV LHC data | I. Komarov[1] – [1]Ecole Polytechnique Federale de Lausanne (CH)

The very first Run II LHC data allows LHCb to measure the cross-sections for quarkonia, beauty and charm productions. Results should be available quickly thanks to the new "Turbo" stream procedure allowing the analysis of particle candidates selected at trigger level without the need of offline reconstruction. First results are presented, conditional on LHC machine operation.

26.3 | FR 24-07-15 15:00 | HS32

Matching the Nagy-Soper parton shower at next-to-leading order | M. Kraus[1], M. Czakon[1], H. Hartanto[2], M. Worek[1] – [1]RWTH Aachen, [2]RWTH Aachen University

We give a short review of the shower concept, first introduced by Nagy and Soper, that includes full quantum correlations in the shower evolution. We also state the current status of implementation of the publicly available shower program Deductor. However, the main focus of the talk will be the matching of the shower at next-to-leading order within the MC@NLO formalism. Matching is necessary in order to increase the accuracy of theoretical predictions and to employ a hadronization model. We will show first results using Deductor in conjunction with the Helac-NLO framework for top quark pair production in association with one hard jet.

26.4 | FR 24-07-15 15:15 | HS32

Fully differential decay rate of a standard model Higgs boson into a b-quark pair at NNLO accuracy | Z. Trocsanyi[1], V. Del Duca[2], C. Duhr[3], G. Somogyi[1], F. Tramontano[4] – [1]University of Debrecen (HU), [2]Universita e INFN Torino (IT), [3]CERN, [4]Universita e INFN, Napoli (IT)

We compute the fully differential decay rate of the standard model Higgs boson to a b-quark pair at NNLO accuracy. We use

a general subtraction scheme developed for computing QCD jet cross sections in perturbation theory. The double real and real-virtual contributions to the second order radiative corrections, regularized by subtractions, are finite in four space-time dimensions and their contribution to the decay rate can be computed with any jet function defined in four dimensions. We also demonstrate the finiteness of the regularized double virtual correction analytically. We present the differential decay rate into b-jets as a function of the jet resolution parameter for the JADE and Durham clustering algorithms.

26.5 | FR 24-07-15 15:30 | HS32

Numerical Implementation of the Loop-Tree Duality | S. Buchta[1], G. Chachamis[2], G. Rodrigo[3], P. Draggiotis[4], I. Malamos[1] – [1]IFIC Valencia, [2]IFT UAM/CSIC, Madrid, [3]CSIC, [4]Institute of Nuclear & Particle Physics NCSR "Demokritos"

The Loop-Tree Duality (LTD) is a novel perturbative method in QFT that establishes a relation between loop–level and tree–level amplitudes, which gives rise to the idea of treating them simultaneously in a common Monte Carlo. Initially introduced for one–loop scalar integrals, the applicability of the LTD has been expanded to higher order loops and Feynman graphs beyond simple poles. For the first time, a numerical implementation relying on the LTD was done in the form of a computer program that calculates one–loop scattering amplitudes. I will present details on the employed contour deformation as well as results for scalar and tensor integrals.

26.6 | FR 24-07-15 15:45 | HS32

From dimensional regularization to NLO computations in four dimensions | G. Sborlini[1], G. Rodrigo Garcia[2], R. Hernandez Pinto[1] – [1]IFIC-Valencia, [2]IFIC Valencia

Loop-tree (LT) duality allows to express virtual contributions in terms of phase-space integrals, thus leading to a direct comparison with real radiation terms. In this talk, we review the basis of the method and describe its application to regularize Feynman integrals. Performing an integrand-level combination of real and virtual terms, we show that it is possible to recover physical results by simply taking the four-dimensional limit of some D-dimensional expressions. Moreover, this method provides a natural physical interpretation of infrared singularities, their origin and the way that they cancel in the complete computation.

26.7 | FR 24-07-15 16:30 | HS32

Photon and photon+jet production measurements with the ATLAS detector | M. Bessner[1], A. Read[2] – [1]Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE), [2]University of Oslo (NO)

Isolated prompt photons provide a direct probe of short-distance physics, complementary to that provided by measurements of jets or vector-bosons and are sensitive to the gluon density of the proton. The inclusive prompt photon cross sections have been measured by the ATLAS collaboration at 7 and 8 TeV pp collision centre-of-mass energies, over a wide range of transverse momenta. The diphoton and photon+jet system cross sections have also been measured as a function of several kinematic variables. These experimental results are reported in different fiducial regions covering a wide acceptance and are compared to next-to-leading order QCD calculations with different models of the parton content of the proton. First LHC Run-2 results will be included if available.

26.8 | FR 24-07-15 16:45 | HS32

Di-vector Boson Production in Association with Multiple Jets at the LHC | H. Ita

The study of vector-boson pair production in association with jets is one of the key signatures for the analysis of the electroweak symmetry breaking mechanism. While the vector bosons are the clear signs of electroweak dynamics, the associated jets are important tags to suppress backgrounds and probe the kinematic dependence of the interactions. At high jet multiplicity the di-vector boson signature plays a particularly important role as background to Higgs transverse momentum distribution, vector boson scattering, top-quark physics as well as background for searches of new physics. Given the rather small cross section, this process class will rise to particular importance in the ongoing physics run at the LHC with more data and center-of-mass energy available. In this talk we present for the first time Next-to-Leading Order QCD corrections to the Standard Model production of oppositely charged W-bosons in association with up to three jets. The results are obtained by using modern on-shell and unitarity methods, which have been implemented in the BlackHat program. We present predictions for total and differential cross sections at the LHC following previous related studies by ATLAS and CMS. The quantum corrections reduce considerably spurious renormalisation and factorisation scale dependence of the predictions. Finally, we discuss universal features that appear at large jet multiplicities.

26.9 | FR 24-07-15 17:00 | HS32

Drell-Yan and vector boson plus jets measurements with the ATLAS detector | M. Zinser[1], A. Read[2] – [1]Johannes-Gutenberg-Universitaet Mainz (DE), [2]University of Oslo (NO)

The inclusive production of W and Z bosons as well the off-shell Z/gamma* production are standard candles at hadron colliders. The measurement of their production cross-sections can be compared to theory calculations at NNLO QCD and have an impact on our knowledge of the parton densities of the proton. Run-1 studies carried out by the ATLAS Collaboration are reviewed and first LHC Run-2 results will be included if available. Measurements of the transverse momentum of Z/gamma* bosons and their decay lepton angular decorrelation with the phi* observable have been performed in different di-lepton invariant mass and rapidity regions. These measurements are sensitive to soft resummation effects and hard jet emissions for small

and large momentum transfers, respectively, probing QCD in a unique way. Productions of light and heavy-flavour jets in association with a W or a Z boson in proton-proton collisions are important processes to study QCD in multi-scale environments and have sensitivity to parton density functions. The ratio of (Z+jets)/(W+jets) provides a precise test of QCD due to the large cancellations of theoretical and experimental uncertainties.

26.10 | FR 24-07-15 17:15 | HS32
Jet measurements from CMS | D. Roy[1] – [1]Saha
Recent results on jets measurements as well as jet properties and jet variables are presented.

26.11 | FR 24-07-15 17:30 | HS32
Studies of jet production properties and the strong coupling constant with the ATLAS detector | P. Starovoitov[1], A. Read[2] – [1]Ruprecht-Karls-Universitaet Heidelberg (DE), [2]University of Oslo (NO)
Several aspects of jet production in pp collisions have been measured by the ATLAS collaboration. The momentum-weighted sum of the charges of tracks associated to a jet is sensitive to the electrical charge of the parton initiating the jet. The distribution of the so-called jet charge has been measured in dijet events using pp collision data at 8 TeV with the ATLAS detector. The measurement of the dijet azimuthal decorrelations, as well as the jet-jet energy correlations are sensitive to the strong coupling constant. Measurements of multi-jet systems with or without a veto on additional jets, probe QCD radiation effects. Jet shapes have been measured in ttbar events for light flavour as well as heavy flavour jets. These measurements constitute precision tests of QCD in a new energy regime.

26.12 | FR 24-07-15 17:45 | HS32
Vector boson production in association with jets and heavy flavor quarks from CMS | M. Peruzzi[1] – [1]CERN
The production of vector bosons (V = W, Z or γ) in association with jets is a stringent test of perturbative QCD and is a background process in searches for new physics. Total and differential cross-section measurements of vector bosons produced in association with jets and heavy flavour quarks in proton-proton collisions at the LHC are presented. The measurements are compared to next-to leading order calculations and event simulations that devise matrix element calculations interfaced with parton showers.

27 – Top and Electroweak Physics
FR 24-07-15 14:30-18:00
HS31

27.1 | FR 24-07-15 14:30 | HS31
Subleading processes in production of W^+W^- pairs in proton-proton collisions | A. Szczurek[1], M. Luszczak[2] – [1]Institute of Nuclear Physics, [2]University of Rzeszow
W^+W^- production is one of the golden channels for testing the Standard Model as well as for searches beyond the Standard Model. We discuss many new subleading processes for inclusive production of W^+W^- pairs not included in the literature so far. We focus on photon-photon induced processes. We include elastic-elastic, elastic-inelastic, inelastic-elastic and inelastic-inelastic contributions in the formalism with photonic PDFs. We also calculate the contributions with resolved photons including the partonic substructure of the virtual photon. We include in addition single and central diffractive production of W^+W^- pairs as well as double parton scattering contribution. Predictions for the total cross section and differential distributions in W- boson rapidity and transverse momentum as well as WW invariant mass are presented. The $\gamma\gamma$ components constitute only about 1-2 but increases up to about 10 and are even comparable to the dominant $q\bar{q}$ component at large M_{WW}. The photon-photon contributions are very important in the context of studying anomalous triple and quartic boson couplings. The DPS component gives large contribution for large W^+W^- invariant masses or large rapidity distances. We discusses all the missing terms in the context of recent ATLAS and CMS data.

27.2 | FR 24-07-15 14:48 | HS31
Measurement of anomalous triple and quartic gauge couplings at CMS | S. Duric[1] – [1]University of Wisconsin (US)
The recent multiboson measurements from CMS are interpreted in terms of constraints on anomalous triple and quartic gauge couplings.

27.3 | FR 24-07-15 15:06 | HS31
Di-boson production measurements with the ATLAS detector | L. Chevalier[1], A. Read[2] – [1]CEA/IRFU,Centre d'etude de Saclay Gif-sur-Yvette (FR), [2]University of Oslo (NO)
Measurements diboson production cross sections in proton-proton interactions at 7 and 8 TeV are reported from the ATLAS experiment. The cross section results are measured in phase space regions defined by the decay kinematics and then extrapolated to the full phase spaces. Cross sections for WV (V=W or Z) production in the leptonic or semileptonic channels are compared to (N)NLO predictions of the Standard Model and are used to place constraints on anomalous triple-gauge-boson couplings. First LHC Run-2 results will be included if available.

27.4 | FR 24-07-15 15:24 | HS31
Multiboson production at CMS | P. Dudero[1], A. Meyer[2] – [1]Texas Tech University (US), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
We present studies of different multiboson final states in pp collisions at 8 TeV center-of-mass energy based on data recorded by the CMS detector at the LHC. These include precise measurements of W and Z production in association with a photon, diphoton,WW,WZ and ZZ as well as triboson production productions.

27.5 | FR 24-07-15 15:42 | HS31
The Inclusive four-lepton lineshape measurement from pp collisions at 8 TeV with ATLAS | L. Xu[1], A. Read[2] – [1]Brookhaven National Laboratory (US), [2]University of Oslo (NO)
The ATLAS Collaboration has carried out the analysis of the inclusive four-lepton lineshape measurement using data corresponding to 20.3 fb-1 of integrated luminosity from proton-proton collisions at $\sqrt{s}$= 8 TeV at the LHC collected with the ATLAS detector. The study focuses on the differential cross section as a function of the 4-lepton mass spectrum ranging from 80 to 1000 GeV where several distinct physics processes give rise to the production of 4-lepton final state. These are the single Z resonant processes, the Higgs production at 125 GeV, as well as continuum ZZ production processes with qq^- and gg initial states.

28 – Detector R&D and Data Handling
FR 24-07-15 14:30-18:15
HS42

28.1 | FR 24-07-15 14:30 | HS42
CMS Tracker Upgrades: R&D Plans, Present Status and Perspectives | B. Vormwald[1], A. Meyer[2] – [1]Hamburg University (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
The present CMS pixel detector designed for a luminosity of 10∧34 cm-2s-1 will have to be replaced at the end of 2016. The new upgraded detector will have higher tracking efficiency and lower mass with four barrel layers and three forward/backward disks to provide a hit coverage up to absolute pseudo-rapidities of 2.5. In a second stage, in order to maintain its physics reach during the high luminosity phase of the LHC (HL-LHC), when the machine is expected to deliver an instantaneous luminosity of 5 x 10∧34 cm∧-2 s∧-1 for total of 3000 fb∧-1, CMS will build a new tracker, comprising completely new pixel detector and outer tracker. The ongoing R&D activities on both pixel and strip sensors will be presented. The present status of the Inner and Outer Tracker projects will be illustrated, and the possible perspectives will be discussed.

28.2 | FR 24-07-15 14:45 | HS42
The upgraded Pixel detector and the commissioning of the Inner Detector tracking of the ATLAS experiment for Run-2 at the Large Hadron collider | K. Potamianos[1], ATLAS Collaboration[2], Y. Yamazaki[3] – [1]Lawrence Berkeley National Lab. (US), [2]ATLAS, [3]Kobe University (JP)
The upgraded Pixel detector and the commissioning of the Inner Detector tracking of the ATLAS experiment for Run-2 at the Large Hadron collider. Run-2 of the LHC will provide new challenges to track and vertex reconstruction with higher energies, denser jets and higher rates. Therefore the ATLAS experiment has constructed the first 4-layer Pixel detector in HEP, installing a new Pixel layer, also called Insertable B-Layer (IBL). IBL is a fourth layer of pixel detectors, and has been installed in May 2014 at a radius of 3.3 cm between the existing Pixel Detector and a new smaller radius beam-pipe. The new detector, built to cope with the high radiation and expected occupancy, is the first large scale application of 3D detectors and CMOS 130nm technology. In addition the Pixel detector was refurbished with a new service quarter panel to recover about 3% of defective modules lost during run-1 and a new optical readout system to readout the data at higher speed while reducing the occupancy when running with increased luminosity. In addition, many improvements to Inner Detector track and vertex reconstruction were developed during the two year shutdown of the LHC. These include novel techniques developed to improve the performance in the dense cores of jets, optimisation for the expected conditions, and a software campaign which lead to a factor of three decrease in the CPU time needed to process each recorded event.

28.3 | FR 24-07-15 15:00 | HS42
Inner tracking devices at the Belle II experiment | G. Casarosa[1], C. Schwanda[2] – [1]Sezione di Pisa (IT), [2]Austrian Academy of Sciences
In the future Belle II experiment at the SuperKEKB collider in Tsukuba, Japan, charged particle tracking in the vicinity of the e^+ e^- interaction point is provided by a two-layer silicon pixel detector based on the novel DEPFET technology (PXD) and by a four-layer silicon strip detector (SVD). In this presentation, we review the technology and the design of these two devices, and describe the current state of their construction.

28.4 | FR 24-07-15 15:15 | HS42
Upgrade of the LHCb VELO detector | M. Williams[1] – [1]CERN
The upgrade of the LHCb experiment, planned for 2019, will transform the experiment to a trigger-less system reading out the

full detector at 40 MHz event rate. All data reduction algorithms will be executed in a high-level software farm. The upgraded detector will run at luminosities of 2 x 1033 /cm2/s and probe physics beyond the Standard Model in the heavy flavour sector with unprecedented precision. The Vertex Locator (VELO) is the silicon vertex detector surrounding the interaction region. The current detector will be replaced with a hybrid pixel system equipped with electronics capable of reading out at 40 MHz. The detector comprises silicon pixel sensors with 55x55 um2 pitch, read out by the VeloPix ASIC, from the TimePix/MediPix family. The hottest region will have pixel hit rates of 900 Mhits/s yielding a total data rate more than 3 Tbit/s for the upgraded VELO. The detector modules are located in a separate vacuum, separated from the beam vacuum by a thin custom made foil. The detector halves are retracted when the beams are injected and closed at stable beams, positioning the first sensitive pixel at 5.1 mm from the beams. The material budget will be minimised by the use of evaporative CO2 coolant circulating in microchannels within 400 um thick silicon substrates. The current status of the VELO upgrade will be described and latest results from irradiated sensor assemblies will be presented.

28.5 | FR 24-07-15 15:30 | HS42

LHCb Upgrade – The Scintillating Fibre Tracker | B. Leverington[1] – [1]Ruprecht-Karls-Universitaet Heidelberg (DE)

The LHCb detector will be upgraded during 2019 in order to collect data from proton-proton collisions at the LHC at higher instantaneous luminosities and to read out the data at 40MHz using a trigger-less read-out system. All front-end electronics will be replaced and several sub-detectors must be redesigned to cope with the higher occupancy. The current tracking detectors downstream of the LHCb dipole magnet will be replaced by the Scintillating Fibre (SciFi) Tracker. The SciFi Tracker will be constructed using 2.5m long scintillating fibres and read out by Silicon Photomultipliers (SiPM) located outside the acceptance. The fibres have a diameter of 0.25mm, are wound into ribbons with 5 or 6 staggered layers of fibres, and will cover a total active area of around 360m2. State-of-the-art multi-channel SiPM arrays are being developed to read out the fibres. A custom ASIC, the PACIFIC, will be used to digitise the signals from the SiPMs and additional front-end electronics based on FPGAs will be used to reconstruct hit positions. There are a number of challenges involved in the construction of this detector: the radiation hardness of the fibres and the SiPMs; the mechanical precision required while building large active detector components; and the cooling required to mitigate the effects of radiation damage. The evolution of the design since the Technical Design Report in 2014 and the latest results, including test beam data, will be presented.

28.6 | FR 24-07-15 15:45 | HS42

Test of MPGD modules with a large prototype Time Projection Chamber | D. Bhattacharya[1] – [1]CEA/IRFU,Centre d'etude de Saclay Gif-sur-Yvette (FR)

The International Large Detector (ILD) is one of the detector concepts at the ILC where calorimetry and tracking systems are combined. The tracking system consists of a Silicon vertex detector, forward tracking disks and a large volume Time Projection Chamber (TPC). R&D for a Micro Pattern Gaseous Detector (MPGD) TPC has been carried out within the framework of LC-TPC collaboration. Beam tests have been performed using a Large Prototype, equipped with up to seven identical modules in a 1 T magnetic field at DESY. Results obtained with several technologies (GEM, Resistive Micromegas) will be presented (drift velocity, field distortions, spatial resolution, alignment measurements). Recently a new resistive material, diamond-like carbon, has been tested and compared with carbon-loaded polyimide. Cooling with two-phase CO2 has been applied, leading to stabilize within 0.1 ℃ the temperature of the electronics below 30 ℃.

28.7 | FR 24-07-15 16:30 | HS42

The WAGASCI experiment at JPARC to measure neutrino cross-sections on water | E. Noah Messomo[1], A. Blondel[2] – [1]Geneva university, [2]Universite de Geneve (CH)

In the T2K experiment, the far detector, Super-Kamiokande, observes neutrino interactions on water while the near detectors are mainly constituted of plastic. The uncertainty due to the difference of target materials is one of major systematic uncertainties in the T2K neutrino oscillation analyses. A new neutrino detector named WAGASCI has been developed to measure the cross section ratio of neutrino (and antineutrino) interactions with water and plastic targets with a large angular acceptance. The experiment will be situated at the JPARC near detector station. The water sections of the WAGASCI detector consists of 80% water within a mesh of 3-mm thick plastic scintillators assembled into a 3D grid-like structure. The scintillator is readout with Wave-length shifting fibers connected to new Multi-Pixel Photon Counters (MPPCs) with low crosstalk rate and high photon detection efficiency (PDE). The experiment is complemented with an instrumented muon range detector comprising a magnetic spectrometer (Baby-MIND).

28.8 | FR 24-07-15 16:45 | HS42

First results from the NA62 straw spectrometer | V. Palladino[1], H. Danielsson[1], P. Lichard[1], G. Ruggiero[1] – [1]CERN

The NA62 experiment at CERN is a fixed target experiment, it is located in the north area SPS high intensity facility. It aims at a precision measurement of the ultra-rare decay $K^+ \to \pi^+ \nu\bar{\nu}$. In order to achieve this goal a low mass ($\approx$1.8% X_0) spectrometer has been built to track charged kaon decay products. The system consists of $\approx$7000 straw tubes operating in vacuum. The analog signals are shaped, amplified and discriminated by an ASIC chip (CARIOCA) mounted on the front-end board (cover) and a TDC was implemented in a FPGA. The data is sent from the cover to the Straw Readout Board (SRB) and then to the PC farm for analysis and storage. The first NA62 physics run took place in October-December 2014 and both the

detector commissioning and the measured performance will be presented. The goal of this presentation is to give a general overview of the system and in particular the readout scheme. The results obtained from the alignment, r-t dependance, track fit and time resolution, will be described in detail. A comparison with results from GARFIELD simulations will also be presented.

28.9 | FR 24-07-15 17:00 | HS42

The LHeC detector | P. Newman[1], N. Armesto Perez[2] – [1]University of Birmingham (GB), [2]Universidade de Santiago de Compostela (ES)

The LHeC is a proposed upgrade of the LHC to study ep/eA collisions in the TeV regime, by adding a 60 GeV electron beam through an Energy Recovery Linac. A detector is under design for high precision measurements which may be readily installed by its modular structure. The talk presents the main concepts and progress in the simulation, including an extension to the FCC-he configuration.

28.10 | FR 24-07-15 17:15 | HS42

Performance of a Large 1 m^2 Micromegas Detector Using Ar and Ne based Drift Gases | P. LÖsel[1], O. Biebel, R. Hertenberger[2], A. Zibell[3], J. Bortfeldt[2], R. Muller[2] – [1]LMU Munich, [2]Ludwig-Maximilians-Univ. Muenchen (DE), [3]Bayerische Julius Max. Universitaet Wuerzburg (DE)

Micromegas (MICRO MEsh GAseuos Structures) are used in a broad field of applications due to their excellent spatial resolution and single plane track reconstruction capability. They consist of three active planes, a cathode, a micro-mesh and a strip anode with 0.45 mm modularity. The distance of the micro-mesh from the cathode being typically 5 mm is large in contradiction to the tiny distance of 0.128 mm to the anode, thus creating a drift and amplification region with electric fields differing by a factor of more than 50 and thus increasing the electron transparency of the micro-mesh well above its optical transparency. Standard position information is obtained by the charge center on the responding anode-strips, alternatively in a TPC-like mode, the track of the incident particle can be reconstructed measuring the drift times of the primary ionized electrons as a function of the position of the respective anode-strip. We report on the performance of a 1 m^2 in size Micromegas with 2048 electronic channels using detector gases based on Ar:CO_2 or Ne:CF_4 mixtures. Central questions are hereby: homogeneity of pulse-height and efficiency, mesh-transparency, calibration possibility of positions of single readout strips using cosmic muons and a tracking reference and the impact of the different drift times on the angular and spatial resolution as a function of the incident angle.

28.11 | FR 24-07-15 17:30 | HS42

Characterization of n ew crystals for X rays detection | M. Bonesini[1], R. Bertoni[2], M. Clemenza[3], R. Mazza[2], M. Nastasi[4], A. De Bari[5], A. Menegolli[6], R. Nardo'[7], M. Rossella[8] – [1]Sezione INFN, Dipartimento di Fisica G. Occhialini, Universita' Milano Bicocca, Italy, [2]Sezione INFN Milano Bicocca, [3]Sezione INFN e Dipartimento di Fisica G. Occhialini Università di Milano Bicocca, [4]Sezione INFN e Universita' Milano Bicocca, [5]Sezione INFN e Universita' di Pavia, [6]Sezione INFN e Universita' Pavia, [7]Universita' Pavia, [8]Sezione INFN Pavia

Development of fast scintillators, such as Pr:LuAg or Ce:GAAG crystals, has been put forward in the framework of Time-of-Flight (TOF) Positron Emission Tomography (PET). These crystals have fast primary decay time (20-90 ns), high density and a fairly high light output (up to 57000 photons/MeV). The fact that they have higher densities and are not hygroscopic, as compared to Ce:LaBr3, points to their use as X-rays detectors (around 100 KeV) for nuclear physics experiments. These new scintillating crystals for X-ray spectroscopy applications have been studied using different radioactive sources,wrapping diffusers and photodetectors, including UV sensitive SiPM arrays. A sample of Pr:LuAG and Ce:GAAG crystals with 0.5" x 0.5" surface area and 13 mm thickness and a NaI crystal of the same surface and 26 mm thickness used as a reference have been characterized in the X-rays energy range 100 - 1000 keV. Different light detectors were adopted for the Pr:LuAG studies,sensitive to its ultraviolet emission (peak at 310 nm): a 3" PMT (Hamamatsu R11065) and the new S13361 Hamamatsu MPPC arrays of, with silicon resin as a window. Results are presented on the performance of the Pr:LuAG (Ce:GAAG) crystals, to be mounted in a 2 x 2 array to be tested in the 2015 run of the FAMU experiment at RIKEN-RAL muon facility, for the precise measurement of the proton radius where the detection of X rays around 100 KeV is crucial.

28.12 | FR 24-07-15 17:45 | HS42

Particle identification devices at the Belle II experiment | R. Pestotnik[1], C. Schwanda[2] – [1]Jozef Stefan Institute, [2]Austrian Academy of Sciences

Particle identification at the Belle II experiment at the SuperKEKB collider in Tsukuba, Japan, is provided by two Cherenkov imaging devices, the time of propagation (TOP) counter in barrel (RICH with quartz radiator) and the ARICH in the endcap regions (RICH with aerogel radiotor). In this presentation, we review the technology and the design of these two devices, and describe the current state of their construction.

28.13 | FR 24-07-15 18:00 | HS42

Test Beam Results of a 3D Diamond Detector | M. Dunser[1], H. Kagan[2], W. Trischuk[3], .. Rd42 Collaboration[1] – [1]CERN, [2]Ohio State University (US), [3]University of Toronto (CA)

A prototype of a novel detector using single-crystal chemical vapor deposited diamond and resistive electrodes in the bulk

forming a 3D diamond device will be presented. The electrodes of the device were fabricated with laser assisted phase change of diamond into a combination of diamond-like-carbon, amorphous carbon and graphite. The connections to the electrodes of the 3D device were made using a photo-lithographic process. A prototype detector system consisting of the 3D device connected to a multi-channel readout was successfully tested in a 120GeV proton beam at CERN proving for the first time the feasibility of the 3D diamond detector concept for particle tracking applications. The electrical properties and beam test results of the prototype device will be presented.

29 – Neutrino Physics

FR 24-07-15 14:30-18:00
HS7

29.1 | FR 24-07-15 14:30 | HS7

LBNO-DEMO (WA105): a large demonstrator of the Liquid Argon double phase TPC | V. Galymov[1], A. Rubbia[2] – [1]IPNL/CNRS, [2]ETH

A giant (10-50 kt) liquid argon TPC has been proposed as the detector for an underground observatory for the study of neutrino oscillations, neutrino astrophysics and proton decay. This detector has excellent tracking and calorimetric capabilities much superior to currently operating neutrino detectors. LBNO-DEMO (WA105) is a large demonstrator of the double phase liquid argon TPC based on the GLACIER design, with a $6\times6\times6\approx m^3$ (appr. 300t) active volume. The TPC will be built inside a tank based on industrial LNG technology. Electrons produced in the liquid argon are extracted in the gas phase. Here, a readout plane based on LEM detectors provides amplification before the charge collection onto an anode plane with strip readout. PMT located on the bottom of the tank containing the liquid argon provide the readout of the scintillation light. This demonstrator is an industrial prototype of the design proposed for a large underground detector. WA105 is under construction at CERN and will be exposed to a charged particle beam (0.5-20 GeV/c) in the North Area in 2018. The data will provide necessary calibration of the detector performances and benchmark sophisticated reconstruction algorithms. This project is a crucial milestone providing feedback for the long baseline neutrino program, including projects like LBNO and DUNE.

29.2 | FR 24-07-15 14:45 | HS7

Stokes-shift engineered colloidal quantum dots as wavelength downshifters for detection of VUV light in Lar and LXe detectors | M. Bonesini[1], S. Brovelli[2], M. Fasoli[3], A. Vedda[4], M. Rossella[5] – [1]Sezione INFN, Dipartimento di Fisica G. Occhialini, Universita' Milano-Bicocca, [2]Dipartimento di Scienza dei Materiali, Universitá di Milano Bicocca, Milano, Italy, [3]Sezione INFN e Dipartimento di Scienza dei Materiali, Universita' Milano Bicocca, Milano, Italy, [4]Sezione INFN e Dipartimento di Scienza dei Materiali, Universita'di Milano Bicocca, Milano, Italy, [5]Sezione INFN Pavia

The detection of vacuum ultraviolet (VUV) radiation emitted by ionizing particles in large liquid Argon (LAr) or Xenon Time Projection chambers (TPCs) is of key relevance in experimental neutrino or dark matter search. Typical schemes use photodetectors coated with down-conversion dyes, such as tetraphenyl butadiene (TPB). The development of large-area waveguides based on TPB is, however, hampered by the strong spectral overlap between its absorption and emission spectrum that leads to severe optical losses. Colloidal quantum dots (QD) offer a promising alternative to organic dyes for VUV down-conversion thanks to their large absorption cross section and efficient narrow emission, that can be tuned so as to match the efficiency peak of chosen photodetectors. It has been recently shown that QD can be engineered so as to effectively decouple their absorption and emission functions and concomitantly suppress Auger recombination that typically affects the scintillation performances of conventional QDs. So called 'Stokes-shift engineered QDs' have been successfully applied to demonstrate large area LSCs with complete suppression of re-absorption losses for distances of tens of centimeters. Here we report VUV absorption and photoluminescence excitation spectra of Stokes shift engineered CdSe/CdS QDs up to 100 nm, that demonstrate the great applicative potential of this class of functional nanomaterials for VUV harvesting and down-conversion in LAr or LXe VUV measurement.

29.3 | FR 24-07-15 15:00 | HS7

Predicting the Leptonic Dirac CP Violation Phase from Sum Rules | A. Titov[1], I. Girardi[1], S. Petcov[2] – [1]SISSA/INFN, [2]SISSA/INFN/IPMU

Establishing the status of the CP symmetry in the lepton sector is one of the major goals of the programme of future research in neutrino physics. In the reference 3-neutrino mixing scheme CP-violating effects in neutrino oscillations can be caused by the Dirac CP violation phase δ present in the 3×3 unitary neutrino mixing matrix U. Using the fact that $U = U_e^\dagger U_\nu$, where U_e and U_ν are 3×3 unitary matrices which diagonalise respectively the charged lepton and the neutrino mass matrices, we consider in a systematic way forms of U_e and U_ν allowing us to express δ as a function of the neutrino mixing angles present in U and the angles contained in U_ν. After obtaining sum rules for $\cos\delta$, we consider several forms of U_ν dictated by, or associated with, symmetries, such as tri-bimaximal, bimaximal, etc., for which the angles in U_ν are fixed. For each of these forms and forms of U_e allowing to reproduce the measured values of the neutrino mixing angles, we construct the likelihood function for $\cos\delta$, using i) the latest results of the global fit analysis of neutrino oscillation data, and ii) the prospective uncertainties in the determination of the neutrino mixing angles. Our results show that the measurement of δ along with improvement of the precision on the neutrino mixing angles can provide unique information about the possible existence of symmetry in the lepton

sector.

29.4 | FR 24-07-15 15:15 | HS7

Neutrino CP violating phase from μ decay at rest | E. Ciuffoli[1] – [1]IMP, CAS

The determination of the value of θ13, which turned out to be considerably larger than the expected, opened the way to the measurement of the CP violating phase δ in the leptonic sector. We consider the following experimental setup: a 800MeV proton beam hits a target at a single site, creating μ antineutrinos via μ decay at rest; the electron antineutrinos produced by oscillations interact via IBD in two large liquid scintillators or water Cherenkov detectors. Studying the oscillation probability at different baselines it is possible to measure δ with good precision (5-15 degree in 10 years). We present several possible locations for this experiment in east Asia, each using accelerators or detectors already planned or under construction. No degeneracy is present between δ and π-δ.

29.5 | FR 24-07-15 15:30 | HS7

Neutrino Super Beam for lepton CP violation discovery based on the European Spallation Source | E. Baussan[1], M. Dracos[2] – [1]Institut Pluridisciplinaire Hubert Curien (FR), [2]IPHC/IN2P3-Strasbourg

For the lepton CP violation discovery very intense neutrino beams are needed produced using very powerful proton beams. The proposed project, ESSnuSB, is based on the European Spallation Source proton linac the construction of which started in 2014 and will finish by 2023. This linac will have a power of 5 MW producing protons of 2 GeV energy. The combination of the high beam intensity and the comparatively low proton energy allows the neutrino measurements to be made with a megaton Water Cherenkov neutrino detector installed 1000 m down in a mine at $\approx$540 km from the neutrino source which is near the position of the second neutrino oscillation maximum. The relative variation of the electron neutrino yield with the CP violation angle δCP is about three times larger at the second maximum as compared to that at the first maximum. This implies that the measurement of δCP is about three times less sensitive to the experimental systematic errors, which is the error determining the ultimate performance for discovery and measurement of leptonic CP violation. This observation has the potential to shed light on the matter-antimatter asymmetry in Universe. The performance of the experiment for such measurements will be presented and compared with other proposed experiments. The use of the large underground neutrino detector to measure the proton lifetime, detect cosmological neutrinos and neutrinos from supernova will also be described.

29.6 | FR 24-07-15 15:45 | HS7

Probing non-standard neutrino interactions at ESSnuSB | S. Raut[1], M. Blennow[1], S. Choubey[2], T. Ohlsson[3] – [1]KTH Royal Institute of Technology, [2]Harish-Chandra Research Institute, [3]Royal Institute of Technology (KTH)

Non-standard interactions (NSI) of neutrinos arise in various models of physics beyond the Standard Model. These interactions affect the oscillations of neutrinos and can therefore be probed by long-baseline experiments. In this work, we study the possibility of probing NSI at the source and detector using the proposed superbeam experiment at the ESS facility (ESSnuSB). ESSnuSB has been shown to have exceptional capability in measuring the Dirac-CP phase of the neutrino mixing matrix. We study the effect of NSI on this measurement at ESSnuSB. We also determine the bounds that ESSnuSB can impose on the values of the various NSI parameters, and compare them with the existing bounds.

29.7 | FR 24-07-15 16:30 | HS7

Statistical issues in future neutrino oscillation experiments | A. Tonazzo

The neutrino community has been debating on how to assess the potential of future oscillation experiments for determining the neutrino Mass Hierarchy and for establishing CP violation in the leptonic sector. A review of some basic concepts and of the approach chosen by different projects to present their results will be shown. The key issues relevant for the future will be discussed.

29.8 | FR 24-07-15 16:45 | HS7

The Jiangmen Underground Neutrino Observatory | W. Wang[1] – [1]Sun Yat-Sen University

The Jiangmen Underground Neutrino Observatory (JUNO) is a multipurpose neutrino experiment aiming to determine the neutrino mass hierarchy and precisely measure the neutrino oscillation parameters by detecting reactor antineutrinos at $\approx$53 km baselines using a 20-kiloton liquid scintillator detector placed at 1800-m.w.e deep underground. JUNO is also capable of observing supernova neutrinos, studying the atmospheric neutrinos, solar neutrinos, geoneutrinos, and other physics. The international collaboration of JUNO was established in 2014 and the civil construction has started in 2015. JUNO is planning to start data taking in the year of 2020. The scientific opportunities and the status of JUNO will be presented in this talk.

29.9 | FR 24-07-15 17:00 | HS7

The PINGU detector | T. Ehrhardt, S. BÖser[1] – [1]Universität Mainz

The world's largest neutrino telescope, the IceCube Neutrino Observatory, is built in one of the planet's most extreme environments at South Pole Station Antarctica. Completed in 2010, and instrumenting morethan a cubic-kilometre of ice, IceCube has been designed to measure the flux of astrophysical neutrinos it recently discovered. It also comprises a low-energy detector array, called DeepCore, that has performedworld-leading indirect dark matter searches and very high statistic studies of atmo-

spheric neutrinos down to approximately 10 GeV.Building on the success of DeepCore, a new infill array called PINGU (the Precision IceCube Next Generation Upgrade) is now being proposed that will further reduce the in-ice energy threshold to a few GeV. Such a detector will be capable of significantly expanding the current low-energy program, including the potential to make a first determination of the neutrino mass ordering. In this talk we will discuss the design and sensitivity of the PINGU detector.

29.10 | FR 24-07-15 17:15 | HS7

KM3NeT/ORCA: Measuring the neutrino mass hierarchy in the Mediterranean sea | T. Pradier[1], A. Kouchner[2] – [1]IPHC, [2]Universite de Paris VII (FR)

Since the measurement of the mixing angle theta_13, the determination of the neutrino mass hierarchy (normal vs. inverted) has become one of the central challenges of neutrino physics, together with the search for CP violation in the leptonic sector. Recent studies have pointed out that the neutrino mass hierarchy can be investigated in the atmospheric neutrino sector, in the energy range 1-20 GeV, where oscillations are affected by Earth matter effects, exploiting the appearance/disappearance patterns of different neutrino types as a function of energy and path through the Earth. ORCA - Oscillations Research with Cosmics in the Abyss - will be a detector made of a dense configuration of KM3NeT detection units, optimised for studying the interactions of neutrinos in seawater at low energies. To be deployed at the French KM3NeT site, ORCA's multi-PMT optical modules will take advantage of the excellent optical properties of deep seawater to accurately reconstruct both cascade and track events with a few GeV of energy. This contribution reviews these methods and technology and presents the ORCA sensitivity for the neutrino mass hierarchy.

29.11 | FR 24-07-15 17:30 | HS7

Status of the neutrinos from STORed Muons (nuSTORM) facility | A. Bross[1] – [1]Fermilab

This talk reviews the current status of the neutrinos from STORed Muons (nuSTORM) facility. The basic idea for nuSTORM (the production of neutrino beams from the decay of muons in a racetrack-like decay ring) was discussed in the literature over 30 years ago in the context of searching for non-interacting ("sterile") neutrinos. However, it was only in the past five years that the concept was fully developed, motivated again in large part, by the facility's unmatched reach in addressing the evolving data on oscillations involving sterile neutrinos. The talk will include a brief review of the physics motivation behind nuSTORM, a high-level description of the facility and then describe in detail the neutrino beams it can produce. Although nuSTORM is a neutrino factory-like facility, due to its particular nature, it can also provide an intense, very pure, muon neutrino beam from pion decay. This so-called "Neo-conventional" muon neutrino beam from nuSTORM makes nuSTORM a hybrid neutrino factory. The talk will include sensitivity plots that indicated how well the facility can perform for short-baseline oscillation searches and show its potential for a neutrino interaction physics program.

29.12 | FR 24-07-15 17:45 | HS7

SHiP: a new facility with a dedicated detector for studying ν_τ properties and nucleon structure functions | G. De Lellis[1], W. Bonivento[2] – [1]Universita e INFN, Napoli (IT), [2]INFN Cagliari

SHIP is a new general purpose fixed target facility, whose Technical Proposal has been recently submitted to the CERN SPS Committee. In its initial phase, the 400GeV proton beam extracted from the SPS will be dumped on a heavy target with the aim of integrating 2×10^{20} pot in 5 years. A dedicated detector downstream the target will allow to probe a variety of models with light long-lived exotic particles and masses below a few GeV/c^2. Another dedicated detector will allow the study of neutrino cross-sections and angular distributions, and it will be the focus of the talk. ν_τ deep inelastic scattering cross sections will be measured with a statistics 1000 times larger than currently available, with the extraction of the F_4 and F_5 structure functions, never measured so far. Moreover, ν_τ's will be distinguished from $\bar{\nu}_\tau$'s, thus providing the first observation of the $\bar{\nu}_\tau$. With ν_μ scattering it will be possible to reduce by about 50% the current uncertainty on the strange content of the nucleon in the range of the x variable between 0.05 and 0.3. Eventually, it will be possible to improve existing limits on dark photons decaying into dark matter particles, with the elastic scattering of these ones on electrons. The detector will be based on several techniques developed for the OPERA experiment at LNGS.

30 – Non-Perturbative Field Theory and String Theory

SA 25-07-15 09:00-13:00
HS32

30.1 | SA 25-07-15 09:00 | HS32

Recent Progress on the Gauge Theory Sector of F-Theory | D. Klevers[1] – [1]CERN

F-theory provides a geometric framework for engineering non-perturbation string vacua that have proven fruitful for the construction of GUT models for particle phenomenology. Its power in reliably extracting the physics of the strongly coupled string theory relies on the power of algebraic geometry. F-theory provides a dictionary between algebro-geometric properties of elliptically fibered Calabi-Yau manifolds and the lower-dimensional string theory effective action. In my talk, I will discuss recent progress in extracting the data of the gauge theory sector of the F-theory effective theories. In particular, I will focus on the construction of the Abelian sector of the theory as well as discrete gauge symmetry realizations in F-theory. Applications to

particle phenomenology are discussed briefly and connections to recent developments in mathematics are highlighted.

30.2 | SA 25-07-15 09:15 | HS32

Non-supersymmetric heterotic model building | S. Groot Nibbelink

We discuss recent investigations of constructions of non-supersymmetric models in string theory. We start from the non-supersymmetric heterotic SO(16)xSO(16) in ten dimensions and describe its compactification on smooth and singular manifolds. We show that it is possible to get models that look quite similar to the Standard Model of particle physics. However, understanding the cosmological constant in such construction is a major challenge for future research.

30.3 | SA 25-07-15 09:30 | HS32

A class of 2D non-abelian gauged linear sigma models | A. Gerhardus[1] – [1]Bethe Center for Theoretical Physics, Universität Bonn

Two-dimensional gauged linear sigma models with $N = (2, 2)$ supersymmetry are a powerful tool for studying the worldsheet theories of type II string compactifications. We construct a certain class of non-abelian gauged linear sigma models that exhibit an interesting phase structure emerging from non-Abelian strong coupling dynamics. The observed phase structure leads to a duality proposal amongst these models, for which we provide further evidence by matching the respective two sphere partition functions. As some of the models at low energies flow to non-linear sigma models with Calabi-Yau target spaces, the duality proposal results in a correspondence of non-complete intersection Calabi-Yau varieties.

30.4 | SA 25-07-15 09:45 | HS32

Entanglement entropy and far-from-equilibrium energy flow | E. Megias[1], J. Erdmenger[2], D. Fernandez[3], M. Flory[4], A. Straub[1] – [1]Max-Planck-Institut fur Physik, Munich, [2]Max Planck Institute for Physics, [3]M, [4]Max-Planck Institut fur Physik, Munich

The time evolution of the energy transport triggered in a strongly coupled quantum critical system by a temperature gradient is holographically related to the evolution of an asymptotically AdS black brane with a gradient in its planar horizon. Of relevance in these systems is the appearance of a universal steady state, described by a boosted thermal state. A relevant observable that provides physical insight about the evolution of the system and the eventual formation of a steady state is the entanglement entropy. In this talk, I will study the far from equilibrium energy transport of such a system by using gauge/gravity duality, and present results for the time evolution of the entanglement entropy. Some references: (1) M.J. Bhaseen, B. Doyon, A. Lucas, K. Schalm, arXiv:1311.3544[hep-th]. (2) I. Amado, A. Yarom, arXiv:1501.0162[hep-th] (3) J. Erdmenger, D. Fernandez, M. Flory, E. Megias, A.K. Straub, in preparation.

30.5 | SA 25-07-15 10:00 | HS32

Thermalization in a confining Gauge Theory at strong coupling | E. Kiritsis[1], T. Ishii[2], C. Rosen[2] – [1]University of Crete and APC, [2]University of Crete

Time-dependent perturbations of states in a 3+1 dimensional confining gauge theory are considered in the context of holography. The perturbations are induced by varying the gauge theory's coupling of a dimension three scalar operator in time. The dual gravitational theory belongs to a class of Einstein-dilaton theories which exhibit a mass gap at zero temperature and a first order deconfining phase transition at finite temperature. The perturbation is realized in various thermal bulk solutions by specifying time dependent boundary conditions on the scalar, and we solve the fully backreacted Einstein-dilaton equations of motion subject to these boundary conditions. We compute the characteristic time scale of many thermalization processes, noting that in every case we examine, this time scale is determined by the imaginary part of the lowest lying quasi-normal mode of the final state black brane. We quantify the dependence of this final state on parameters of the quench, and construct a dynamical phase diagram. Further support for a universal scaling regime in the abrupt quench limit is provided. The implications for the thermalization of the quark gluon plasma in heavy ion collisions are discussed

30.6 | SA 25-07-15 10:15 | HS32

FRG Approach to Nuclear Matter in Extreme Conditions | P. PÓsfay[1], A. Jakovac[2], G. Barnafoldi[3] – [1]Wigner Research Centre for Physics, [2]Eotvos University Budapest, [3]Hungarian Academy of Sciences (HU)

Functional renormalization group (FRG) is an exact method for taking into account the effect of quantum fluctuations in the effective action of the system. The FRG method applied to effective theories of nuclear matter yields equation of state witch incorporates quantum fluctuations of the fields. Using the local potential approximation the equation of state for Walecka-type models of nuclear matter under extreme conditions is determined. These models are tested by solving the corresponding Tollman-Oppenheimer-Volkov (TOV) equations and investigating the properties (mass and radius) of the corresponding compact star models.

30.7 | SA 25-07-15 11:30 | HS32

Tensor networks for gauge field theories | K. Van Acoleyen[1] – [1]Ghent University

In the last decade the tensor network state (TNS) formalism has emerged as a new language for our understanding of quantum many body systems. As a Hamiltonian variational method, the TNS framework can handle dynamical non-equilibrium

phenomena and regimes with finite fermionic densities, and it therefore presents a promising complementary approach to the Monte-Carlo Euclidean lattice simulations. Recently it has been realized that TNS also provide a very natural language for gauge theories. In this talk I will discuss their application in this context. I will present some recent work on the TNS approach for 1+1 dimensional gauge theories. A notable result here is the real-time simulation at the full quantum level of the dynamical Schwinger particle creation process for 1+1 dimensional QED. In addition, I will also briefly consider TNS applications on higher dimensional gauge theories.

30.8 | SA 25-07-15 11:45 | HS32

Error reduction using the covariant approximation averaging | E. Shintani[1] – [1]Mainz University

I will present the recent result of nucleon form factor using error reduction technique, so called as all-mode-averaging. This algorithm is able to reduce the computational cost of correlation function in Monte-Carlo calculation by adopting the covariant approximation into quark propagator. In this talk, I will discuss this technique on nucleon form factor calculation and show the high statistical analysis of axial charge and isovector form factor in two-flavor Wilson-clover fermion configurations.

30.9 | SA 25-07-15 12:00 | HS32

Renormalization of the energy-momentum tensor on the lattice | M. Pepe[1] – [1]INFN

We construct an energy-momentum tensor on the lattice which satisfies the appropriate Ward Identities and has the right trace anomaly in the continuum limit. These relations come forth when the length of the box in the temporal direction is finite, and they take a particularly simple form if the coordinate and the periodicity axes are not aligned. We implement the method for the SU(3) Yang-Mills theory and, by carrying out numerical simulations, the renormalization constants of the traceless components of the tensor are determined with a precision of roughly half a percent for values of the bare coupling constant in the range $0 < g^2 < 1$. The renormalization constants of the energy momentum tensor provide also a new method to measure the thermodynamic features of a Quantum Field Theory: numerical results are presented for the Equation of State.

30.10 | SA 25-07-15 12:15 | HS32

Universal aspects in the equation of state for Yang-Mills theories | A. Nada[1], M. Panero[2], M. Bruno[3], R. Pellegrini[4], M. Caselle[5] – [1]University of Torino & INFN, Turin, [2]University of Turin and INFN, Turin, [3]NIC, DESY, [4]University of Edinburgh, [5]University of Turin & INFN, Turin

We present high-precision lattice calculations of the thermodynamics of Yang-Mills theories with different gauge groups. In the confining phase, we show that the equation of state is described remarkably well by a gas of massive, non-interacting glueballs, provided that an effective bosonic closed-string model is used to derive an exponentially growing Hagedorn spectrum for the heavy states. In particular, this model describes very accurately the results for the SU(3) theory reported by BorsÃ¡nyi et al. in JHEP 07 (2012) 056, as well as a novel set of lattice data for the SU(2) theory. In addition, we also also show that the equation of state in the deconfined phase exhibits a near perfect proportionality to the number of gluon degrees of freedom, including for the Yang-Mills theory based on the exceptional, center-less gauge group G_2.

30.11 | SA 25-07-15 12:30 | HS32

The low-lying spectrum of N=1 supersymmetric Yang-Mills theory | P. Giudice[1], G. MÜenster[1], S. Piemonte[1], G. Bergner[2], I. Montvay[3] – [1]University of Münster, [2]University of Bern, [3]DESY

The spectrum of the lightest bound states in N=1 supersymmetric Yang-Mills theory, calculated on the lattice, is presented. The masses have first been extrapolated towards vanishing gluino mass and then to the continuum limit. The final picture is consistent with the formation of degenerate supermultiplets.

30.12 | SA 25-07-15 12:45 | HS32

Volume dependence in SU(N) gauge theories with twisted boundary conditions | M. Koren[1], M. Garcia Perez[2], A. Gonzalez-Arroyo[3], M. Okawa[4] – [1]IFT UAM-CSIC Madrid, [2]IFT UAM-CSIC, [3]IFT UAM-CSIC & UAM, [4]Hiroshima University

We analyze 2+1 dimensional Yang-Mills theory on a spatial torus with twisted boundary conditions. It is conjectured that the physical quantities in the theory obey the so-called x-scaling, i.e. depend only on the variable $x \approx NL/b$ and the magnetic flux, given by the parameters of the twist (L being the length of the spatial torus and b the inverse 't Hooft coupling). Using lattice approach and a broad range of values of N, we show numerical evidence supporting the x-scaling conjecture both in the non-zero electric flux sector and in the zero-flux (glueball) sector. Finally, generalization to 3+1 dimensions is discussed.

31 – Flavour Physics and Fundamental Symmetries

SA 25-07-15 09:00-13:20

HS41

31.1 | SA 25-07-15 09:00 | HS41

Measurement of the CKM angle γ at LHCb | J. Garra Tico[1] – [1]University of Cambridge (GB)

The angle γ is the least constrained parameter in the CKM unitarity triangle. Its determination in decays induced by tree-level b–>c and b–>u transitions is largely unaffected by potential new physics contributions. This allows for a consistency check of

the unitarity triangle, but also of comparisons with γ determinations from modes with loop-diagrams. LHCb' γ combination for CKM 2014 already dominates the world average. Several new measurements are presented.

31.2 | SA 25-07-15 09:15 | HS41

Dalitz analyses with B–>Dh decays | W. Qian[1] – [1]Centre National de la Recherche Scientifique (FR)

Decays of b-hadrons to states including open charm provide a rich laboratory to constrain the unitarity matrix and search for new physics. We present recent measurements in this sector, including first observations of orbitally excited D mesons, measurements of their spin, mass and decay widths.

31.3 | SA 25-07-15 09:30 | HS41

NP models with extended gauge groups: Impact on flavour observables | F. De Fazio[1] – [1]INFN Bari

I discuss the predictions of models based on an extended gauge group on several rare B decays, focusing in particular on the correlations among flavour observables. Two cases are considered in details: models introducing a new Z' gauge boson and the Randall Sundrum model with custodial protection.

31.4 | SA 25-07-15 09:45 | HS41

An MCMC study of non-minimal flavour violation in the MSSM | B. Herrmann[1] – [1]LAPTh Annecy-le-Vieux, France

We present an extensive study of non-minimally flavour violating (NMFV) elements in the Lagrangian of the Minimal Supersymmetric Standard Model (MSSM). We impose a variety of theoretical and experimental constraints and perform a detailed scan of the parameter space by means of a Markov-Chain Monte-Carlo (MCMC) setup. To our knowledge, this represents the first study of several non-zero flavour-violating elements within the MSSM. We present the results of the MCMC scan with a special focus on the flavour-violating parameters and related observables at the LHC. Based on these results, we define benchmark scenarios for studies of NMFV effects at the LHC.

31.5 | SA 25-07-15 10:00 | HS41

Test of the Standard model and search for new physics using Unitarity triangle fits | G. Martinelli[1], D. Derkach[2], A. Bevan[3], M. Bona[4], M. Ciuchini[5], E. Franco[6], V. Lubicz[7], F. Parodi[8], M. Pierini[9], C. Schiavi[10], L. Silvestrini[11], V. Sordini[12], A. Stocchi[13], C. Tarantino[14], V. Vagnoni[15] – [1]Scuola Int. Superiore di Studi Avanzati (IT), [2]University of Oxford (GB), [3]University of London (GB), [4]Queen Mary University of London (UK), [5]Universita di Roma Tre and INFN, [6]INFN Sezione di Roma, [7]University of Roma Tre, [8]Università degli Studi e INFN Genova (IT), [9]California Institute of Technology (US), [10]Universita e INFN Genova (IT), [11]INFN Rome, [12]Universite Claude Bernard-Lyon I (FR), [13]LAL CNRS Universite Paris Sud, [14]University Roma Tre, [15]Universita e INFN, Bologna (IT)

During the last 15 years, B-physics facilities have been giving enormous contributions to the consolidation of the Standard Model (SM) in the flavour sector. New analyses flowing from the LHC experiments, in particular LHCb, are now providing unprecedented insights into CKM metrology and new evidences for rare decays. The CKM picture can be tested with great precision, and very precise SM predictions can be obtained from global analyses. We present here the results of the latest global SM analysis performed by the UTfit collaboration. In addition, Unitarity Triangle (UT) analyses, within and beyond the Standard Model (SM), are used to search for cracks in our current understanding and constrain the parameter space in possible new physics (NP) scenarios. We present an update of the UT analysis beyond the SM by the UTfit collaboration. Assuming NP, all of the available experimental and theoretical information on DF=2 processes is combined using a model-independent parametrisation. We determine the allowed NP contributions in the kaon, D, Bd, and Bs sectors and, in various NP scenarios, we translate them into bounds for the NP scale as a function of NP couplings. We also present the perspectives for future UT analyses on the basis of existing extrapolations of experimental results from the Belle-II and LHCb experiments, as well as of expected improvements from Lattice QCD computations.

31.6 | SA 25-07-15 10:20 | HS41

The Belle II experiment at the SuperKEKB collider | J. Wiechczynski[1], C. Schwanda[2] – [1]Polish Academy of Sciences (PL), [2]Austrian Academy of Sciences

The Belle II experiment at the SuperKEKB collider in Tsukuba, Japan, will start physics data taking in the year 2018 and aims at accumulating 50 ab^{-1} of e^+ e^- collision data, about 50 times the data set of the previous Belle experiment. The physics program provides simultaneous studies of a wide range of areas in *b*-quark, *c*-quark, τ-lepton, two-photon, quarkonium and exotic physics. Belle II, as a next generation flavour factory, will search for New Physics in the flavour sector at the precision frontier, and further reveal the nature of QCD in describing matter. In this presentation, we review the current state of Belle II construction and describe the main physics opportunities at this future facility.

31.7 | SA 25-07-15 10:35 | HS41

B Physics at CMS with Run2 and beyond | K. Chen[1] – [1]National Taiwan University (NTU)

The LHC is entering into operation with an increased centre-of-mass energy of 13 TeV, and within the next 3 years of operations (Run2) the foreseen integrated luminosity delivered to CMS will be about 100 fb-1. The B hadron production cross section is expected to nearly double at this energy compared to Run1, thus potentially increasing by almost one order of magnitude

the collected statistics relative to Run1. This will enable CMS to perform enhanced measurements in the B sector. A further increase in integrated luminosity is expected to occur in two more steps after the second LHC long shutdown (LS) in 2018 and the third LS in 2021, thus enabling to significantly improve the precision of several B physics measurements, including Bs/Bd->mu+ mu-, and search for rarer decays. This talk will report on the prospects for B physics measurements with high statistics data at CMS, and will present preliminary results obtained with 13 TeV data.

31.8 | SA 25-07-15 10:50 | HS41

Flavours at a high luminosity e+e- collider (FCC-ee) | S. Monteil[1], J. Kamenik[2], J. Fesel Kamenik[3], J. F. Kamenik[4] – [1]Univ. Blaise Pascal Clermont-Fe. II (FR), [2]INFN LNF, [3]Jozef Stefan Institute (SI), [4]Jozef Stefan Institute

A possible long-term strategy for high-energy physics at colliders considers a tunnel of about 100 km circumference, which takes advantage of the present CERN accelerator complex.A possible first step of the project is high-luminosity e^+e^- collider aimed at studying comprehensively the electroweak scale with centre-of-mass energies ranging from the Z pole up to beyond the $t\bar{t}$ production threshold. A 100 TeV pp collider is considered as the ultimate goal of the project. FCC groups have been formed in a design study hosted by CERN, aiming at a CDR in time for next European Strategy milestone (2018-2019). The unprecedented statistics at the Z pole ($O(10^{12-13})$ Z decays potentially delivered by the e^+e^- collider can be studied in particular to explore further the Flavour Physics case at large. We'll discuss the possible measurements of rare decays of b-hadrons, which can complement the anticipated knowledge from the foreseen b-Physics programs. This very statistics can be used as well to study Lepton Flavour Violating Z decays, which would serve as an indisputable evidence for New Physics if seen. In absence of signal, we'll discuss the constraints to be set on models embedding additional right-handed sterile neutrinos. Heavy sterile neutrinos, addressing in some models both the questions of dark matter and baryonic asymmetry in the Universe, can also be searched for directly at FCC-*ee*. Prospects of these direct searches will be described.

31.9 | SA 25-07-15 11:30 | HS41

Electric Dipole Moments - A Window for New Physics | H. Stroeher[1] – [1]Forschungszentrum Juelich GmbH

Permanent Electric Dipole Moments (EDM) of non-degenerate systems, e.g., leptons (electron, muon, tau) and hadrons (neutron, proton), provide a unique opportunity to search for physics beyond the Standard Model (BSM). Since EDMs violate P-, T-, and (via CPT) CP-symmetry they may also provide a solution to one of the biggest puzzles of contemporary physics and cosmology, i.e., the apparent matter-antimatter asymmetry of the Universe. EDMs are very small - in fact the SM predictions (electroweak CP violation) are beyond experimental reach with current techniques. Up to now, very stringent limits have been determined directly only the neutron and indirectly (from bound systems) for the electron and the proton. A recent idea to directly investigate EDMs of the proton and light ions (deuteron and 3He) in storage rings has the potential to improve the sensitivity significantly - at the same time, they will be required to elucidate the EDM source - once a finite EDM will be observed. The talk will give a brief overview of the status and future perspectives of the experimental EDM activities worldwide.

31.10 | SA 25-07-15 11:50 | HS41

NoMoS: Beyond the Standard Model Physics in Neutron Decay | G. Konrad[1] – [1]SMI Wien

The newly established New Frontiers Group 'NoMoS: Beyond the Standard Model Physics in Neutron Decay' of the Austrian Academy of Sciences aims to search for traces of new physics in neutron beta decay with novel experimental techniques. Precision measurements in neutron decay allow searching for physics beyond the Standard Model. An accuracy of 10^{-4} in the observables corresponds to energy scales of 1 – 100 TeV for new particles and interactions; far above the production threshold at the LHC. To achieve this accuracy, a new technique is developed: R×B spectroscopy. An R×B spectrometer measures the momentum of charged particles by their drift in a circular magnetic field. This precision method will be applied to determine several correlations between decay products in neutron decay. For measurements at ultimate statistics, the R×B spectrometer will be combined with PERC, a new facility at the FRM II in Garching/Germany that collects electrons and protons from a large neutron decay volume. A final goal is to measure or set limits on the Fierz interference term. This term is forbidden in the Standard Model and has not yet been measured with neutrons. A non-zero value would indicate that yet unknown charged Higgs bosons, sleptons, or leptoquarks were exchanged instead of the Standard Model W boson. Besides the physics motivation, the measurement concept and physics programme of NoMoS are presented.

31.11 | SA 25-07-15 12:05 | HS41

Toward a hyperfine splitting measurement of antihydrogen | M. Simon[1], A. Capon[1], S. Lehner[1], C. Malbrunot[2], V. Mascagna[3], O. Massiczek[1], D. Murtagh[4], Y. Nagata[5], B. Radics[4], C. Sauerzopf[1], K. Suzuki[1], M. Tajima[6], M. Diermaier[1], L. Venturelli[3], S. Van Gorp[4], J. Zmeskal[1], H. Breuker[2], H. Higaki[7], Y. Kanai[4], E. Lodi-Rizzini[8], Y. Matsuda[6], S. Ulmer[4], P. Dupre[4], E. Widmann[1], Y. Yamazaki[9], C. Kaga[7], B. Kolbinger[1], N. Kuroda[6], M. Leali[3], Y. Abo[9], Y. Higashi[6], S. Ishikawa[6], H. Torii[6] – [1]Austrian Academy of Sciences (AT), [2]CERN, [3]Universita di Brescia (IT), [4]Inst. of Physical and Chemical Research (JP), [5]Tokyo University of Agriculture and Technology (JP), [6]University of Tokyo (JP), [7]Hiroshima University (JP), [8]Universita di Brescia & INFN (IT), [9]RIKEN (JP)

The formation of antihydrogen opens a new avenue toward precise matter-antimatter symmetry studies through atomic spectroscopy techniques. The ASACUSA collaboration is pursuing an experiment to measure the ground-state hyperfine splitting of antihydrogen in a polarized beam [1]. For hydrogen this transition has been measured in a beam and with a maser reaching

a relative precision of 4 × 10e-8 [2] and 10e-12 [3], respectively. Recently, the first observation of antihydrogen atoms arriving 2.7m downstream of the formation region in a field-free environment has been reported [4]. During the subsequent shutdown of CERN, a source of cold polarized hydrogen atoms was built and experiments were performed to characterize the spectroscopy apparatus with a hydrogen beam. Now the complete apparatus for antihydrogen spectroscopy has been assembled and operated during a short experimental run. The latest status of the antihydrogen hyperfine splitting experiment will be presented including the results of the hydrogen beam experiment, which confirm the high precision and accuracy of our recently developed spectroscopy apparatus. With this device ground state hyperfine spectroscopy at a fractional precision on the few ppb level has been demonstrated very recently.

31.12 | SA 25-07-15 12:20 | HS41

PERC - A clean, bright and versatile source of neutron decay products | B. Maerkisch[1] – [1]Universität Heidelberg

Neutron beta decay is an excellent system to study the charged weak interaction experimentally. The decay is precisely described by theory and unencumbered by nuclear structure effects. Observables are numerous correlation coefficients, spectra and the neutron lifetime. Precision measurements in neutron beta decay are used to investigate the structure of the weak interaction and to derive the CKM matrix element Vud. In this talk, I will focus on the new experiment PERC, which is currently under construction at the FRM II, Garching. Its main component is a 12 m long superconducting magnet system. PERC is designed to improve measurements of several correlation coefficients by an order of magnitude. I will present the concept of the instrument as well as its current status.

31.13 | SA 25-07-15 12:35 | HS41

A new high sensitivity search for neutron-antineutron oscillations at the ESS | D. Milstead[1] – [1]Stockholm University (SE)

A sensitive search for neutron-antineutron oscillations can provide a unique probe of some of the central questions in particle physics and cosmology: the energy scale and mechanism for baryon number violation, the origin of the baryon-antibaryon asymmetry of the universe, and the mechanism for neutrino mass generation. A remarkable opportunity has emerged to search for such oscillations with the construction of the European Spallation Source (ESS). A collaboration has been formed which has proposed a nnbar search at the ESS which would provide a sensitivity to the oscillation probability which is three orders of magnitude greater than that achieved at the ILL experiment.

31.14 | SA 25-07-15 12:50 | HS41

Study of B -> K pi pi gamma decays | G. Eigen[1] – [1]University of Bergen

We present a measurement of the time-dependent CP asymmetry in the radiative-penguin decay B0 -> K_S pi+ pi- gamma, using a sample of 471 million BBbar events recorded with the BaBar detector at the PEP-II e+e- collider at SLAC. We obtain the CP-violating parameters S and C in the decay, and, using new theoretical input, extract from them the time-dependent mixing-induced CP asymmetry, S_rho0KS, related to the hadronic CP eigenstate rho∧0 K_S. This observable provides information on the photon polarization in the underlying b -> s gamma transition. The extraction of S_rho0Ks is done assuming isospin symmetry, using a study of B+ -> K+ pi+ pi- gamma decays. In this mode, we measure intermediate amplitudes of different resonances decaying to K pi pi through the intermediate states rho∧0 K∧+, K∧*0 pi∧+ and K pi (S wave) pi∧+. In addition to the need for this information for the extraction of S_rho0KS, it provides information on the B -> K pi pi system, which is useful for other studies of the photon polarization.

32 – Higgs and New Physics

SA 25-07-15 09:00-13:00
Grosser Festsaal

32.1 | SA 25-07-15 09:00 | Grosser Festsaal

Searches for resonant and non-resonant new phenomena in ATLAS | W. Fedorko[1], E. Shabalina[2] – [1]University of British Columbia, [2]Georg-August-Universitaet Goettingen (DE)

Many new physics scenarios beyond the Standard Model predict the presence of narrow or broad resonances decaying to a pair of quarks/gluons, charged/neutral leptons, photons and their combinations, or a multi-jet final state. Non-resonant excess in tails of mass and transverse momentum distributions is another strong indication of new physics. This talk highlights recent ATLAS searches on new phenomena in di-jet, multi-jet, di-lepton, photon+jet, di-photon and multi-jet final states using LHC Run 1 data. First LHC Run-2 results and/or prospects will be privileged, if available.

32.2 | SA 25-07-15 09:15 | Grosser Festsaal

Searches for resonant and non-resonant new phenomena in CMS | B. Clerbaux[1], A. Meyer[2] – [1]Inter-University Institute for High Energies (BE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Many new physics scenarios beyond the Standard Model predict the presence of narrow or broad resonances decaying to a pair of quarks/gluons, charged/neutral leptons, photons and their combinations, or a multi-jet final state. Non-resonant excess in tails of mass and transverse momentum distributions is another strong indication of new physics. This talk highlights recent CMS searches on new phenomena in di-jet, multi-jet, di-lepton, photon+jet, di-photon and multi-jet final states using LHC Run

1 data. First LHC Run-2 results and/or prospects will be privileged, if available.

32.3 | SA 25-07-15 09:30 | Grosser Festsaal

Four-Quark Effective Operators at Hadron Colliders | M. De Vries[1] – [1]Mainz University

The robustness of translating effective operator constraints to BSM theories crucially depends on the mass and coupling of BSM particles. This is especially relevant for hadron colliders where the partonic centre of mass energy is around the typical energy scales of natural BSM theories. The caveats in applying the limits are discussed using Z and G models, illustrating the effects for a large class of models. This analysis shows that the applicability of effective operators mainly depends on the ratio of the transfer energy in the events and the mass scale of the full theory. Moreover, based on these results a method is developed to recast existing experimental limits on four-quark effective operators to the full theory parameter space.

32.4 | SA 25-07-15 09:45 | Grosser Festsaal

Searches for top/bottom partners and new phenomena in top/bottom quark pair signatures in ATLAS and CMS | I. Marchesini[1], A. Meyer[2] – [1]Hamburg University (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

This talk presents searches for new phenomena in signatures with a pair of top-quarks, a top and bottom-quark, together with searches for fermionic top/bottom partners (VLQs). ATLAS and CMS results from Run-1 and Run-2 (if available) will be presented together with their interpretations, with a view to the reconstruction techniques used in the searches.

32.5 | SA 25-07-15 10:00 | Grosser Festsaal

Searches for new phenomena in multilepton final states in ATLAS and CMS | S. Jain[1], A. Meyer[2] – [1]National Central University (TW), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Hints of new physics in B-physics sector have lead to considerable interests on the flavor physics and lepton flavor violating (LFV) observables at the LHC. Searches for LFV decays of the Standard Model particles or new heavy particles have been conducted at the ATLAS and CMS experiment. This talk summarizes Run 1 searches for LFV phenomena and new physics in multi-lepton/photon final states. First LHC Run-2 results will be included if available.

32.6 | SA 25-07-15 10:15 | Grosser Festsaal

Discovery potential for T' -> tZ in the trilepton channel at the LHC | L. Basso[1], J. Andrea[1] – [1]Institut Pluridisciplinaire Hubert Curien (FR)

The LHC discovery potential of heavy top partners decaying into a top quark and a Z boson is studied in the trilepton channel at 13 TeV in the single production mode. The clean multilepton final state allows to strongly reduce the background contaminations and to reconstruct the T' mass. We show that a simple cut-and-count analysis probes the parameter space of a simplified model as efficiently as a dedicated multivariate analysis. The trilepton signature finally turns out to be as sensitive in the low T' mass region as the complementary channel with a fully hadronic top quark, and more sensitive in the large mass domain. The reinterpretation in terms of the top-Z-quark anomalous coupling is shown.

32.7 | SA 25-07-15 10:30 | Grosser Festsaal

Search for new phenomena in diboson final states in ATLAS and CMS | V. Cavaliere[1], E. Shabalina[2], A. Meyer[3] – [1]Univ. Illinois at Urbana-Champaign (US), [2]Georg-August-Universitaet Goettingen (DE), [3]Rheinisch-Westfaelische Tech. Hoch. (DE)

Resonant production of two massive bosons (WW, WZ, ZZ, W/Z+gamma, W/Z+H and HH) is a smoking gun signature for physics beyond the Standard Model. Searches for diboson resonances have been performed in final states with dierent numbers of leptons and jets including fat-jets with jet substructure. The searches at the highest accessible masses employ new identification techniques to disentangle the decay products of the boson in highly boosted configurations. New resonances decaying into Higgs bosons are also considered. This talk highlights ATLAS and CMS searches for diboson resonances with LHC Run 1 data. First LHC Run-2 results will be included if available.

32.8 | SA 25-07-15 10:45 | Grosser Festsaal

Asymmetries at the LHC as tools to discover Z' bosons | D. Millar[1], S. Moretti[2], L. Cerrito[1] – [1]University of London (GB), [2]STFC - Rutherford Appleton Lab. (GB)

We investigate the sensitivity of asymmetry observables constructed from top pair decay products, particularly in the dileptonic and semileptonic channels, to an underlying Z boson arising from U(1) gauge extensions to the standard model. We demonstrate that combinations of spin and charge asymmetries can enable one to distinguish between a selection of benchmark Z models owing to their unique dependencies on chiral couplings to the new gauge boson. We also discuss the role of the Forward-Backward Asymmetry (AFB) in setting bounds on or even discovering a Z' at the LHC and show that it might be a powerful tool for this purpose. We analyse two different scenarios: Z'-bosons with a narrow and wide width, respectively. We find that, in the first case, the significance of the AFB search can be comparable with that of the bump search usually adopted by the experimental collaborations.

32.9 | SA 25-07-15 11:30 | Grosser Festsaal

A Cosmological Solution to the Electroweak Hierarchy Problem | D. Kaplan[1], P. Graham[2], S. Rajendran[3] – [1]Johns Hopkins

University, [2]Stanford University, [3]UC Berkeley
I present a new class of solutions to the electroweak hierarchy problem that does not require either weak scale dynamics or anthropics. In these solutions, dynamical evolution during the early universe drives the Higgs mass to a value much smaller than the cutoff. The simplest model has the particle content of the standard model plus a QCD axion and an inflation sector. In a model with additional fields, the highest cutoff achieved is 1,000,000 times the weak scale. I discuss the physical implication of these models and hopes for detection.

32.10 | SA 25-07-15 11:55 | Grosser Festsaal
Prospects of the high luminosity LHC from CMS and ATLAS | A. Tricomi[1], A. Meyer[2] – [1]Universita e INFN, Catania (IT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
Prospects for the high luminosity LHC will be given in the fields of Higgs physics and SUSY searches. The prospects will be presented for ATLAS and CMS.

32.11 | SA 25-07-15 12:10 | Grosser Festsaal
Higgs Physics at CLIC | S. Redford[1], E. Sicking[1] – [1]CERN
The Compact Linear Collider (CLIC) is an attractive option for a future multi-TeV linear electron-positron collider, offering the potential for a rich precision physics programme, combined with sensitivity to a wide range of new phenomena. The physics reach of CLIC has been studied for several centre-of-mass energies. A staged construction and operation of CLIC provides the ideal scenario for precise studies of the properties of the ≈125 GeV Higgs boson. Operation at a few hundred GeV allows the couplings and width of the Higgs boson to be determined in a model-independent manner through the study of the Higgsstrahlung and WW-fusion processes. Operation at higher centre-of-mass energies provides high statistics and the potential to study the top Yukawa coupling. At the highest energy (presently planned to be 3 TeV c.m.) the Higgs boson self-coupling can be accurately measured. In this talk we explore the potential of the CLIC Higgs physics programme, based on full simulation studies of a wide range of final states. Dedicated studies to identify the optimal low-energy stage of CLIC for Higgs physics are shown. The evolution of the physics sensitivity with centre-of-mass energy is presented in terms of a model-independent global fit of the couplings and the total width and constrained kappa fits employed by the LHC experiments.

32.12 | SA 25-07-15 12:30 | Grosser Festsaal
The Higgs Physics Program at the International Linear Collider | C. Duerig, F. Simon[1] – [1]Max-Planck-Institut fuer Physik
The precise exploration of all aspects of the Higgs sector is one of the key goals for future colliders at the Energy Frontier. The International Linear Collider ILC provides the capability for model-independent measurements of all relevant couplings of the Higgs boson to fermions and gauge bosons, including direct measurements of the Top Yukawa coupling as well as of the Higgs self-coupling. This contribution will review the highlights of Higgs physics at the ILC in the context of a 20-year-long physics program. This program covers different collision energies up to 500 GeV with various beam polarisations, each contributing important aspects to the exploration of this new sector of particle physics. Beyond this initial scope of the ILC, we will also discuss the prospects of a 1 TeV upgrade, which offers complementary capabilities for the measurement of double Higgs production and the Higgs self-coupling.

32.13 | SA 25-07-15 12:45 | Grosser Festsaal
Higgs Physics at the Future Circular Colliders (FCC) | M. Klute[1], K. Peters[2] – [1]Massachusetts Inst. of Technology (US), [2]CERN
After the Higgs boson discovery, the precision measurements and searches for new phenomena in the Higgs sector are among the most important goals in particle physics. Experiments at the Future circular colliders (FCC) under study are ideal to study these questions. Electron-position collisions up to an energy of 350 GeV (FCC-ee) provide the ultimate precision in Higgs physics with studies of couplings, mass, total width and CP parameters of the Higgs boson and searches for exotic and invisible decays. A proton collider with a center-of-mass energy of up to 100 TeV (FCC-hh) can further extend this program with precise measurements of the Higgs boson coupling to the top quark and of its self-coupling as well as with searches for rare decays. Direct searches for additional, higher mass scalar resonances can also be performed. In this talk we will discuss the complementary Higgs physics program and projected results for the FCC-ee and FCC-hh colliders.

33 – Top and Electroweak Physics
SA 25-07-15 09:00-13:00
HS31

33.1 | SA 25-07-15 09:00 | HS31
Physics with jets at LHCb | R. Barlow[1] – [1]University of Huddersfield (GB)
LHCb has a unique capability to separate beauty and charm jets. We present recent results on jet tagging performance, W+b,c jets and the observation of the top quark in the forward acceptance at the LHC.

33.2 | SA 25-07-15 09:18 | HS31

Top properties measurements with the ATLAS detector | T. Neep[1], J. Katzy[2] – [1]University of Manchester (GB), [2]DESY, HAMBURG
The top quark is unique among the known quarks in that it decays before it has an opportunity to form hadronic bound states. This makes measurements of its properties particularly interesting as one can access directly the properties of a bare quark. Measurements of the charge asymmetry in topquark pair events are presented. The measurements use both the 7 and 8 TeV ATLAS datasets and probe models of physics beyond the Standard Model. A measurement of the correlation between the direction of the spins of topquark pairs is also presented. The measurement agrees with the Standard Model and is used to set limits on the production of the supersymmetric partner of the top quark. In addition, a novel measurement of colour flow in topquark pair events is presented. The measurement uses the jets originating from the Wboson and demonstrates the ability of the colour flow observable to distinguish between colour octet and colour singlet final states.

33.3 | SA 25-07-15 09:36 | HS31
Measurements of the top quark properties in ttbar production at the LHC (includes charge asymmetry, top quark polarization, spin correlations and tt+V) | F. Roscher[1], A. Meyer[2] – [1]KIT - Karlsruhe Institute of Technology (DE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
Measurements are presented of the properties of top quarks in pair production from proton-proton collisions at the LHC. The data were collected at pp centre-of-mass energies of 7 and 8 !TeV by the CMS experiment during the years 2011 and 2012. The charge asymmetry is measured using the difference of the absolute rapidities of the reconstructed top and anti-top kinematics, as well as from distributions of the top quark decay products. The measurements are performed in the decay channels of the ttbar pair into both one and two leptons in the final state. The results, obtained differentially in several kinematic variables of the ttbar-system, are discussed in the context of the forward-backard asymmetry measurements at Tevatron. The polarization of top quarks is measured from the decay angular distributions. Top quark spin correlations and asymmetries are measured from the angular distributions of the top quark decay products. Measurements of the associate production of top quark pairs with vector bosons (photons, W and Z) are also presented. The results are compared with standard model predictions.

33.4 | SA 25-07-15 09:54 | HS31
Measurements of forward-backward asymmetries and top quark polarization with the D0 detector | U. Husemann[1], D0 Collaboration[2] – [1]KIT - Karlsruhe Institute of Technology (DE), [2]DZero Experiment, Fermilab
We present recent measurements based on $t\bar{t}$ production in both the lepton+jets and dilepton channels using the D0 detector at the Fermilab Tevatron Collider. In both channels we measure angular distributions to extract the ttbar production forward-backward asymmetry and the top polarization in different basis. The full Run II D0 data sample corresponding to 9.7 fb^{-1} of integrated luminosity is used for this measurement.

33.5 | SA 25-07-15 10:13 | HS31
Measurement of the properties of top quarks in decays (includes W polarization, top quark charge and couplings) | J. Piedra Gomez[1], A. Meyer[2] – [1]Universidad de Cantabria (ES), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
Several measurements of top quark properties in top quark decays are presented using data collected by the CMS experiment during the years 2011 and 2012. The polarization of W bosons in top quark decays is measured. The W-boson helicity fractions and angular asymmetries are extracted and limits on anomalous contributions to the Wtb vertex are determined. Furthermore, searches for flavor-changing neutral currents in top quark decays are presented using samples of top-quark pair event candidates decaying via Wb and Zq into lνb and llq events. The flavor contents in top-quark pair events are measured using the fraction of top quarks decaying into a W-boson and a b-quark relative to all top quark decays, R=BR(t->Wb)/Sum(BR(t->Wq)), and the result is used to determine the CKM matrix element Vtb as well as the width of the top quark resonance. The top-quark charge is measured, using the charge correlations between high-pT muons from W boson decays and soft muons from B-hadron decays in b jets.

33.6 | SA 25-07-15 10:31 | HS31
Measurement of top quark properties in single top production | A. Tiko[1], A. Meyer[2] – [1]Nat. Inst. of Chem.Phys. & Biophys. (EE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)
Single top topologies are exploited for studies of top quark properties. This includes the first measurement of single top polarization in the t-channel production mode in pp collisions, which directly confirms the V-A nature of the tWb production vertex. W-helicity fractions are measured in the phase space sampled by a selection optimized for t-channel single top production, orthogonal to the ttbar final states used in traditional measurements of these properties. Anomalous couplings of the top quark are also searched in t-channel single top production with a NN-based analysis.

33.7 | SA 25-07-15 11:30 | HS31
Precision Electroweak measurements at the Future Circular Colliders | M. Dam[1], R. Tenchini[2] – [1]University of Copenhagen (DK), [2]Universita di Pisa & INFN (IT)
The prospects for electroweak precision measurements at the Future Circular Collider with electron-positron beams (FCC-ee) should provide improvements by a factor of order 25 over the present status, and constitute a broad search for the existence of

new, weakly interacting particles up to very high energy scales. The Z mass and width, as well as the value of the electroweak mixing angle and b partial width, can be measured with very high precision at the Z pole thanks to an instantaneous luminosity five to six orders of magnitude larger than LEP. At centre-of-mass energies around 160 GeV, corresponding to the WW production threshold, the W mass can be determined very precisely with high-statistics cross section measurements at several energy points. These exceptional performance can be achieved thanks to continuous beam energy calibration by resonant depolarization of the beams that will be described. Considerable improvements of the strong coupling constant determination down to a precision of $\Delta\alpha_s(m_Z) \simeq \pm 0.0001$ will be possible with the measurements of the hadronic widths of the Z and W bosons. Similarly, a very precise determination of the top mass and top couplings to the Z and photon can be provided by an energy scan at the $t\bar{t}$ production threshold, from 340 to 360 GeV.

33.8 | SA 25-07-15 11:50 | HS31
Top and EW physics at the LHeC | Z. Zhang[1], N. Armesto Perez[2] – [1]LAL, Orsay (FR), [2]Universidade de Santiago de Compostela (ES)
The LHeC is a proposed upgrade of the LHC to study ep/eA collisions in the TeV regime, by adding a 60 GeV electron beam through an Energy Recovery Linac. In ep, high precision electroweak and top physics can be performed, such as measurements of anomalous top couplings, for which simulation studies are presented, besides the prospect to access the top PDF.

33.9 | SA 25-07-15 12:10 | HS31
Top Quark Physics at a Future Linear Collider | R. Poeschl[1], F. Simon[2] – [1]Laboratoire de l'Accelerateur Lineaire (FR), [2]Max-Planck-Institut fuer Physik
The International Linear Collider and Compact Linear Collider projects aim to build a linear electron-positron collider with a center-of-mass energy well above the top quark pair production threshold. In this contribution an overview is presented of the potential of their top quark precision physics programme. One of the highlights is a precise determination of the top quark mass through a scan of the center-of-mass energy around the pair production threshold, that is expected to yield a total uncertainty on the top quark MSbar mass of less than 50 MeV. The results of a full-simulation analysis are presented, including a discussion of the main systematic uncertainties. Full simulation results are also presented for measurements of the top quark couplings to the Z-boson and the photon. The anomalous form factors are expected to be constrained to better than 1%, significantly beyond the expected precision at the Large Hadron Collider. Further new results are presented for the sensitivity to non-standard top quark decays and its interaction with the Higgs boson.

33.10 | SA 25-07-15 12:30 | HS31
Precision measurements of the top quark couplings at the FCC | P. Janot[1], A. Blondel[2] – [1]CERN, [2]Universite de Geneve (CH)
With a centre-of-mass energy just above the top pair threshold production ($\sqrt{}$s $\approx$ 365-370 GeV) and a luminosity of 1.8 10∧34/cm2/s in up to four IPs, the FCC-ee can provide a measurement of the top quark to the photon and the Z with a precision below the per-cent level. This precision is reached with the sole angular and momentum distributions of the lepton arising from semi-leptonic decays in top anti-top events, and can be further improved with other observables. In a complementary manner, the FCC-hh, with Vs $\approx$ 100 TeV and an integrated luminosity of several 1/ab, can measure the ratio of the ttH to the ttZ cross section to better than a per-cent. Together with the ttZ couplings and the Higgs decay branching ratios measured at the FCC-ee, the FCC can therefore provide a measurement of the ttH coupling with a precision below the per-cent. These precisions allow the parameters of many Composite Higgs models to be critically explored. In this respect, as well as in many others, the combination of the FCC-ee and the FCC-hh provide the best search reach and the best precision of all projects on the market.

34 – Education and Outreach

SA 25-07-15 09:00-13:00
HS7

34.1 | SA 25-07-15 09:00 | HS7
Stepping Outside: A Perspective on Outreach | D. Kaplan
I will talk about my experience giving public lectures and making the 2014 documentary, Particle Fever, in the context of how it affected me, my research, my perspective on our field and our responsibility. Then I'll show a video clip - let's call it an outtake from the film.

34.2 | SA 25-07-15 09:20 | HS7
Accelerating Public Engagement | S. Zollinger[1] – [1]Science & Technology Facilities Council
In particle physics researchers work at small scales within projects, but are also part of a larger scale within a collaboration. In the same way, researchers can be part of both small scale Public Engagement activities and large scale programs. No matter the scale, the principles of successful Public Engagement are the same: a work cycle that includes strategy, planning, implementation, and evaluation. Public Engagement can be a challenge for a scientist with an extensive list of research goals, a full

conference and meetings calendar, teaching resources to be completed, the next visitor group at the door, another popular science talk to be prepared, and an interview to give. Working with different target audiences such as scientists, educators, students of all age groups, and the enquiring public, high quality public engagement must ensure the needs of these varied audiences are met. In addition, it is also important to accomplish the aims and objectives of institutions. To tackle these challenges, efficient planning is essential. In this talk, I describe a work cycle in Public Engagement, review examples of effective models, and describe best practice methods. This talk will provide tips and techniques to ease your work and maximise your impact in Public Engagement - on both large and small scales.

34.3 | SA 25-07-15 09:35 | HS7

LECTURING ON SILICON SENSORS USING THE EDUCATIONAL ALIBAVA SYSTEM | C. Lacasta Llacer[1], C. Garcia[2], S. Marti I Garcia[3], J. Bernabeu Verdu[4], J. Carlos[5], M. Lozano Fantoba[6], G. Pellegrini[7], M. Ullan Comes[8], A. Greenall[9], G. Casse[9], J. Rodriguez[10] – [1]IFIC-Valencia, [2]IFIC Valencia (ES), [3]IFIC-Valencia (UV/EG-CSIC), [4]Universidad de Valencia (ES), [5]ALIBAVA Systems, [6]Instituto de Fisica Corpuscular (ES), [7]Centro Nacional de Microelectrónica (IMB-CNM-CSIC) (ES), [8]CNM-Barcelona (ES), [9]University of Liverpool (GB), [10]ALIBAVA systems

The Educational ALIBAVA System (EASY) is a compact and portable system for lecturing sensor instrumentation at university teaching laboratories. EASY tests and readouts a silicon micro-strip sensor. The front-end electronics is based on a low noise ASIC with 128 input channels. Semiconductor devices are widely used as radiation sensors in many scientific and industrial applications. They are of uttermost importance in the High Energy Physics experiments as tracking devices and extensively used in Nuclear Physics for spectroscopy. Moreover, silicon sensors are extensively used in medical physics imaging and inland security, where their low cost, miniaturization, packaging and integration of electronics represent a clear advantage. A book of exercises with EASY (including theory explanations and hands-on activities) helps physics and engineering students to be educated on the first principles of the semiconductor sensors, their operation in real systems, as well as the associated electronics. There one can find clear explanation of the different type of runs to acquire the data, and with a proposal of some basic exercises for the students like: setting the operation voltage of the sensors, finding the pedestals and the noise, the synchronization with the trigger, charge collection and energy deposition, depletion voltage of the sensor, charge sharing between neighbour strips, the spatial resolution of the sensor and spectroscopy with different radioactive source.

34.4 | SA 25-07-15 09:50 | HS7

Involving other communities through challenges and cooperation | C. Nellist[1], C. Adam Bourdarios[2] – [1]LAL-Orsay (FR), [2]Laboratoire de l'Accelerateur Lineaire (FR)

The ATLAS collaboration has recently setup three projects targeting citizen science or specific communities : The goal of the HiggsML project was to bring particle physicists and data scientist together by a "challenge": compete online to obtain the best Higgs to tau tau signal significance on a set of ATLAS fully simulated signal and background. The challenge ran from May to September 2014, drawing considerable attention. 1785 teams participated, making it the most popular challenge ever on the Kaggle platform. Higgs Hunters is the first Particle Physics project hosted on a web-based citizen science platform called Zooniverse. Volunteers are asked to scan ATLAS data and Monte Carlo events, looking for secondary vertices. Results will be compared to the ATLAS secondary vertex finding algorithm in the context of the search for long lived particles in Supersymmetric models. So far more than 5,000 users have taken part, classifying more than 600,000 interesting features in ATLAS event displays. The ATLAS @ home project allows volunteers to run simulations of collisions in the ATLAS detector. During the first year the community essentially consisted of software fans, who were attracted by the technical challenge and contributed a lot to the debugging via message boards. With the start of LHC, the number of people attracted for outreach reasons is growing. In this talk, the setup, current success and future of such projects will be reviewed.

34.5 | SA 25-07-15 10:05 | HS7

ATLAS and CMS Virtual Visits: Bringing Cutting Edge Science into the Classroom and Beyond | M. Lapka[1] – [1]CERN

Advances in information and communications technologies (ICTs) has given rise to innovative use of web-based video tools for global communication, enhancing the impact of large research facilities and their Outreach and Education programmes. One such example involves videoconferences to schools and remote events around the globe, known as Virtual Visits, conducted by the ATLAS and CMS experiments at CERN. The goal of these programmes is to help the public and especially young people engage and understand how science works in the field of particle physics, through direct dialogue between ATLAS/CMS scientists and remote audiences. Both experiments enhanced the Virtual Visits concept in different ways but with the same objective, which is to break geographical barriers, allowing more people to enter the world of science, physics and particle physics, and to support local education and outreach activities. Both experiments have hosted virtual visits by thousands of people from all seven continents, with participants connecting from locations such as Kathmandu to Rio de Janeiro, Ghana to Riyadh, and also the South Pole. Audiences included mainly high-school students and their teachers but also policy makers and the general public. This talk gives an overview of the educational, technical and organizational aspects of both programmes, with their unique added value. We also present feedback collected from the participants, followed by recommendations for the future development envisaging creating sustainable tools.

34.6 | SA 25-07-15 10:20 | HS7

Inspiring students through masterclasses | K. Leney[1] – [1]University College London (UK)
Masterclasses are an excellent platform to inspire, motivate and educate students about High Energy Physics (HEP). They typically entail lectures on a chosen topic followed by a hands-on session where students get to experience being a researcher for the day. A number of HEP masterclasses have been developed, including the International Particle Physics Masterclasses, supported by IPPOG. These provide a programme structure for students to analyse real collision data collected by the four main LHC experiments (ATLAS, CMS, ALICE, and LHCb) and to interact with other students from all over the world via a video conference. This talk will show examples of the exercises students perform, including a measurement of the D∧0 lifetime using LHCb data. The practicalities of organising masterclass events will also be presented, together with a discussion of how to adjust the masterclass programs to suit your specific needs.

34.7 | SA 25-07-15 10:35 | HS7
Outreaching Particle Physics to Developing Countries | K. Shaw[1] – [1]INFN Gruppo Collegato di Udine and ICTP Trieste
There is a huge untapped potential of physicists that come from countries without a strong tradition in the field. Strong young students may lack exposure to physics and physics research, they may not be aware of opportunities for further study, and governments and institutions may not fully recognise the importance of investing into the fundamental sciences. Outreaching particle physics to developing countries can play a key role in promoting the growth and development of scientific culture, and our scientific community must support education and the development of research worldwide. The respective issues encountered by countries in the development of particle physics research are presented along with how international outreach aids their endeavour, and the various ways that we physicists can outreach to young students from developing countries including the ICTPs Physics Without Frontiers program.

34.8 | SA 25-07-15 10:50 | HS7
Adversity in life, sharing science | B. Blossier[1] – [1]CNRS
Building an inclusive society is an active field nowadays. Of course education is a key entry for people with disabilities to fulfill their citizenship. We propose to present a couple of initiatives recently taken in France in that direction, by letting the pupils with disabilities discover and share science: in particular the operation "La Main à la Päte" promoted by Académie des Sciences and an effort undertaken by the Ministry of Education and scientists from CNRS to improve the instruction of teachers of physics and chemistry to work with those pupils.

34.9 | SA 25-07-15 11:30 | HS7
LHC discoveries and particle physics concepts for education | F. Ould-Saada[1] – [1]University of Oslo (NO)
LHC data are successfully deployed in International Masterclasses where young students explore the Higgs discovery and other measurements. Promises of new discoveries in the 13 TeV era and opportunites offered by CERN open data have triggered new educational materials. After a few success stories, we describe new features and future plans. We identify four levels of high school engagement. The introductory level provides limited amounts of data in short activities to convey key concepts. These experiences lead to participation in day-long masterclasses. With more time and some scaffolding, students design their own investigations to access larger data sets in an e-Lab. Research projects based on large LHC datasets open possibilities for university (and advanced high school) students and result in strong support to theoretical and experimental lectures. Tools to analyze larger datasets allow more concepts to be brought closer to students. Invariant mass is successfully mastered to measure properties of known particles and discover new ones. Other achievements include understanding the concepts of 'event' and 'statistics'. Signals of graviton resonances in di-lepton, di-photon and di-Z boson mass distributions, and the exploitation of ETmass to study dilepton invariant mass endpoints of SUSY particles already exist. These educational materials follow LHC 'heartbeats' and can influence textbooks and teaching methods.

34.10 | SA 25-07-15 11:45 | HS7
Education and Outreach Activities in Astroparticle Physics offered by Netzwerk Teilchenwelt | H. Bretz[1] – [1]DESY
What are cosmic particles and where do they come from? These are questions which are not only fascinating for scientists. The German education and outreach organization 'Netzwerk Teilchenwelt' offers a large variety of projects and activities to bring the methods and newest results of high energy and astroparticle physics to high school students and teachers. Several experiments with a focus on the latter have been established which can be built and conducted in the classroom. Cloud chambers help students understand basic methods of detecting charged particles. Scintillation detectors as well as small water Cherenkov detectors based on coffee thermos and photomultipliers can be used to measure the flux of secondary particles from cosmic ray induced air showers. These setups enable the students to do their own measurements, e.g. the zenith angle distribution of the flux or the half life of muons. Additionally students can participate in masterclasses either at schools or organized as international masterclasses, where they can analyze real data from the Pierre Auger Observatory or the IceCube Neutrino Observatory. The talk gives an overview of the different projects and an outlook of activities planned for the near future.

34.11 | SA 25-07-15 12:00 | HS7
Virtual Research and Learning Communities in Latin America: the CEVALE2VE case | C. Rangel Smith[1] – [1]Uppsala

University (SE)
A virtual research and learning community can be a powerful tool for educational purposes. It has a wide range of possibilities for multi-institution participation; such as synchronous and asynchronous online engagement, decentralized student discussions and academic networking, as well as being cost effective. In this context, the CEVALE2VE virtual community (Centro de Altos Estudios de Altas Energías) is a Venezuelan initiative for the generation of new researchers in high-energy physics (HEP). Its goal is to contribute to the scientific dissemination of fundamental physics and the regional modernization of university education. The members of CEVALE2VE are a group of Venezuelan researchers, currently involved in projects related to the HEP field, and geographically located in different academic institutions of Europe and North America. The project involves several academic institutions of Venezuela and Colombia in order to reach a wide audience, and exploits current communications technologies, where data, software tools and information resources are shared. Several activities have been hosted by CEVALE2VE that include a series of public lectures, ATLAS virtual visits, the implementation of a virtual course “Introduction to Particle Physics” for undergraduate students and the supervision of masters thesis. The use of the current technologies to share material and interact with the students creates a vibrant and participatory learning environment.

34.12 | SA 25-07-15 12:10 | HS7
Cascade projects competition - a way to build on Masterclass success | I. Melo[1] – [1]University of Zilina (SK)
International Particle Physics Masterclasses are successful in motivating high school students. However, it is a one day event and some of the students are ready to go deeper into the realm of particle physics. In the Cascade competition (developed at University of Birmingham) teams of 3 - 6 high school students work for several weeks on projects on projects of their choice with the help of mentors - volunteers from the HEP community and their teachers. Then they make 20 minute presentations in their schools, record them and send videos to organizers. The best teams are selected by the jury and given appropriate prize. Experience from the UK and Slovakia shows that this is a very good format to engage students. They enjoy team work and public presentation. About 40% of participants are girls. The competition is easy to organize since presentations at schools do not require presence of the organizers. Winning projects have a solid scientific content and can be fun to watch. Team members are often interested in pursuing a physics career a the competition helps them to establish contacts with the HEP community.

34.13 | SA 25-07-15 12:20 | HS7
Involving students in HEP research with the help of the “Inspiring Science Education” and “Go-lab” European outreach projects | C. Kourkoumelis[1], S. Vourakis[1], G. Vasileiadis[2] – [1]National and Kapodistrian University of Athens (GR), [2]University of Athens (GR)
The Inspiring Science Education and Go-lab outreach projects (approved by the European Commission) have been running for about two years. Their goal is the promotion of science education in schools though new methods built on the inquiry based education techniques and involving large consortia of European partners who test them with large scale pilots in thousands of European schools. Both projects take advantage of the access to unique facilities -offered through the partners- that exist only in very few, or even one, place such as the LHC at CERN, the Icecube experiment at the South Pole or remotely operated telescopes, to make real time observations. The students can use those resources without having to travel to their respective locations, saving considerable time and expense. A large inventory of such lesson plans are available for the teachers to introduce their students to “The Big Science ideas”. The authors of this contribution have experimented for several years in finding ways to introduce HEP in schools. They have found that the most effective way is a combination of lectures, virtual tours to specific experiments and hands-on experience. This combination has taken the form of the so called “mini masterclass” which are a half-day workshop taking place locally at the interested schools Recent hands-on activities, developing and testing the above mentioned innovative applications will be reviewed.

34.14 | SA 25-07-15 12:30 | HS7
Education and outreach through building blocks | C. Adam Bourdarios[1], S. Mehlhase[2] – [1]Laboratoire de l’Accelerateur Lineaire (FR), [2]Ludwig-Maximilians-Univ. Muenchen (DE)
To support the outreach activities of Atlas institutes and to grab people’s attention in science exhibitions and during public events, we have created both a very detailed model of the experiment built entirely out of Lego bricks as well as an outreach programme using Lego bricks to get people to think about particle detectors and involve them in a conversation about particle physics in general. A large Lego model, consisting of about 9500 pieces, has been ’exported’ to more than 55 Atlas institutes and has been used in numerous exhibitions to explain the proportion and composition of the experiment to the public. As part of ’Build Your Own Particle Detector’ programme (byopd.org) we conducted more than 15 events, either involving a competition to design and build the ’best’ particle detector from a random pile of pieces or to take part in the construction of one of the large models, as part of a full day outreach event. Recently we’ve added miniature models of all four LHC experiments, that will be used at various outreach events in the future.

34.15 | SA 25-07-15 12:40 | HS7
IPPOG: Experts in bringing new discoveries to the public | M. Kobel[1] – [1]Technische Universitaet Dresden (DE)
IPPOG (the International Particle Physics Outreach Group) is a network of particle physicists and communicators with contacts

all across Europe and beyond. In the last 10 years members of IPPOG have developed a wealth of tools which enable the public and especially young high school students from an age of 16 years onwards to perform own data analysis on real scientific data from the LHC. In addition IPPOG is also instrumental in fostering other innovative methods for providing the public with access to cutting edge research of particle physics as well as astroparticle physics. Several programs for high school students and teachers are organized by members of IPPOG, aiming at sharing the excitement of particle and astroparticle physics research. IPPOG together with related networks like the teacher program QuarkNet in U.S., and the Netzwerk Teilchenwelt in Germany have successfully solved three related challenges: 1) What is needed to prepare research data in a way that young people grasp the aims and methods of research? 2) What is needed to follow in (nearly) real time the progress of scientific research? 3) How can one-day efforts like international masterclasses or international cosmic days be complemented by sustainable context material, like the IPPOG resources database, the Quarknet e-lab, or the school-tailored material resort of Netzwerk Teilchenwelt?

34.16 | SA 25-07-15 12:50 | HS7

Connecting Science and Society through Creative Education and Outreach | A. Alexopoulos[1] – [1]CERN

Although significant investments have been made over the last two decades to introduce innovative approaches to science education, recent studies demonstrate that approaches based solely on inquiry and problem solving methods have a relatively low degree of adoption in school settings. In response to this, recent years have seen the emergence of a movement that seeks to encourage the public and especially young people to discover new ways to look at and understand how science works with the support of creative and artistic interventions. The so-called STEAM movement, as reflected in various national and international initiatives in both sides of the Atlantic, calls for arts integration into science teaching and learning as a catalyst for developing creative skills that are necessary to thrive in an innovation economy. One example of such initiatives is art@CMS, an education and outreach programme of the CMS Experiment at CERN. Situated within the STEAM movement, art@CMS is a dynamic international network of collaborations involving scientists, artists, students and educators, aimed at engaging the public and especially young people with scientific research in particle physics. Through interdisciplinary workshops and art exhibitions, this programme has so far helped 100,000 people, including hundreds of school students, in 12 countries to gain a better understanding of how science works and how the public can engage with it.

35 – Detector R&D and Data Handling

SA 25-07-15 09:00-11:00
HS42

35.1 | SA 25-07-15 09:00 | HS42

Offline performance of the CMS Tracker during early Run II | B. Francois[1], A. Meyer[2] – [1]Universite Catholique de Louvain (UCL) (BE), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

We will discuss the early Run II performance of the CMS Pixel and Strip Tracker, with the detector operating cold for the first time. The startup conditions at 13 TeV for both subdetectors will be summarised, including specifics for 50ns and 25ns operations and improvements in calibrations which were developed during 2013 and 2014. The impact of the Tracker alignment based on cosmic and collision data-taking will also be discussed together with the detector performance at high pileup.

35.2 | SA 25-07-15 09:15 | HS42

The ATLAS Distributed Computing project for LHC Run-2 and beyond. | A. Di Girolamo[1], ATLAS Collaboration[2], Y. Yamazaki[3] – [1]CERN, [2]ATLAS, [3]Kobe University (JP)

The ATLAS Distributed Computing infrastructure has evolved after the first period of LHC data taking in order to cope with the challenges of the upcoming LHC Run2. An increased data rate and computing demands of the Monte-Carlo simulation, as well as new approaches to ATLAS analysis, dictated a more dynamic workload management system (ProdSys2) and data management system (Rucio), overcoming the boundaries imposed by the design of the old computing model. In particular, the commissioning of new central computing system components was the core part of the migration toward the flexible computing model. The flexible computing utilization exploring the opportunistic resources such as HPC, cloud, and volunteer computing is embedded in the new computing model, the data access mechanisms have been enhanced with the remote access, and the network topology and performance is deeply integrated into the core of the system. Moreover a new data management strategy, based on defined lifetime for each dataset, has been defined to better manage the lifecycle of the data. In this note, the overview of the operational experience of the new system and its evolution is presented

35.3 | SA 25-07-15 09:30 | HS42

The LHCb Higher Level Trigger in Run II | S. Stahl[1] – [1]CERN

The current LHCb trigger system consists of a hardware level, which reduces the event rate of 30 MHz of inelastic collisions to 1 MHz, at which the detector is read out. In the subsequent High Level Trigger, based on a farm of 20k parallel-processing CPUs, the event rate is reduced to what can be processed offline, about 5 kHz in Run I. In preparation for Run II, LHCb has implemented a mechanism which uses disk space in the HLT farm to buffer events while performing run-by-run detector calibrations, and which allows the HLT to exploit the time between LHC fills for processing events. We show how these changes

will allow the Run II HLT to implement almost the full offline reconstruction, and the way that this approach will expand LHCb's Charm and Kaon physics programmes in particular. We also discuss the relevance of multivariate selections in the context of such an offline-like HLT. Finally, we discuss how this offline-like HLT will allow LHCb's output rate to be increased to 12.5 kHz in Run II, in particular by dedicating part of the bandwidth to exclusive triggers which perform the full offline selection and analysis real-time and write to disk only the few informations needed for the extraction of the physical observables. We also discuss the impact of this real-time analysis scheme on the physics programme of the LHCb upgrade, relying entirely on the HLT that will perform an offline-like reconstruction on the full 40MHz LHC bunch crossing rate in real-time.

35.4 | SA 25-07-15 09:45 | HS42

LHCb upgrade: plans and potential | F. Muheim[1] – [1]University of Edinburgh (GB)

During the LHC Run 1 the LHCb experiment has successfully performed a large number of world-class precision measurements in heavy flavour physics by having collected over 3 fb-1 at centre-of-mass energies of 7 TeV and 8TeV. However, even after an additional expected integrated luminosity of 5 fb-1 in Run 2, many of the LHCb measurements will remain limited by statistics. The current 1 MHz readout system is the main bottle neck to run LHCb at higher luminosity and with higher trigger efficiencies. LHCb will therefore undergo a major upgrade in the Long Shutdown 2 of LHC (2019) aimed at collecting an order of magnitude more data by 2028. The upgrade consists of a new full readout at the LHC bunch crossing rate (40 MHz) with the ultimate flexibility of only a software trigger. In order to increase the instantaneous luminosity five times, up to 2x10∧33 cm-2s-1, several sub-detector upgrades are also underway, such to cope with the expected higher occupancies and radiation dose. The architecture of the upgraded DAQ system will be presented, together with the 40MHz High-Level software trigger and the expected physics performance. An overview of the planned sub-detector upgrades will be given as well

35.5 | SA 25-07-15 10:00 | HS42

The data acquisition and trigger system of the Belle II experiment | C. Li, C. Schwanda[1] – [1]Austrian Academy of Sciences

Both the trigger and the data acquisition systems of the Belle II experiment at the SuperKEKB collider in Tsukuba, Japan, are completely redesigned to cope with the considerably higher event and background rates compared to the previous Belle experiment. Belle II hardware (Level-1) trigger consists of several sub-triggers and a final decision logic, which issues the trigger with a fixed latency of about 5 μs after bunch crossing. The data acquisition (DAQ) system reads the detector signals upon the Level-1 trigger decision and transfers the data from the front-end electronics through several steps of data processing to the storage system. In this presentation, we review the design of these two systems and describe the current state of their construction.

35.6 | SA 25-07-15 10:15 | HS42

HistFitter: a flexible framework for statistical data analysis | J. Lorenz[1], M. Baak[2], G. Besjes[3], D. Cote[4], A. Koutsman[5] – [1]Ludwig-Maximilians-Univ. Muenchen (DE), [2]CERN, [3]Niels Bohr Institute, Univ. of Copenhagen, [4]University of Texas at Arlington (US), [5]TRIUMF (CA)

We present a software framework for statistical data analysis, called *HistFitter*, that has been used extensively by the ATLAS Collaboration to analyze big datasets originating from proton-proton collisions at the Large Hadron Collider at CERN. Since 2012 HistFitter has been the standard statistical tool in searches for supersymmetric particles performed by ATLAS. HistFitter is a programmable and flexible framework to build, book-keep, fit, interpret and present results of data models of nearly arbitrary complexity. Starting from an object-oriented configuration, defined by users, the framework builds probability density functions that are automatically fit to data and interpreted with statistical tests. Internally HistFitter uses the statistics packages RooStats and HistFactory. A key innovation of HistFitter is its design, which is rooted in analysis strategies of particle physics. The concepts of control, signal and validation regions are woven into its fabric. These are progressively treated with statistically rigorous built-in methods. Being capable of working with multiple models at once that describe the data, HistFitter introduces an additional level of abstraction that allows for easy bookkeeping, manipulation and testing of large collections of signal hypotheses. Finally, HistFitter provides a collection of tools to present results with publication quality style through a simple command-line interface.

35.7 | SA 25-07-15 10:30 | HS42

Track Fitting in Belle II: the GENFIT Library and its Performance | T. SchlÜter[1] – [1]LMU München

We discuss track fitting as implemented in the Belle II experiment currently under construction at KEK in Tsukuba, Japan. Track fitting sits at the interface of physics analysis and detector data, is essential to the tasks of detector calibration and alignment, and it also is an integral part of Belle II's high-level trigger. To address the variety of tasks, the track-fitting software, initially based on the GENFIT library, underwent significant redesign. The revised version aims at being experiment-independent and is now the default track-fitting software in the Belle II and PANDA experiments. It implements a variety of track-fitting algorithms, provides a data storage model which allows storage at differnet levels of detail and provides high-level operations on tracks such as combinations of tracks from different subdetectors, it provides visualization, and supports all commonly employed types of tracking detectors. It provides a Runge-Kutta type track extrapolation code with handling of energy loss and multiple scattering. It interfaces to the commonly used Millipede II software for detector calibration and alignment, and to the experiment-independent vertexing library RAVE. Our contribution will discuss design choices and the performance of the soft-

ware in its different roles at the Belle II experiment.

35.8 | SA 25-07-15 10:45 | HS42

Prototyping a coherent framework for full, fast and parameteric detector simulation for the FCC project | J. Hrdinka[1], B. Hegner[2], A. Salzburger[2], A. Zaborowska[3] – [1]Vienna University of Technology (AT), [2]CERN, [3]Warsaw University of Technology (PL)

The outstanding success of the physics program of the LHC including the discovery of the Higgs boson shifted the focus of part of the high energy physics community onto the planning phase for future collider projects. Hadron based and electron-positron based collider technologies are considered as potential LHC successors. Common to both branches is the need for a coherent software framework in order to carry out simulation studies to establish the potential physics reach or to test different technology approaches. Detector simulation is a particularly necessary tool needed both for design studies of different detector concepts and to establish the relevant performance parameters. In addition, it allows to provide input for the development of reconstruction algorithms needed to cope with the expected future environments. We present a coherent framework that combines full, fast and parameteric detector simulation embedded in the Gaudi framework and based on the FCC event data model. The detector description is based on DD4Hep and the different simulation approaches are centrally steered through the Geant4 simulation. A prototype example of a simple tracking detector will be demonstrated for the different simulation approaches and a potential workflow to use full simulation based on Geant4 and fast simulation techniques alongside will be presented.

36 – Accelerators

SA 25-07-15 09:00-13:00
HS33

36.1 | SA 25-07-15 09:00 | HS33

Crystal Ball : On the Future High Energy Colliders | V. Shiltsev[1] – [1]Fermilab

Particle colliders for high-energy physics have been in the forefront of scientific discoveries for more than half a century. The accelerator technology of the colliders has progressed immensely, while the beam energy, luminosity, facility size, and cost have grown by several orders of magnitude. The method of colliding beams has not fully exhausted its potential but has slowed down considerably in its progress. I will briefly review known costs for 17 large accelerators based on traditional technologies (RF, magnets, etc),and examine feasibility of near- or medium-term collider projects that are currently subjects of design work or under active discussions. I will conclude with an attempt to look beyond the current horizon and to find what paradigm changes are necessary for breakthroughs in the field, and describe some R&D programs at FNAL which prepare for the long-term future, e.g. studies with crystals and the IOTA ring research.

36.2 | SA 25-07-15 09:30 | HS33

Latest results on critical-path R&D towards the Compact Linear Collider (CLIC) and related high-gradient linac applications | P. Burrows[1], P. Burrows[2] – [1]Oxford University, [2]University of Oxford (GB)

The Compact Linear Collider (CLIC) project explores the possibility of constructing a future multi-TeV linear electron-positron collider for high energy frontier physics post LHC. The CLIC-concept is based on high gradient normal-conducting accelerating structures. The RF power for the acceleration of the colliding beams is produced by a two beam acceleration scheme, where power is extracted from a high current drive beam that runs parallel with the main linac. A status report will be given on the most recent R&D progress towards achieving the CLIC design goals. This will include: high-gradient RF system design, tests and results, with application to future FEL facilities; drive-beam phase feed-forward system prototype results; beam dynamics studies at ATF2 and FACET and novel nano-beam emittance preservation techniques. The design parameters for an energy-staged implementation of CLIC will be presented.

36.3 | SA 25-07-15 10:00 | HS33

Awake, Advanced Proton-Driven Plasma Wakefield Experiment at CERN | E. Gschwendtner[1] – [1]CERN

The Advanced Proton Driven Plasma Wakefield Acceleration Experiment (AWAKE) aims at studying plasma wakefield generation and electron acceleration driven by proton bunches. It is a proof-of-principle R&D experiment at CERN and the world's first proton driven plasma wakefield acceleration experiment. The AWAKE experiment will be installed in the former CNGS facility and uses the 400 GeV proton beam bunches from the SPS. The first experiments will focus on the self-modulation instability of the long proton bunch (rms $\approx$12cm) in the plasma. This instability is used to transform the incoming bunch into a train of short bunches with a period approximately equal to the plasma wavelength, $\approx$1.2mm at a nominal plasma electron density of 7e14/cc. These experiments are planned for the end of 2016. Later, in 2018, low energy ($\approx$15 MeV) electrons will be externally injected to sample the wakefields and be accelerated beyond 1GeV. The main goals of the experiment will be summarized, an overview of the beam lines, the experimental area, the plasma cell and the diagnostics will be given and the status of the facility will be shown.

36.4 | SA 25-07-15 10:30 | HS33

The LBNF Beamline | V. Paolone[1] – [1]University of Pittsburgh

The LBNF beamline complex is designed to provide a neutrino beam of sufficient intensity and energy to meet the goals of the DUNE experiment with respect to long-baseline neutrino oscillation physics. Presented in this talk will be the issues related to the baseline design from the physics, beam power (>1 MW), lifetime, and radiological requirements. Potential future upgrades to the beamline to improve the neutrino flux spectrum and for higher beam power (>2 MW) will also be presented

36.5 | SA 25-07-15 11:30 | HS33

Strategy for Superconducting Magnet Development for a Future Hadron-Hadron Circular Collider at CERN | D. Schoerling[1], H. Bajas[1], M. Bajko[1], A. Ballarino[1], M. Benedikt[1], S. Izquierdo Bermudez[1], B. Bordini[1], L. Bottura[1], M. Buzio[1], G. De Rijk[1], M. Karppinen[1], F. Lackner[1], A. Milanese[1], J. Van Nugteren[2], V. Parma[1], J. Perez[1], S. Russenschuck[1], F. Savary[1], E. Todesco[1], D. Tommasini[1] – [1]CERN, [2]Twente Technical University (NL)

Following the recommendation of the European Strategy Group for Particle Physics, a study on options for a Future Circular Collider (FCC) with center-of-mass energy of 100 TeV, a luminosity of 5–10 × 10∧34 cm2s-1 and a circumference in the range of 100 km was started. The study integrates, under the auspices of the European Committee for Future Accelerators (ECFA), ongoing accelerator and technology initiatives at CERN and in Member States. A key technology for the FCC are high-field superconducting accelerator magnets. The FCC arc magnets need an aperture of 50 mm, with dipole fields with a target of 16 T and quadrupole gradients with a target in excess of 400 T/m. Based on these preliminary parameters, we discuss in this paper design options and challenges for the main magnetic elements of such a collider, and outline a strategy for the development of the required technology.

36.6 | SA 25-07-15 11:50 | HS33

The RF system for FCC-ee | A. Butterworth[1] – [1]CERN

The FCC-ee is a high-luminosity, high-precision e+e- circular collider, envisioned in a new 80-100 km tunnel in the Geneva area. It is envisaged to operate the collider with centre of mass energies ranging from 90 GeV for Z production to 350 GeV at the t-tbar threshold. With a constant power budget for synchrotron radiation, the FCC-ee RF system must meet the requirements for both the highest possible accelerating voltage and very high beam currents with the same machine, albeit possibly at different stages. Beam-induced higher order mode power will be a major issue for running at the Z pole, and will have a strong impact on the RF system design. Iterations are ongoing on RF scenarios and staging, choice of cavities and cryomodule layout, RF frequency and cryogenic temperature.

36.7 | SA 25-07-15 12:10 | HS33

The ILC Positron Source | G. Moortgat-Pick[1], S. Riemann[2], A. Ushakov[3], O. Adeyemi[4], K. Floettmann[5] – [1]University of Hamburg / DESY, [2]Deutsches Elektronen-Synchrotron (DE), [3]University of hamburg, [4]University of Hamburg, [5]DESY

High luminosity is required at future Linear Colliders which is particularly challenging for all corresponding positron sources. At the ILC, polarized positrons are obtained from electron-positron pairs by converting high-energy photons produced by passing the high-energy main electron beam through a helical undulator. The conversion target undergoes cyclic stress with high peak values. To distribute the high thermal load, the target is rotated with 100 m/s. However, the cyclic stress over long time as well as the temperature dependent material parameters yield thermo- mechanical load which could exceed the recommended fatigue limit. In the talk, a general overview about the ILC positron source components is given as well as new results on the target stress evolution. The target design parameters are reviewed as well.

36.8 | SA 25-07-15 12:30 | HS33

Accelerator physics challenges in Electric Dipole Moment measurements | M. Bai[1] – [1]FZJ

A convincing measurement of CP-violation that is significantly larger than Standard Model prediction will shine a strong light on the mystery of the asymmetry between matter and antimatter. Even though there have been breakthroughs of verifying CP-violation using accelerators, these measurements are still not at the level to explain the deficiency of anti-matter in our universe. Since the intrinsic electric dipole moment (EDM) requires simultaneous parity and time reversal violation, the search of the EDM of nucleon, atom and etc. provides another approach to probe CP-violation. Hence, such a precise direct measurement of charged particle's EDM has been encouraged as a strategic research field. The quest to use storage rings to directly measure of EDM of charged particles with unprecedented precision pushes a number of current accelerator science and technologies beyond their state-of-the art to allow directly access to the EDM signal as well as keep all the systematics under full control. This includes a set of topics on the full understanding of various sources of systematics due the imperfection of the machine as well as intrinsic beam dynamics, development of high field electrostatic deflector as well as hybrid electric and magnetic bender, and precise control of beam properties, orbits and optics, as well as spin dynamics. This presentation will report the status of current storage ring based EDM search R&D at Juelich as well as worldwide.

Posters

44 – Poster

Aula & Arcades

44.1 | Poster | Aula & Arcades

LHC signatures and cosmological implications of the E6 inspired SUSY models | R. Nevzorov[1] – [1]University of Adelaide & ITEP

The breakdown of E_6 gauge symmetry at high energies may lead to supersymmetric (SUSY) models based on the Standard Model (SM) gauge group together with extra $U(1)_N$ gauge symmetry under which right–handed neutrinos have zero charge. To ensure anomaly cancellation and gauge coupling unification the low energy matter content of these models involve three 27 representations of E_6 and a pair of $SU(2)$ doublets from additional 27 and $\overline{27}$. In these models there are two states which are absolutely stable and can contribute to the dark matter density. One of them is the lightest SUSY particle (LSP) which is expected to be lighter than 1 eV forming hot dark matter in the Universe. The presence of another stable neutral state allows to account for the observed cold dark matter density. The next–to–lightest SUSY particle (NLSP) in these models also tends to be light and can result in the substantial branching ratio of the nonstadard decays of the lightest Higgs boson. We present $6D$ orbifold GUT construction that lead to the E_6 inspired SUSY models of this type, explore the two–loop renormalisation group (RG) flow of couplings, examine the two–loop upper bound on the lightest Higgs boson mass as well as discuss the implications of the Z' and exotic states for the LHC phenomenology and cosmology in these models.

44.2 | Poster | Aula & Arcades

A new type of the inflaton effective potential | J. Balitsky[1], V. Kiselev[2] – [1]Moscow Institute of Physics an Technology(State University), [2]IHEP (SRC Kurchatov Institute) and MIPT, Russia

In our previous work [1] it was shown that the effective potential of the inflaton is generated by gravitational loops. Such mechanism is applicable to the inflation of early Universe. Three possible scenarios of the inflation dynamics are described and fitted to the latest Planck data. [1] "Inflaton as a pseudo-Goldstone boson of vacuum energy shift symmetry", JCAP, 1475 no. 04, 032 (2015) [ArXiv:1410.2528]

44.3 | Poster | Aula & Arcades

Measurement of the cosmic ray (e^++e^-) flux with AMS | V. Vagelli[1] – [1]INFN Perugia (IT)

We present the measurement of the cosmic ray (e^++e^-) flux in the energy range 0.5 GeV to 1 TeV based on the analysis of 10.6 million $e^\pm$ events collected by AMS during the first 30 months of data taking. The statistics and the resolution of the AMS detector provide an accurate measurement in the whole energy range. No features have been observed in the flux, and the (e^++e^-) spectrum can be accurately described by a single power law with spectral index $\gamma = -3.170 \pm 0.008$(stat+syst) $\pm$ 0.008(energy scale) above 30.2 GeV. The new and unique information revealed by the (e^++e^-) flux measurement sets additional significant constraints in the search for the origin of cosmic ray $e^\pm$.

44.4 | Poster | Aula & Arcades

Vacuum Persistence in Fierz-Pauli Theory on a Curved Background | S. Hwang[1], D. Schimmel[2] – [1]Technical University of Munich, [2]Ludwig Maximilian University of Munich

No abstract available

44.5 | Poster | Aula & Arcades

Problematic aspects of extra dimensions | M. Eingorn[1] – [1]urn:Facebook

The following recent results concerning multidimensional Kaluza-Klein (KK) models with different types of compactification of extra spatial dimensions (ESDs) are discussed in detail. First, in the case of toroidal compactification, dust-like gravitational field sources are incompatible with relativistic tests in the Solar system. Such non-dust-like sources as latent solitons (particularly, black strings and black branes), characterized by tension in the internal space, satisfy these tests, but they must be uniformly smeared over the ESDs, that contradicts quantum mechanics and statistical physics predicting KK modes. Second, in the case of spherical compactification, dust-like sources satisfy the relativistic tests, however, because of the background matter perturbation they acquire the effective relativistic pressure in the external space, which is incompatible with thermodynamics. Again, tension in the ESDs can save the situation, but then the sources must be uniformly smeared. The necessity of smearing also holds true for Ricci-flat (in particular, Calabi-Yau) internal spaces. More general Einstein compactification does not obviate this grave difficulty.

44.6 | Poster | Aula & Arcades

Complementary Test of the Dark Matter Self-Interaction by Direct and Indirect Detections | C. Chen[1], G. Lin[2], Y. Lin[2] – [1]National Center for Theoretical Sciences, Taiwan, [2]Institute of Physics, National Chiao Tung University, Hsinchu 30010, Taiwan

The halo dark matter (DM) can be gravitationally captured by the Sun. For self-interacting DM (SIDM), we show that the number of DM trapped inside the Sun remains unsuppressed even if the DM-nucleon cross section is negligible. We consider a

SIDM model where $U(1)$ gauge symmetry is introduced to account for the DM self-interaction. Such a model naturally leads to isospin violation for DM-nucleon interaction, although isospin symmetry is still allowed as a special case.We show that the indirect detection of DM-induced neutrinos from the Sun can probe those SIDM parameter ranges not reachable by direct detections. Those parameter ranges are either the region with a very small m_χ or the region opened up due to isospin violations.

44.7 | Poster | Aula & Arcades

Confirmation of the $f_0(500)$ existence by pion scalar form factor and also the correct values of $f_0(500)$ mass and width from it | S. Dubnicka[1], A. Dubnickova[2], R. Kaminski[3], A. Liptaj[4] – [1]Inst.of Physics SAS, Bratislava, Slovakia, [2]Dpt.of Theor.Phys. FMPHI, Comenius University, Bratislava, Slovakia, [3]Henryk Nievodniczanski Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland, [4]Inst.of Phys., SAS, Bratislava, Slovakia

The pion scalar form factor phase representation derived from the first principles together with unprecise experimental information on the S-wave isoscalar $\pi\pi$ scattering phase shift in elastic region is sufficient for a confirmation of $f_0(500)$ meson existence in a model independent way. However, for determination of correct mass and width of $f_0(500)$ in the framework of such fully solvable mathematical scheme the data with theoretical errors to be generated by the Garcia-Martín-Kaminski-Pela'es-Yndurain Roy-like equations should be employed.

44.8 | Poster | Aula & Arcades

Accurate decay-constant ratios f_{B^*}/f_B and $f_{B_s^*}/f_{B_s}$ from QCD sum rules | D. Melikhov[1], W. Lucha[2], S. Simula[3] – [1]HEPHY & SINP, Moscow State University, [2]HEPHY, [3]INFN

We present our analysis of the decay constants of the beauty vector mesons within QCD sum rules for the two-point correlators of vector currents. While the decay constants of the vector mesons, similar to the decay constants of the pseudoscalar mesons, individually have large uncertainties induced by theory parameters not known with a satisfactory precision, these uncertainties almost entirely cancel out in the ratios of vector over pseudoscalar decay constants. These ratios may be thus predicted with very high accuracy due to the good control over the systematic uncertainties of the decay constants gained upon application of our hadron-parameter extraction algorithm. Our results are $f_{B^*}/f_B = 0.944 \pm 0.011_{\rm OPE} \pm 0.018_{\rm syst}$ and $f_{B_s^*}/f_{B_s} = 0.947 \pm 0.023_{\rm OPE} \pm 0.020_{\rm syst}$. Thus, both f_{B^*}/f_B and $f_{B_s^*}/f_{B_s}$ are less than unity at 2.5σ and 2σ level, respectively.

44.9 | Poster | Aula & Arcades

Observation and measurements of the production of prompt and non-prompt J/ψ mesons in association with a Z boson in pp collisions at $\sqrt{s}$ = 8 TeV with the ATLAS detector. | J. Katzy[1] – [1]DESY, HAMBURG

The associated production of vector boson with heavy quarkonia is a key observable for understanding the quarkonium production mechanisms. In this poster we present the first evidence of the production of the Z boson in association with a prompt and non-prompt J/ψ meson and measure its production rate in comparison of the inclusive Z production. Relative contributions to the signal from single and double parton scattering are estimated. We compare single parton scattering cross-sections to cutting-edge theoretical calculations in the colour singlet and colour octet formalisms. Finally, we extract a lower limit in the double parton scattering effective cross section.

44.10 | Poster | Aula & Arcades

Measurement of the weak mixing phase phi_s through time-dependent CP violation in Bs0—>J/psi phi decay in ATLAS | J. Katzy[1] – [1]DESY, HAMBURG

In this work, we present a measurement of the Bs0—>J/psi phi time–dependent CP asymmetry parameters using the combined Run-1 dataset. Bs0—>J/psi phi decay channel is sensitive to the new physics contributions, and already small deviations in a measurement of phi_s would be hints for the existence of the new particles. A four-dimensional unbinned maximum likelihood fit, which also includes information of the Bs0 production flavour, is used to extract the parameters from the corresponding measured decay time and angular distributions of the Bs0 –> J/ψ(μ+μ-)ϕ(K+K-) decay. Apart from CP-violating mixing phase phi_s, several parameters describing the Bs0 meson system are measured. These include the Bs0 lifetime 1/Γs, the decay width difference $\Delta\Gamma$s between the heavy and the light mass eigenstates, and the transversity amplitudes |A0(0)| and |A||(0)|. The results are compatible with Standard Model predictions. Within the given uncertainties, the ATLAS results are consistent with the measurements from other LHC experiments. The significance of the deviation from the Standard Model prediction will be clarified once more data has been accumulated following the LHC upgrade and the statistical precision of the measurements improved.

44.12 | Poster | Aula & Arcades

Tasting the SU(5) nature of Supersymmetry at the LHC | B. Herrmann[1], S. Fichet[2], Y. Stoll[1] – [1]LAPTh Annecy-le-Vieux, France, [2]IITP Natal, Brazil

We elaborate on a recently found SU(5) relation confined to the up-(s)quark flavour space, that remains immune to large quantum corrections up to the TeV scale. We investigate the possibilities opened by this new window on the GUT scale in order to find TeV-scale SU(5) tests realizable at the LHC. These SU(5) tests appear as relations among observables involving either flavour violation or chirality flip in the up-(s)quark sector. We present a variety of tests, which appear as relations among observables involving flavour violation or chirality flips and rely on the techniques of top polarimetry, charm-tagging, or Higgs detection from cascade decays. We consider the cases of heavy Supersymmetry, natural Supersymmetry, and top-charm Supersymmetry.

We find that O(10) to O(100) events are needed to obtain 50% of relative precision at 3-sigma significance for all of these tests.

44.13 | Poster | Aula & Arcades

Search for a violation of the Pauli Exclusion Principle with electrons | A. Pichler, J. Marton[1], C. Curceanu[2], H. Shi[3] – [1]Oesterreichische Akademie der Wissenschaften, [2]LNF-INFN, [3]LNF INFN

A. Pichler for the VIP2 collaboration The Pauli Exclusion Principle (PEP) is the foundation for our understanding of many fields of physics where systems of fermions are concerned. Since no simple explanation for the principle exists, it remains to be a postulate open to experimental tests, which are difficult as there is no well-established theory to predict a violation in a quantitative way. However, there have been high precision experiments searching for a possible PEP violation in the framework of Quantum Mechanics. In a pioneering experiment, Ramberg and Snow supplied electric current to a Cu target, and searched for PEP violating atomic transitions of the “fresh" electrons from the current. The non-existence of the anomalous X-rays from such transitions then set the upper limit for a PEP violation. Following this method, the VIP (VIolation of Pauli Exclusion Principle) experiment improved the sensitivity due to high resolution X-ray detectors and background suppression at LNGS in Gran Sasso. It obtained an upper limit at the level of 10∧(-29) for the probability that an external electron captured by a Cu atom can de-excite to the 1s state already occupied by two electrons. The experiment and the results will be presented. The preparation of the follow-up experiment VIP-2 planned at Gran Sasso, aiming to increase the sensitivity by two orders of magnitude, will also be shown.

44.14 | Poster | Aula & Arcades

Electron-antineutrino angular correlation coefficient a measurement in neutron beta-decay with the spectrometer aSPECT | R. Maisonobe[1], S. Baessler[2], M. Beck[3], F. GlÜck[4], P. Guimera-Milan[1], W. Heil[5], M. Klopf[6], G. Konrad[6], C. Schmidt[5], M. Simson[1], T. Soldner[1], R. Virot[1], A. Wunderle[5], O. Zimmer[1] – [1]Institut Laue-Langevin, [2]University of Virginia, [3]WWU Muenster, [4]K, [5]Johannes Gutenberg-Universität, [6]TU Wien

Free neutron decays into a proton, an electron and an antineutrino. This is a weak interaction process described by the V-A theory within the Standard Model. The beta decay of the neutron is parametrized by several measurable correlation coefficients which are related to parameters of the Standard Model and are used to search for new physics. The spectrometer aSPECT was designed to measure the electron-antineutrino angular correlation coefficient a with a new accuracy of 0.3% (previous measurements reached an accuracy of 5%). The value of this coefficient is inferred from the shape of the proton recoil spectrum. The principle is to measure with high precision the integral proton spectrum using magnetic adiabatic collimation and electrostatic retardation. Data acquisition for a 1% measurement was performed during a beam-time in 2013 at the Institut Laue-Langevin in Grenoble. The analysis is ongoing to study different systematic effects and the accuracy in the extraction of the coefficient a. Dedicated measurements or simulations were conducted to determine background, edge effect, magnetic and electric fields, etc. The experiment and preliminary results are presented in this poster.

44.15 | Poster | Aula & Arcades

Hint of Lepton Flavor Violation at the LHC | S. Biswas[1], B. Allanach[2], S. Mondal[3], M. Mitra[4], D. Chowdhury[5], S. Han[6], S. Lee[7] – [1]Korea Institute for Advance Study, [2]University of Cambridge, [3]Harish-Chandra Research Institute, India, [4]IPPP, Durham University, [5]INFN, Roma, [6]Korea Advanced Institute of Science and Technology, Daejeon, [7]KAIST

The recent results from the LHCb in the context of ($B^+ \to K^+ll$) decay, the CMS analysis in the context of right handed W-boson (W_R) search and CMS searches for the di-leptoquark production show significant deviations from the Standard Model expectations. In this work, we address these seemingly uncorrelated results in the context of $\mathcal{R}$-parity violating supersymmetry. We found that a particular combination of LQD^c-type operators which successfully explain the LHCb result, can also accommodate the CMS excesses.

44.16 | Poster | Aula & Arcades

Search for diboson resonances with jets in 20 fb-1 of pp collisions at sqrt(s) = 8 TeV with the ATLAS detector | A. Picazio[1] – [1]Universite de Geneve (CH)

A search for narrow diboson resonances in a dijet final state is performed in 20.3 fb-1 of proton- proton collisions at a center-of-mass energy of sqrt(s) = 8 TeV, collected in 2012 by the ATLAS detector at the Large Hadron Collider. The jet mass and jet substructure properties have been used to tag each jet as a boson. Using the invariant mass distribution of the boson tagged dijet system, 95% CL exclusion limits are set on the production cross section times branching ratio to WW, WZ, or ZZ final states of W' Extended Gauge Model (EGM) bosons and Kaluza-Klein excitations of the graviton in the bulk Randall-Sundrum model, as a function of the resonance mass. The observed mass distributions exhibit an excess of events above 1.8 TeV.

44.17 | Poster | Aula & Arcades

Correlating Bq0 –> μ+μ- and KL –> π0$\nu\nu$ Decays with Four Generations | F. Xu[1], M. Kohda[2], G. Hou[3] – [1]Institute of Physics, Academia Sinica, Taiwan, [2]Chung-Yuan Christian University, [3]National Taiwan University (TW)

The Bs –> μ+μ- mode has finally been observed, albeit at rate 1.2σ below Standard Model (SM) value, while the rarer Bd0 –> μ+μ- decay has central value close to 4 times SM expectation but with only 2.2σ significance. The measurement of CP violating phase ϕs has finally reached SM sensitivity. Concurrent with improved measurements at LHC Run 2, KL –> π0$\nu\nu$ and

K+ –> π+$\nu\nu$ decays are being pursued in a similar time frame. We find, whether Bd0 –> μ+μ- is enhanced or not, KL –> π0$\nu\nu$ can be enhanced up to the Grossman-Nir bound in the fourth generation model, correlated with some suppression of Bs –> μ+μ-, and with ϕs remaining small.

44.18 | Poster | Aula & Arcades

Strong decay of scalar B meson | B. Blossier[1] – [1]CNRS

Using Heavy Meson Chiral Perturbation Theory is very popular to extrapolate to the chiral limit phenomenologically relevant quantities of heavy flavour physics that are computed on the lattice at unphysically large pion masses. We show that the effect of the first orbital excitation may be not negligible in chiral loops because the corresponding pionic coupling is large. We have extracted that coupling by measuring single meson to multihadrons correlation function at lattice points where the scalar B meson lies near the B pi threshold. That computation is required to obtain in the chiral limit the scalar B meson decay constant in static limit of Heavy Quark Effective Theory.

44.19 | Poster | Aula & Arcades

Anomaly-free chiral fermion sets and gauge coupling unification | C. Simoes[1], L. Cebola[2], D. Emmanuel-Costa[3], R. GonzÁlez Felipe[4] – [1]IFPA, University of Liège, [2]Departamento de Física and Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico, Universidade de Lisboa, [3]D. Emmanuel-Costa1,†, R. González FelipeDepartamento de Física and Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico, Universidade de Lisboa, [4]Departamento de Física and Centro de Física Teórica de Partículas (CFTP), Instituto Superior Técnico, Universidade de Lisboa; Instituto Superior de Engenharia de Lisboa, ISEL

In this work we search for minimal sets of chiral fermions, with arbitrary quantum numbers, beyond the Standard Model that are anomaly-free and lead to vector-like particles under SU(3) and electromagnetic U(1) after symmetry breaking. We further study which of these anomaly-free sets lead to unification of the gauge couplings at energy scales higher that 5.0×10∧15 GeV in order to be consistent with proton decay bounds. A similar study is performed in the context of the SU(5) gauge group; for some of the anomaly-free sets found it is possible to obtain unification of the gauge couplings with the extra fermions decoupling at high intermediate scales.

44.20 | Poster | Aula & Arcades

New-physics signals of a model with a vector-singlet up-type quark | S. Umasankar[1], A. Alok[2], S. Banerjee[2], D. London[3], D. Kumar[4] – [1]Indian Institute of Technology Bombay, [2]Indian Institute of Technology Jodhpur, [3]Universite de Montreal, [4]University of Rajasthan

The VuQ model involves the addition of a vector isosinglet up-type quark to the standard model. In this model the full CKM quark mixing matrix is 4×3. Using present flavor-physics data, we perform a fit to this full CKM matrix, looking for signals of new physics (NP). We find that the VuQ model is very stronly constrained. There are no hints of NP in the CKM matrix, and any VuQ contributions to loop-level flavor-changing $b \to s$, $b \to d$ and $s \to d$ transitions are very small. There can be significant enhancements of the branching ratios of the flavor-changing decays $t \to uZ$ and $t \to cZ$, but these are still below present detection levels.

44.21 | Poster | Aula & Arcades

b-flavour tagging in pp collisions | A. Birnkraut[1] – [1]Technische Universitaet Dortmund (DE)

An essential ingredient of all time-dependent CP violation studies of B mesons is the ability to tag the initial flavour of the B meson. The harsh environment of 7 and 8 TeV pp collisions makes this a particularly difficult enterprise. We report progresses in the flavour tagging of B0 and Bs mesons, including developments of novel techniques like the use of an opposite side charm tagger.

44.22 | Poster | Aula & Arcades

Test of lepton universality in the ratio of branching fractions BF(Y(3S)-> tau+tau-)/BF(Y(3S)->mu+mu-) at BABAR | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)

We present a test of lepton universality through the measurement of the ratio of the branching fraction for Υ(3S) decays into tau leptons to that for decays to a muon pair (R = BF(Y(3S)-> tau+tau-)/BF(Y(3S)->mu+mu-). A violation of lepton universality would be evidence of new physics, for example via the existence of a light CP-odd Higgs boson. This measurement, which makes use of a sample of Y(3S) decays corresponding to an integrated luminosity of 2.4 fb-1 collected by the BABAR detector at the PEP-II e+e- collider, represents a significant improvement upon the present precision of R.

44.23 | Poster | Aula & Arcades

The FCC-ee physics experimental program | A. Blondel[1] – [1]Universite de Geneve (CH)

One of the focuses of the Future Circular Collider design study is a high luminosity and high precision e+e- collider with energies ranging from (approx.) the Z peak to above the top quark pair production threshold. This is also a possible first step towards the ultimate goal, a 100 TeV hardon collider. The high luminosity allows to contemplate 10∧12-13 Z decays, 10∧8 W pairs, 2.10∧6 ZH events and 10∧6 top quark pairs. The experimental conditions and beam energy properties allow a very pow-

erful physics program including high precision measurements and search for rare processes. The status of the experimental study, including a number of challenges, will be presented.

44.24 | Poster | Aula & Arcades

Spin correlations of muons and tau leptons in ee->$\mu\mu$ and ee->tau tau and of leptons in the final state of gg->ee, $\mu\mu$, tau tau | V. Lyuboshitz[1], V. Lyuboshitz[1] – [1]Joint Institute for Nuclear Research, Dubna

The spin structure of the processes e^+e^- -> $\mu^+\mu^-$ and gg -> e^+e^- are theoretically investigated. It is demonstrated that, if the primary particles are unpolarized, the final state lepton pair remains unpolarized as well but their spins prove to be strongly correlated. Explicit expressions for the elements of the spin density matrices and the components of the correlation tensor of the final state lepton system are derived. It is established that the spin correlations have a pure quantum character, since one of the Bell-type incoherence inequalities for the correlation tensor components is always violated.

44.25 | Poster | Aula & Arcades

Discreteness in particle masses and parameters of the Standard Model | S. Sukhoruchkin[1] – [1]PNPI

The tuning effect in particle masses consists of empirical rational relations between them. Using estimation by CODATA of the ratio between the masses of the neutron and electron 1838.6836605(11) the shift of neutron mass 161.65(6) keV forms the ratio 8x1.001(1) with the nucleon mass difference. It is a confirmation of the tuning effect [1,2]. Scalar boson mass M_H=126.5 GeV, results of the analysis of differences of nuclear binding energies ΔE_B [2] and parameters of the Quark Model originated from the gluon quark dressing effect are in relations with masses of the fundamental bosons. 1) M_q=441 MeV and M_H/18·16=436 MeV were compared with M_Z/(L=13·16 − 1)=440.5 MeV; 2) The second parameter of the CQM M''_q=m_ρ/2=387.7(2) MeV was compared with M_W/(L=13·16 − 1)=388.4 MeV [2]. Other particle masses, f_π and M_H, M_Z, M_W are compared with integer numbers (k) of the common period δ=16m_e equal to the doubled value of the difference between the mass splitting of the pion. The origin of this discreteness and its connection with the symmetries will be discussed. 1. S. Sukhoruchkin, Nucl. Phys. B 234C (2013) 241. 2. S. Sukhoruchkin, Nucl. Phys. B 258-259C (2015) 268.

44.26 | Poster | Aula & Arcades

Probing the U(1)$_{B-L}$ model through the process $e^+e^- \to \nu\bar{\nu}\gamma$ | M. Hernandez-Ruiz[1], A. Gutierrez-Rodriguez[1] – [1]Universidad Autonoma de Zacatecas

We probe the U(1)$_{B-L}$ model via the process $e^+e^- \to \nu\bar{\nu}\gamma$. We also analyzed the effects of extra gauge boson Z' in the cross section at high energy linear e^+e^- collider and high luminosity; namely, International Linear Collider (ILC) and Compact Linear Collider (CLIC).

44.27 | Poster | Aula & Arcades

Enhanced CP violation in the Magnetic Field | P. Filip[1] – [1]Slovak Academy of Sciences (SK)

We suggest, that specific decay channels of mesons can be influenced by external electromagnetic field of sufficient strength. In particular, CP - violating decay of Eta meson Eta–> Pi+Pi-, which is limited to BR < 10∧-27 in Standard Model, can become enhanced in the magnetic field. Phenomenon occurs due to quantum superposition of J=0 Eta meson state with (Sz=0) substate of (J=1) vector meson (decaying also to Pi+Pi- channel due to G parity violation). Such behavior corresponds to indirect CP violation due to mixing, which is enhanced by external magnetic field.

44.28 | Poster | Aula & Arcades

Search for pair production of vector-like partners of the top quark (T), with T –> tH, H–> $\gamma\gamma$ | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

The recent discovery of a Higgs boson at the LHC sets strong constraints on a simple, sequential third generation of quarks. Still, the presence of new physics is necessary to stabilize the mass of the Higgs boson, if one wants to avoid an unnaturally high level of fine tuning of the theory. In supersymmetry, bosonic top quark partners would cancel the loops that induce this large instability. Similarly, fermionic top quark partner quarks can also serve this purpose. We present a search for a new T particle, which is a vector-like partner of the top quark, focusing on the T quark pair production. We use data collected with the CMS experiment during the year 2012, in proton-proton collisions at the LHC at a centre-of-mass energy of 8 TeV. Older searches for heavy vector-like-quarks focused separately either on the T –> bW or T –> tZ final states. The precise knowledge of the Higgs boson mass now allows to target the T –> tH decay as well. Here we focus exclusively on events with at least one top partner undergoing the T –> tH decay chain; in order to ensure a Higgs boson is actually present in the final state, we exploit the Higgs to diphoton final state.

44.29 | Poster | Aula & Arcades

Production of charged Higgs boson pairs in the $pp \to ppH^+H^-$ reaction at the LHC and FCC | A. Szczurek[1], P. Lebiedowicz[2] – [1]Institute of Nuclear Physics, [2]Institute of Nuclear Physics PAN

We present differential cross sections for production of charged scalar, weakly interacting, particles via photon-photon fusion in the $pp \to ppH^+H^-$ reaction with exact kinematics. We give predictions for $\sqrt{s}$ = 14≈TeV (LHC) and at the Future Circular Collider (FCC) for $\sqrt{s}$ = 100≈TeV. We present distributions in rapidities, transverse momenta and correlations in azimuthal

angles between the protons and between the charged Higgs bosons. The results are compared with those obtained within equivalent-photon approximation. We discuss the role of the Dirac and Pauli electromagnetic form factors of the proton. We discuss also first calculations of cross section for exclusive diffractive pQCD mechanism with estimated limits on the $g_{hH^+H^-}$ coupling constant within 2HDM based on the LHC experimental data. The diffractive contribution is much smaller than the $\gamma\gamma$ one. Absorption corrections are calculated for the first time differentially for various distributions. In general, they lead to a damping of the cross section. The damping depends on $M_{H^+H^-}$ invariant mass and on four-momentum transfers squared in the proton line. We discuss a possibility to measure the exclusive production of two charged Higgs bosons with the help of so-called forward proton detectors. Literature: P. Lebiedowicz and A. Szczurek, Phys. Rev. D91 (2015) 095008.

44.30 | Poster | Aula & Arcades

Flavor Changing Heavy Higgs Interactions at the LHC | C. Kao[1], G. Hou[2], B. Altunkaynak[1], M. Kohda[3], B. Mccoy[1] – [1]University of Oklahoma, [2]National Taiwan University, [3]Chung-Yuan Christian University

We investigate prospects for discovery of a heavy Higgs boson ϕ^0 ($m_\phi > m_t$) that decays into a top and a charm quark at the CERN Large Hadron Collider (LHC), where ϕ^0 could be a CP-even scalar (H^0) or a CP-odd pseudoscalar (A^0). A general two Higgs doublet model (2HDM) is adopted to study the signature of flavor changing neutral Higgs (FCNH) decay $\phi^0 \to t\bar{c} + \bar{t}c$. Discovery of this signal will greatly improve our understanding of electroweak symmetry breaking and possible sources of tree level flavor changing neutral currents. Almost all LHC coupling measurements of the 126 GeV Higgs boson favor the decoupling limit or the alignment limit of a 2HDM, in which the gauge boson and diagonal fermion couplings of the light neutral Higgs scalar (h^0) approach the Standard Model values. In this limit, FCNH couplings of h^0 are naturally suppressed by a small mixing parameter $\cos(\beta - \alpha)$, while the off-diagonal couplings of heavier neutral Higgs scalars are sustained by $\sin(\beta - \alpha) \sim 1$. We study dominant processes with physics background, applying realistic acceptance cuts and tagging efficiencies. Promising results are found for the LHC running at 13 or 14 TeV collision energies.

44.31 | Poster | Aula & Arcades

Search for squarks and gluinos in final state with jets and missing transverse momentum with the ATLAS detector at the LHC | M. Ronzani[1] – [1]Albert-Ludwigs-Universitaet Freiburg (DE)

Many extensions of the Standard Model (SM) include heavy coloured particles, such as the squark and gluinos of supersymmetric (SUSY) theories, which could be accessible at the Large Hadron Collider (LHC) and detected by ATLAS. The current searches in the LHC run-1 dataset have yielded sensitivity to TeV scale gluinos, as well as to squarks in the hundreds of GeV mass range. The discovery reach in run2 is expected to be greatly enhanced due to the large increase in the LHC centre-of-mass collision energy from 8 TeV to 13 TeV. In this poster, the most recent run-1 results and interpretations from inclusive searches for squark and gluinos in final states with jets and missing transverse momentum are presented. Moreover, we present sensitivity studies for gluino pair production in the same final state with a full simulation of the ATLAS detector at a centre-of-mass energy of 13 TeV.

44.32 | Poster | Aula & Arcades

ATLAS Higgs physics prospects at the high luminosity LHC | P. Glaysher[1] – [1]University of Edinburgh (GB)

Run-I at the LHC has been very successful and included the discovery of a new particle with mass of about 125GeVcompatible within uncertainties with the Higgs boson predicted by Standard Model. In this talk, the Higgs physics prospects at the high-luminosity LHC are presented, assuming an energy sqrt(s) = 14TeVand a dataset of 300 and 3000/fb. In particular, the ultimate precision attainable on the couplings measurements of the 125GeVparticle with elementary fermions and bosons is discussed.

44.33 | Poster | Aula & Arcades

Search for exotic Higgs-boson decays in events with at least one photon, missing transverse momentum, and two forward jets produced in 8 TeV pp collisions with the ATLAS detector | C. Bernius[1] – [1]New York University (US)

A search is performed for Higgs-boson decays to neutralinos and/or gravitinos in events with at least one photon, missing transverse momentum and two forward jets, a topology where vector boson fusion production is enhanced. The analysis is based on a dataset of proton-proton collision data taken at $s_{\sqrt{}}$ = 8 TeV delivered by the Large Hadron Collider and recorded with the ATLAS detector, corresponding to an integrated luminosity of 20.3 fb-1. The observation is consistent with Standard Model expectation and upper limits are set on the production cross section times branching fraction of the Higgs-boson to decay to neutralinos and/or gravitinos.

44.34 | Poster | Aula & Arcades

Limits on the Effective Quark Charge Radius from the QCD Analysis of the Inclusive ep Scattering Cross Sections at HERA | M. Wing[1] – [1]UCL

The H1 and ZEUS combined measurement of inclusive deep inelastic cross sections in neutral and charged current ep scattering, based on the final data sample corresponding to a luminosity of about 1 fb-1, was used as an input to QCD analyses, providing a set of parton distribution functions HERAPDF2.0. Here the analysis is extended to take into account possible signals from physics beyond SM. Quark form factor model, describing possible effects due to quark substructure or finite spatial distribution of the quark charge, is used as a simple test scenario. The only proper procedure to set limits on the BSM model

parameters from the data used to calculate PDFs is to perform the combined analysis, including possible contributions from the BSM processes in the QCD fit to the data. This approach is developed in the presented study using the quark form factor model as a test scenario. Even if the resulting limits on the quark radius seem not to be competitive with the expected LHC limits, these are the first limits set in the strictly correct way. This procedure should also be considered at other experiments, also at LHC, where the PDFs are used to calculate model predictions and set limits on BSM models.

44.35 | Poster | Aula & Arcades

Search for ttH and tt'H with the D0 detector | D0 Collaboration[1] – [1]DZero Experiment, Fermilab

We present a search for the associated production of a Higgs boson with top anti-top pairs in proton anti-proton collisions at a center-of-mass energy of 1.96 TeV using a data sample of 9.7 fb^{-1} of integrated luminosity, which corresponds to the entire Run II D0 dataset. Distributions of the H_T variable separated into 3 jet, 4 *b*-tagging and 2 lepton categories were used to search for the ttH process with $H \to b\bar{b}$ decays. An enhanced production cross section can be achieved if a *t*' quark is produced via a heavy *G*' boson (vector color octet).. An example for such a model is analyzed here leading to an exclusion of a *t*' mass below 446≈GeV for a *G*' mass of 700 GeV and a Higgs mass of 125 GeV. These are the first constraints on such models.

44.36 | Poster | Aula & Arcades

Search for Higgs bosons decaying to aa in the $\mu\mu\ \tau\tau$ final state in pp collisions at $\sqrt{s}$ = 8 TeV with the ATLAS experiment | J. Katzy[1] – [1]DESY, HAMBURG

The recently discovered Higgs boson at a mass 125 GeV provides an excellent tool to probe beyond the Standard Model physics. Many extensions of the Standard Model predict the decay of the Higgs boson into weakly interacting or neutral particles which do not interact with the detector, that could be candidates for dark matter. Using proton-proton collision data collected by the ATLAS detector during Run 1, searches have been performed for an invisibly decaying Higgs boson in three production channels: via vector boson fusion, produced in association with a hadronically decaying vector boson, and produced in association with a leptonically decaying Z boson.

44.37 | Poster | Aula & Arcades

Searches for invisibly decaying Higgs bosons at ATLAS | J. Katzy[1] – [1]DESY, HAMBURG

The recently discovered Higgs boson at a mass 125 GeV provides an excellent tool to probe beyond the Standard Model physics. Many extensions of the Standard Model predict the decay of the Higgs boson into weakly interacting or neutral particles which do not interact with the detector, that could be candidates for dark matter. Using proton-proton collision data collected by the ATLAS detector during Run 1, searches have been performed for an invisibly decaying Higgs boson in three production channels: via vector boson fusion, produced in association with a hadronically decaying vector boson, and produced in association with a leptonically decaying Z boson.

44.38 | Poster | Aula & Arcades

Search for the Standard Model Higgs boson produced in association with top quarks and decaying into a bbbar-pair in pp collisions at sqrt(s)=8 TeV with the ATLAS detector | J. Katzy[1] – [1]DESY, HAMBURG

A search for the Standard Model Higgs boson produced in association with a pair of top quarks (ttH) and decaying into a pair of bottom quarks (H–>bb) is presented. The search is focused on the semileptonic decay of the tt system and exploits different topologies given by the jet and b-tagged jet multiplicities of the event. A neural network is used to discriminate between signal and background events, the latter being dominated by tt+jets production. Using 20.3/fb of data at sqrt(s)=8 TeV collected with the ATLAS detector during Run 1 of the Large Hadron Collider, we obtain an observed (expected) 95% confidence-level upper limit of 3.4 (2.2) times the Standard Model cross section for a Higgs boson with a mass of 125 GeV.

44.39 | Poster | Aula & Arcades

Top associated Higgs production in the ttH to multileptons channel with one hadronic tau in ATLAS | J. Katzy[1] – [1]DESY, HAMBURG

The measurement of the Higgs Boson and its cross-section in top associated production allows a direct measurement of the top quark Yukawa coupling at tree level. This can be compared with the indirect one in gluon-gluon-fusion production. The decay channel of the ttH system in the multilepton final state gives one of the largest sensitivities. The considered sub-channel is one with two same-charged light leptons (electrons or muons) and one hadronically decaying tau-lepton: ttH into 2l+1tau. This poster gives an overview of the analysis and explains in detail the data-driven background estimation of the non-reducible background processes. The analysis includes a dataset of 20.3 inverse fb which has been recorded in LHC Run I at a center-of-mass energy of 8 TeV with the ATLAS detector.

44.40 | Poster | Aula & Arcades

Determination of the off-shell Higgs boson signal strength in the high-mass ZZ and WW final states with the ATLAS detector | J. Katzy[1] – [1]DESY, HAMBURG

Measurements of the ZZ and WW final states in the mass range above the 2mZ and 2mW thresholds provide a unique opportunity to measure the off-shell coupling strength of the Higgs boson. This poster presents a determination of the off-shell Higgs

boson event yields normalised to the Standard Model prediction (signal strength) in the ZZ–>4, ZZ–>22ν and WW–>e$\nu\mu\nu$ final states. The result is based on pp collision data collected by the ATLAS experiment at the LHC, corresponding to an integrated luminosity of 20.3 fb-1 at a collision energy of $s_{\sqrt{}}$=8 TeV. Using the CLs method, the observed 95% confidence level (CL) upper limit on the off-shell signal strength is in the range 5.1–8.6, with an expected range of 6.7–11.0. In each case the range is determined by varying the unknown gg–>ZZ and gg–>WW background K-factor from higher-order QCD corrections between half and twice the value of the known signal K-factor. Assuming the relevant Higgs boson couplings are independent of the energy scale of the Higgs production, a combination with the on-shell measurements yields an observed (expected) 95% CL upper limit on ΓH/ΓSMH in the range 4.5–7.5 (6.5–11.2) using the same variations of the background K-factor. Assuming that the unknown gg–>VV background K-factor is equal to the signal K-factor, this translates into an observed (expected) 95% CL upper limit on the Higgs boson total width of 22.7 (33.0) MeV.

44.41 | Poster | Aula & Arcades

Search for a high mass particle decaying into two photons or Z + photon using the CMS detector and the LHC Run1 data | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

The most recent CMS results on the search for a high mass particle decaying into two photons in the high mass region [150,850] GeV and into a Z boson and a photon in the region [200,500] GeV, using the full dataset recorded at the LHC from pp collisions at the centre of mass energy of 8 TeV will be described. Results will also be presented on the search for a Higgs boson particle decaying into a photon and a Z boson using the full dataset at centre of mass energies of 7 and 8 TeV and on the search for a Higgs boson decaying to two photons, one of which has an internal conversion to a muon or an electron pair, at 8 TeV.

44.42 | Poster | Aula & Arcades

Search for a low-mass pseudoscalar Higgs boson produced in association with a pair of b-quarks and decaying to tau leptons, at CMS | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

A search for a light pseudoscalar Higgs boson produced in association with a pair of b-quarks and decaying to a pair of tau leptons is performed in the context of two-Higgs-doublet models (2HDM). The results are based on an integrated luminosity of 19.7 fb-1 at a center-of-mass energy of 8 TeV accumulated by the CMS experiment at LHC in 2012. Pseudoscalar masses between 25 and 80 GeV are probed in this analysis, while previous di-tau resonance searches have mainly focussed on masses greater than the mass of the Z boson. Light scalar bosons are motivated in 2HDM, even after including all constrains from LEP, Tevatron and LHC Run 1 data results. Upper limits on the production cross-section times branching fraction between 7 and 37 pb are set at 95% confidence level. This search excludes the pseudoscalar Higgs boson in Type 2 of 2HDM with negative Yukawa coupling for masses below 60 GeV.

44.43 | Poster | Aula & Arcades

Searches for vector-like quarks with the ATLAS detector at the LHC | M. Sahinsoy[1] – [1]Bogazici University (TR)

The naturalness argument for theories beyond the Standard Model supports the presence of fermionic top/bottom quark partners, usually referred to as vector-like quarks (VLQs). Searches for vector-like quarks have been performed in various final states with leptons, jets and missing transverse momentum at the ATLAS experiment. This poster summarizes recent VLQ searches at ATLAS with LHC Run 1 data.

44.44 | Poster | Aula & Arcades

Searches for long-lived particle decays in ATLAS | D. Salvatore[1] – [1]Universita della Calabria (IT) - INFN

Searches for the decay of neutral, weakly interacting, long-lived particles using data collected by the ATLAS detector at the LHC are presented. These analyses use the full dataset recorded in 2012: 20.3 fb-1 of proton–proton collision data at $s_{\sqrt{}}$=8 TeV. The first analysis is sensitive to long-lived particles that decay to Standard Model particles producing jets at the outer edge of the ATLAS electromagnetic calorimeter or inside the hadronic calorimeter. The second search employs techniques for reconstructing decay vertices of long-lived particles decaying to jets in the inner tracking detector and muon spectrometer. Signal events require at least two reconstructed vertices. No significant excess of events over the expected background are found, and limits as a function of proper lifetime are reported for the decay of the Higgs boson and other scalar bosons to long-lived particles and for Hidden Valley Z and Stealth SUSY benchmark models.

44.45 | Poster | Aula & Arcades

Search for low-scale gravity signatures in multi-jet final states with the ATLAS detector at $\sqrt{}$s = 8 TeV | K. Wang[1] – [1]McGill University (CA)

A search for evidence of physics beyond the Standard Model in the production of final states with multiple high transverse momentum jets, using 20.3 fb-1 of proton-proton collision data recorded by the ATLAS detector at $\sqrt{}$s = 8 TeV is presented. No excess of events beyond Standard Model expectations is observed, and upper limits on the visible cross-section for non-Standard Model production of multi-jet final states are set. Using benchmark models of black hole and string ball production and decay, exclusion contours are drawn in the space of fundamental Planck mass M_D versus threshold mass for production, M_th.

44.46 | Poster | Aula & Arcades

Elucidating SUSY in the Interplay of LHC and ILC | F. Simon[1] – [1]Max-Planck-Institut fuer Physik

While the current 7/8 TeV results form the LHC excludes highly constrained SUSY models with a light sparticle spectrum, less constrained models are still viable. Certain such models promise both discovery of coloured sparticles during the upcoming 14 TeV run of the LHC, and a rich spectrum of non-coloured states, accessible at the ILC. LHC might or might not give a hint to the existence of these electro-weak states, but only at the ILC can measurements with sufficient precision be done to elucidate the details of the model. This contribution discusses how the combined observations from LHC and ILC can be used to determine MSSM parameters in models with large numbers of free parameters. We illustrate the possible interplay between measurements at ILC and LHC by a concrete example, compatible with all current constraints. It is a full SUSY model which features a small stau-LSP mass difference, and quite heavy coloured particles. The model has been studied using detailed detector simulation of both LHC and ILC detectors.

44.47 | Poster | Aula & Arcades

Measurements of the total and differential cross sections of Higgs boson production | J. Katzy[1] – [1]DESY, HAMBURG

We present measurements of the total and differential cross sections of Higgs boson production that were performed using 20.3≈fb^{-1} of *pp* collisions produced by the Large Hadron Collider at a center-of-mass energy of $\sqrt{s}$ = 8 TeV and recorded by the ATLAS detector. Cross sections are obtained from measured $H \to \gamma\gamma$ and $H \to ZZ \to 4\ell$ event yields, which are combined accounting for detector efficiencies, fiducial acceptances and branching fractions. Differential cross sections are reported as a function of Higgs boson transverse momentum, Higgs boson rapidity, number of jets in the event, and transverse momentum of the leading jet. The total production cross section is determined to be: $\sigma_{pp\to H}$ = 33.0 $\pm$ 5.3 (*stat*) $\pm$ 1.6 (*sys*) pb. The measurements are then compared to state-of-the-art predictions.

44.48 | Poster | Aula & Arcades

Quark flavour violation in h∧0 -> b bbar in the MSSM at one-loop level | E. Ginina, H. Eberl[1], K. Hidaka[2], W. Majerotto[3] – [1]HEPHY Vienna, [2]Tokyo Gakugei University, [3]Austrian Academy of Sciences (AT)

We compute the width of the decay h∧0(125 GeV) -> b bbar at next-to-leading order in the general MSSM with quark flavour violation (QFV). We study the effect of mixing between the second and the third generation of squarks, taking into account the constraints on QFV from B meson data. We discuss the renormalisation for the process as well as the enhancement of the bottom-quark self-energy contributions to the width for large tanb and their resummation. We show numerical results on the decay width GAMMA(h∧0 -> b bbar) as a function of the involved QFV parameters and compare it with the corresponding width in the Standard Model.

44.49 | Poster | Aula & Arcades

Phenomenology of fundamental spinons | R. Allen[1], J. Stenzel[1], J. Kroll[1] – [1]Texas A&M University

In condensed matter physics, the theory of spin–charge separation dates back to the 1950 paper of Tomonaga, but experimental confirmation came only after almost a half century. Here we consider the possibility of a similar phenomenon — inspired in part by the reality of Higgs bosons, and therefore of at least one Higgs condensate — which would potentially be observable in Run 2 of the LHC. The qualitative phenomenology is simple: These fundamental spinons would carry only angular momentum (as spin 1/2 particles) plus energy and momentum, with no charge of any kind, so they must be detected as e.g. missing transverse momentum. They could be produced in virtual processes, such as the decay of virtual Z bosons, or real processes, such as emission from W bosons, but always involving vector bosons in the presence of a Higgs condensate. Their masses are undetermined by the theory (just as was the mass of the observed Higgs), but the mass of a spinon pair must exceed the mass of a Z boson, since the decay of real Z bosons is completely explained by Standard Model particles. Here we will make no attempt to justify the theory in which these spinons emerge, whose more conventional predictions include supersymmetry and SO(N) grand unification. The important fact in the present context is that the theory does lead to this prediction of new particles, which are in principle observable in the relatively near future.

44.50 | Poster | Aula & Arcades

Search for new π^0-like particles at BABAR | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)

We report on a search for new π^0-like particles produced in association with a tau-lepton pair at BABAR. Those objects, with mass and decay modes similar to those of a neutral pion, could provide an explanation for the apparent non-asymptotic behavior of the pion-photon transition form factor, as observed by BABAR. No significant signal is observed, and limits on the production cross sections are found to lie below the values needed to explain the excess with respect to the asymptotic limit observed in the form factor data.

44.51 | Poster | Aula & Arcades

First results on Vector Bilepton production based on LHC data and predictions for Run II | A. Nepomuceno[1], B. Meirose[2] – [1]Universidade Federal Fluminense, [2]University of Texas at Dallas (US)

In this work one investigates the LHC potential for discovering doubly-charged vector bileptons considering the measurable

process $pp \longrightarrow \mu^+\mu^+\mu^-\mu^- X$. We perform the study assuming different bilepton masses and different exotics quark masses. The process cross-section is calculated at leading-order using the CALCHEP package. Combining this calculation with the latest ATLAS results at 7 TeV, we derive, for the first time, bounds on bilepton mass using LHC data. The results exclude bileptons with masses in the range 200 GeV to 500 GeV, depending on the exotics quarks masses. A detector simulation is also performed using the DELPHES package assuming a LHC center-of-mass energy of 13 TeV. The results of the simulation are used to obtain minimal integrated luminosities needed for discovering and for setting limits on bilepton masses at LHC run II.

44.52 | Poster | Aula & Arcades

Study of HH production at CMS | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

The production of the pairs of Higgs bosons provides a direct handle on the structure of the Higgs field potential.While the HH production within the SM is very small and essentially out of the experimental reach within the Run I or II, several beyond SM theories foresee an enhancement that can be already probed with the available data. First searches for resonant and non-resonant productions of pairs of HH bosons within BSM theories, made using data collected during Run I by the CMS collaboration, will be presented.

44.53 | Poster | Aula & Arcades

Interpreting LHC searches for new physics with SModelS | U. Laa[1] – [1]LPSC Grenoble

ATLAS and CMS have performed a large number of searches for physics beyond the Standard Model (BSM). The results are typically presented in the context of Simplified Model Spectra (SMS), containing only a few new particles with fixed decay branching ratios, yielding generic upper limits on the cross section as a function of particle masses. The interpretation of these limits within realistic BSM scenarios is non-trivial and is best done by automated computational tools. To this end we have developed SModelS, a public tool that can test any given BSM model with a Z2 symmetry by decomposing it into its SMS components and confronting them with a large database of SMS results. This allows to easily evaluate the main LHC constraints on the model. Additionally, SModelS returns information on important signatures that are not covered by the existing SMS results. This may be used to improve coverage of BSM searches and SMS interpretations. We will present the working principle of SModelS, in particular the decomposition procedure, the database and matching of applicable experimental results (see arXiv:1312.4175 and 1412.1745). Moreover, we will present applications of SModelS to different models: the MSSM (1312.4175), a model with a sneutrino LSP (1503.02960) and the UMSSM (paper in preparation). These results illustrate how SModelS can be used to identify important constraints, untested regions and interesting new signatures. An outlook to future developments will also be given.

44.54 | Poster | Aula & Arcades

Search for the standard model Higgs boson produced by vector boson fusion and decaying to bottom quarks | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

A search for a standard model Higgs boson in the vector boson fusion production mechanism with decay to bottom quarks is presented. The search analyzes two data samples of proton-proton collisions at sqrt(s) = 8 TeV, collected with the CMS detector during 2012, comprising of 19.8 fb∧-1 (prompt) and 18.3 fb∧-1 (parked). Upper limits on the product of the cross section and the branching fraction into a bottom quark pair, as well as the fitted signal strenght relative to the expectation for the standard model Higgs boson, are derived in the Higgs boson mass range from 115 to 135 GeV. In addition, the combination of this result with other CMS searches for the Higgs boson in the same decay channel is reported.

44.55 | Poster | Aula & Arcades

Search for a Higgs boson decaying to a pair of 125 GeV Higgs bosons (hh) or for a Higgs boson decaying to Zh, with tau leptons in the final state | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

A search for a Higgs boson (H) decaying into a pair of lighter (Standard Model like) 125 GeV Higgs bosons (h) or a Higgs boson (A) decaying into a Z boson and an h boson is presented. This search is performed on a dataset corresponding to an integrated luminosity of 19.7 fb-1 of pp collision data collected by CMS in 2012. A final state consisting of two tau leptons and two b-jets is used to search for the H -> hh decay and a final state consisting of two tau leptons and two additional leptons, compatible with being the decay products of a Z boson, is used to search for the decay A -> Zh. This search is performed in the context of two benchmark scenarios: one scenario of the minimal supersymmetric extension to the standard model and one scenario of a two Higgs Doublet Model. No excess is found and upper limits at 95% confidence level are set on the production cross-section in the mass range 220< mA <350 GeV and 260< mH <350 GeV.

44.56 | Poster | Aula & Arcades

The 4 tau signature of resonant H->hh events at the LHC and its interpretation in beyond-standard-model scenarios | R. Aggleton[1], S. Moretti[2], D. Barducci[3], C. Shepherd-Themistocleous[4] – [1]University of Southampton/Rutherford Appleton Laboratory/University of Bristol, [2]University of Southampton/Rutherford Appleton Laboratory, [3]LAPTh, Universite Savoie Mont Blanc, [4]Rutherford Appleton Laboratory

Whilst the discovered Higgs boson has so far shown no significant deviation from standard model predictions, there remains

the possibility that it could be part of a larger spectrum of exotic Higgs particles, such as those found in supersymmetric standard model theories. In this talk I will explore part of this spectrum by considering the phenomenology of the 4 tau final state from the pair production of lighter (pseudo)scalar Higgs bosons. I will focus on the interpretation of this channel within beyond-standard-model theories, particularly focusing on the next-to-minimal supersymmetric standard model. I will also explore the 4 tau signature from an experimental perspective, summarizing LHC Run I results, and considering the potential from Run II.

44.57 | Poster | Aula & Arcades

Precise predictions for Higgs-masses in the Next-to-Minimal Supersymmetric Standard Model (NMSSM) | P. Drechsel, G. Weiglein[1], S. Heinemeyer[2], L. Galeta[2] – [1]Deutsches Elektronen-Synchrotron (DE), [2]CSIC (Santander, ES)

The NMSSM represents an elegant and well motivated alternative description for the observed phenomenology in high energy physics. In this theory a scalar singlet together with its superpartner is added to the Higgs-sector of the Minimal Supersymmetric Standard Model (MSSM). In order to allow significant testing of the NMSSM by experiments precise predictions for the parameters of the theory are a necessity. The talk will focus on the prediction for the Higgs-masses in the NMSSM at 1-loop order supplemented by the contributions at 2-loop order from the Minimal Supersymmetric Standard Model (MSSM), both obtained by diagrammatic methods. At 2-loop order the resummation of large logarithms is included. The presented approximation at the 2-loop level will be discussed in detail as well as its range of validity. The talk will also provide some insights into the basic principles of the calculation, especially the renormalisation of softly broken supersymmetric gauge theories.

44.58 | Poster | Aula & Arcades

Unitarity, analiticity, dispersion relations and resonances in strongly interacting WLWL, ZLZL and hh scattering | A. Dobado Gonzalez, F. Llanes-Estrada[1], R. Delgado[2] – [1]Universidad Complutense, [2]Universidad complutense

In this work we study in detail the case of a strongly interacting electroweak symmetry breaking electroweak sector. Then we study general properties of the amplitudes like analiticy and unitarity starting from a very general non-linear effective Lagrangian. We illustrate the ideas with the Inverse Amplitude Method, one version of the N/D method and another improved version of the K-matrix. In the three cases we get partial waves which are unitary, analytical with the proper left and right cuts and in some cases poles in the second Riemann sheet that can be understood as dynamically generated resonances. In addition they reproduce the Next to Leading Order (NLO) of the perturbative expansion for the five partial waves (up to J=2) and they are μ independent. Also the unitarization formalisms are extended to the coupled channel case. Then we apply the results to the elastic scattering amplitude for the longitudinal components of the gauge bosons V = W, Z at high energy. We also compute hh –> hh and the inelastic process V V –> hh which are coupled to the elastic V V channel in the I = 0 case. We compare numerically the three methods for various values of the low-energy couplings and explain the reasons for the differences found in the I = J = 1 partial wave. Then we study the resonances appearing in the different elastic and coupled channels in terms of the effective Lagrangian parameters.

44.59 | Poster | Aula & Arcades

A Higgs at 125 GeV and baryon mass spectra derived from a common U(3) framework | O. Trinhammer[1], H. Bohr[1], M. Jensen[1] – [1]Technical University of Denmark, Dept. of Physics

Baryons are described by a Hamiltonian on an intrinsic U(3) Lie group configuration space with electroweak degrees of freedom originating in specific Bloch wave factors. By opening the Bloch degrees of freedom pairwise via a U(2) Higgs mechanism, the strong and electroweak energy scales become related to yield the Higgs mass and the usual gauge boson masses. From the same Hamiltonian we derive both the relative neutron to proton mass ratio and the N and Delta mass spectra. All compare rather well with the experimental values. We predict neutral flavour baryon singlets to be sought for in negative pions scattering on protons or in photoproduction on neutrons and in invariant pion-proton mass in various decays. The fundamental predictions are based on just one length scale and the fine structure constant. The interpretation is to consider baryons as entire entities excited from laboratory space by three impact momentum generators and six Lorentz generators to internalize as nine degrees of freedom covering colour, spin and flavour. Quark and gluon fields come about when the intrinsic structure is projected back into laboratory space depending on which exterior derivative one is taking. With such derivatives on the measure-scaled wavefunction, we derive approximate parton distribution functions for the u and d valence quarks of the proton that compare well with established experimental analysis.

44.60 | Poster | Aula & Arcades

The Inert Doublet Model in the light of LHC and astrophysical data | A. Ilnicka[1], T. Robens[2], M. Krawczyk[3] – [1]University of Warsaw, [2]TU Dresden, [3]Institute of Theoretical Physics, Warsaw University

The Inert Doublet Model (IDM) is one of the simplest extension of the Standard Model in which the scalar sector is augmented by a second scalar doublet. This second doublet does not contribute to Electroweak Symmetry breaking, but due to an exact Z2 symmetry gives rise to the dark sector with stable dark matter candidate. After the discovery of the Higgs boson and fixing the value of its mass, the model has still 5 free parameters, which are however subject to a number of both theoretical and experimental constraints. In our work we present the updated results on the allowed parameter space of the IDM taking into account newest experimental results from LHC and astrophysical experiments. We also give insight on the possibilities and strategies for the direct search for IDM in new LHC run.

44.61 | Poster | Aula & Arcades

Dalitz plot analysis of B -> D D K decays | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)

We present full Dalitz plot analyses for the decays of B mesons to D∧- D∧0 K∧+ andDbar∧0 D∧0 K∧+. We report the observation of the Ds1*(2700) resonance in these two channels and obtain measurements ofthe mass M(Ds1*(2700)) = 2699 +14-7 MeV/c2 and of the widthGamma(Ds1*(2700)) = 127 +24-19 MeV, including statistical and systematicuncertainties. In addition, we observe an enhancement in the D∧0 K∧+invariant mass around 2350-2500 MeV/c2 in both decays, which we are not able to interpret. The resultsare based on 429 fb-1 of data containing 471 million B Bbar pairs collectedat the Y(4S) resonancewith the BABAR detector at SLAC.

44.62 | Poster | Aula & Arcades

Recent results on low-energy e+e- annihilation into hadrons obtained using initial state radiation with the BABAR detector | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)

The BABAR Collaboration has an extensive program of studying hadronic cross sections in e+e- collisions at low-energies, which are accessible at center-of-mass energy of about 10.6 GeV via initial-state radiation. Our measurements allow significant improvements in the precision of the predicted value of the muon anomalous magnetic moment. These improvements are necessary for shedding light on the current ≈3.5 sigma difference between the predicted and the experimental values. We report here the most recent results on several processes, including e+e- -> pi+pi-pi0pi0, e+e- -> K_S K- pi+ pi0 and e+e- -> K_S K- pi+ eta. Each cross section is measured up to 4.5 GeV and the internal structure of the final hadronic states is studied. With the same technique we have also studied the charge asymmetry in the e+e- -> pi+pi- and mu+mu- reactions. The measured asymmetry is compared with QED predictions for muons, and theoretical models for pions. A clear interference pattern is observed for pions in the vicinity of the f_2(1270) resonance.

44.63 | Poster | Aula & Arcades

Study of interference effects in the decays of psi mesons into K+K- | F. Anulli[1], V. Druzhinin[2] – [1]Universita e INFN, Roma I (IT), [2]BINP, Novosibirsk, Russia

Using the ISR technique with an undetected photon, the e+e- -> K+K- reaction has been studied with the BABAR detector in the energy region up to 8 GeV. The BABAR data have been used to measure the charged kaon electromagnetic form factor, and, together with data from other experiments, to perform a model-independent determination of the relative phases between single-photon and three-gluon amplitudes in psi -> K anti-Kdecays. The values of the branching fractions measured in the reaction e+e- -> K+K- are shifted due to interference of resonant and non-resonant amplitudes. We have determined the absolute values of the shifts to be 5% for J/psi and 15% for psi(2S) decays. The interference pattern near the psi(3770) resonance has been studied also.

44.64 | Poster | Aula & Arcades

Measurement of the Collins asymmetries for kaons and pions in e+e- annihilation at BABAR | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)

Inclusive hadron production cross sections and angular distributions in e+e- collisions shed light on fundamental questions of hadronization and fragmentation processes. We present measurements of the Collins azimuthal asymmetries in inclusive production of hadron pairs, in the e+e- -> h1 h2 X annihilation process, where the hadrons (either kaons or pions) are produced in opposite hemispheres. The data collected by the BABAR detector allow the determination of the Collins fragmentation function as a function of hadron fractional energies and transverse momenta for the up, down and strange quarks. These data can be combined with semi-inclusive deep-inelastic-scattering data to extract the transversity distribution function, which is the least known leading-twist component of the QCD description of the partonic structure of the nucleon.

44.65 | Poster | Aula & Arcades

Study of e+e- annihilation into hadrons with the SND detector at the VEPP-2000 collider | V. Druzhinin[1] – [1]BINP, Novosibirsk, Russia

We present results of the experiments carried out at the VEPP-2000 e+e- collider with the SND detector. The reactions e+e- -> rho pi, omega pi, rho eta, omega eta have been studied in the energy region 1.05-2.00 GeV. The measured cross sections have been fitted in the VMD model. Parameters of excited light vector states have been extracted. The neutron and proton electromagnetic form factors has been measured in the energy range from the threshold up to 2 GeV. The result of the search of the e+e- -> eta' reaction is also presented.

44.66 | Poster | Aula & Arcades

Ultra low energy scattering of free polarized hadrons. | C. Adamuscin[1], S. Dubnicka[2] – [1]Slovak Academy of Sciences (SK), [2]Institute of Physics

We study the contribution of the incoming hadrons' polarization to the differential cross section of the hadron scattering at the ultra low energy limit.

44.67 | Poster | Aula & Arcades

Photoproduction of isolated photons, inclusively and with a jet, at HERA | M. Wing[1] – [1]UCL

The photoproduction of isolated photons, both inclusive and together with a jet, has been measured with the ZEUS detector at HERA using an integrated luminosity of 374 pb∧-1. Differential cross sections are presented in the isolated-photon transverse-energy and pseudorapidity ranges 6 < E_T(gamma) < 15 GeV and -0.7 < eta(gamma) < 0.9, and for jet transverse-energy and pseudorapidity ranges 4 < E_T(jet) < 35 GeV and -1.5 < eta(jet) < 1.8, for exchanged-photon virtualities Q∧2 < 1 GeV∧2. Differential cross sections are also presented for inclusive isolated-photon production as functions of the transverse energy and pseudorapidity of the photon. Higher-order theoretical calculations are compared to the results.

44.68 | Poster | Aula & Arcades

Inelastic cross section measurements performed with the CMS experiment | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

The first measurement of the cross section of inelastic proton-lead collisions at 5.02 TeV center-of-mass energy per nucleon-pair is presented. The cross section is corrected for effects beyond the experimental acceptance of CMS. Photon-induced interactions are studied in detail and are excluded from the result, as well as quasi-elastic excitation of the lead nuclei. The data is compared to measurements at much lower center-of-mass energies as well as to predictions of event generators and models. Also the inelastic cross section measured in pp collisions at different center-of-mass energies is reported.

44.69 | Poster | Aula & Arcades

Photon structure functions at the ILC energy range | B. Krupa[1], L. Zawiejski[2], B. Pawlik[1], T. WojtoŃ[1] – [1]Institute of Nuclear Physics Polish Academy of Sciences, [2]Institute of Nuclear Physics PAN

The first measurement of the photon structure functions has been performed using the PLUTO detector at the DESY storage ring PETRA (1981). Following this pioneering work many experiments have been performed at all high energy e^+e^- and ep storage rings. In spite of many researches there are still a lot of issues to be addressed. The last papers containing the experimental data of the photon structure functions were published in 2005 (L3 experiment on LEP). New experimental data can be anticipated from the future linear e^+e^- collider ILC, which is now in a preparation phase. As the beam energy at the ILC will be higher than at LEP, it is expected that it will be possible to measure photon structure functions in a wider range of kinematic variables x, Q^2. The classical way to measure the photon structure functions is the study of $e^+e^- - - > \gamma\gamma - - > e^+e^-$ X process, where X is the leptonic or hadronic final state. For the study of the QED and hadronic photon structure functions the simulations of two-photon processes were performed at ILC centre-of-mass energy using Monte Carlo generators and the ILCSoft package. The analysis used information related to the forward detectors, tracking detectors and calorimeters which are parts of the ILD detector concept.

44.70 | Poster | Aula & Arcades

Measurement of Multijet Production in ep Collisions at High Q² and Determination of the Strong Coupling α_s | C. H1[1], S. Schmitt[2], K. Daum[3] – [1]DESY, [2]Deutsches Elektronen-Synchrotron (DE), [3]Wuppertal, U./Desy

Inclusive jet, dijet and trijet differential cross sections are measured in neutral current deep-inelastic scattering for exchanged boson virtualities 150<Q²<15000 GeV² using the H1 detector at HERA. The data were taken in the years 2003 to 2007 and correspond to an integrated luminosity of 351 pb^{-1}. Double differential Jet cross sections are obtained using a regularised unfolding procedure. They are presented as a function of Q² and the transverse momentum of the jet, P_T^{jet} , and as a function of Q² and the proton's longitudinal momentum fraction, ξ, carried by the parton participating in the hard interaction. In addition normalised double differential jet cross sections are measured as the ratio of the jet cross sections to the inclusive neutral current cross sections in the respective Q² bins of the jet measurements. Compared to earlier work, the measurements benefit from an improved reconstruction and calibration of the hadronic final state. The cross sections are compared to perturbative QCD calculations in next-to-leading order and are used to determine the running coupling and the value of the strong coupling constant as $\alpha_s(M_Z)$=0.1165 (8)exp (38)pdf,theo .

44.71 | Poster | Aula & Arcades

Measurement of Dijet Production in Diffractive Deep-Inelastic ep Scattering at HERA | C. H1[1], K. Daum[2], S. Schmitt[3] – [1]DESY, [2]Wuppertal, U./Desy, [3]Deutsches Elektronen-Synchrotron (DE)

A measurement is presented of single- and double-differential dijet cross sections in diffractive deep-inelastic ep scattering at HERA using data collected by the H1 experiment corresponding to an integrated luminosity of 290 pb^{-1}. The investigated phase space is spanned by the photon virtuality in the range of $4 < Q^2 < 100$ GeV² and by the fractional proton longitudinal momentum loss $x_{IP} < 0.03$. The resulting cross sections are compared with next-to-leading order QCD predictions based on diffractive parton distribution functions and the value of the strong coupling constant is extracted.

44.72 | Poster | Aula & Arcades

Diffractive Dijet Production with a Leading Proton in ep Collisions at HERA | C. H1[1], K. Daum[2], S. Schmitt[3] – [1]DESY, [2]Wuppertal, U./Desy, [3]Deutsches Elektronen-Synchrotron (DE)

The cross section of the diffractive process e+p –> e+Xp is measured at a centre-ofmass energy of 318 GeV, where the system

X contains at least two jets and the leading final state proton p is detected in the H1 Very Forward Proton Spectrometer. The measurement is performed in photoproduction with photon virtualities $Q^2 < 2$ GeV^2 and in deep-inelastic scattering with 4 GeV^2 $< Q^2 <$ 80 GeV^2. The results are compared to next-to-leading order QCD calculations based on diffractive parton distribution functions as extracted from measurements of inclusive cross sections in diffractive deep-inelastic scattering.

44.73 | Poster | Aula & Arcades

Exclusive Photoproduction of ρ^0 Mesons with a Leading Neutron at HERA | C. H1[1], K. Daum[2], S. Schmitt[3] – [1]DESY, [2]Wuppertal, U./Desy, [3]Deutsches Elektronen-Synchrotron (DE)

A first measurement is presented of exclusive photoproduction of ρ^0 mesons associated with leading neutrons at HERA. The data were taken with the H1 detector in the years 2006-2007 at a centre-of-mass energy $\sqrt{s}$ = 319 GeV and correspond to an integrated luminosity of 1.16 pb^{-1}. ρ^0 mesons with transverse momenta $p_T < 1$ GeV are reconstructed from their decays to charged pions in the central tracking chamber, while leading neutrons carrying a large fraction of the incoming proton momentum, $x_L > 0.35$, are detected in the Forward Neutron Calorimeter. The phase space of the measurement is defined by the photon virtuality $Q^2 < 2$ GeV^2, the total energy of the photon-proton system $20 < W_{\gamma p} < 100$ GeV and the polar angle of the leading neutron $\theta_n < 0.75$ mrad. The cross section of the reaction $\gamma p \to \rho^0 \pi^+ n$ is measured as a function of several variables. The data are interpreted in terms of a double peripheral process, involving pion exchange at the proton vertex followed by elastic photoproduction of a ρ^0 meson on the virtual pion. In the framework of one-pion-exchange dominance the elastic cross section of photon-pion scattering, $\sigma_{el}(\gamma\pi^+ \to \rho^0\pi^+)$ at an average energy $\langle W_{\gamma p} \rangle$ = 24 GeV is extracted.

44.74 | Poster | Aula & Arcades

Measurement of Inclusive ep Cross Sections at High Q² at sqrt(s) = 225 and 252 GeV and of the Longitudinal Proton Structure Function F_L at HERA | C. H1[1], K. Daum[2], S. Schmitt[3] – [1]DESY, [2]Wuppertal, U./Desy, [3]Deutsches Elektronen-Synchrotron (DE)

Inclusive ep double differential cross sections for neutral current deep inelastic scattering are measured with the H1 detector at HERA. The data were taken with a lepton beam energy of 27.6 GeV and two proton beam energies of E_p=460 and 575 GeV corresponding to centre-of-mass energies of 225 and 252 GeV, respectively. The measurements cover the region of 6.5×10^{-4}x0.65 for 35Q²800 GeV² up to y = 0.85. The measurements are used together with previously published H1 data at E_p=920 GeV and lower Q² data at E_p=460, 575 and 920 GeV to extract the longitudinal proton structure function F_L in the region 1.5Q²800 GeV².

44.75 | Poster | Aula & Arcades

Search for QCD Instanton-Induced Processes in DIS at HERA | C. H1[1], S. Schmitt[2], K. Daum[3] – [1]DESY, [2]Deutsches Elektronen-Synchrotron (DE), [3]Wuppertal, U./Desy

Signals of QCD instanton-induced processes are searched for in deep-inelastic scattering (DIS) at the electron-proton collider HERA in the kinematic region defined by the Bjorken-scaling variable $x > 10^{-3}$, the inelasticity $0.2 < y < 0.7$ and the photon virtuality $150 < Q^2 < 15000$ GeV². The search is performed using H1 data corresponding to an integrated luminosity of 350 pb^{-1}. Several observables of the hadronic final state of the events are exploited to identify a potentially instanton-enriched domain. Two Monte Carlo models, RAPGAP and ARIADNE, are used to estimate the background from the standard DIS processes, and the instanton-induced scattering processes are modeled by the program QCDINS. In order to extract the expected signal a multivariate data analysis technique is used.

44.76 | Poster | Aula & Arcades

Overview of the two component model for hadroproduction | A. Bylinkin[1], A. Rostovtsev[2], N. Chernyavskaya[3], M. Ryskin[4], D. Kharzeev[5] – [1]MIPT, [2]ITEP Institute for Theoretical and Experimental Physics (RU), [3]National Research Nuclear University MEPhI (RU), [4]Petersburg Nuclear Physics Institute, [5]Stony Brook U./BNL

Overview of the two component model for hadroproduction based on the recently published papers is presented. The transverse momentum spectra of hadrons produced in high energy collisions can be decomposed into the two components: the exponential (thermal) and the power (hard) ones. Thus, charged hadron spectra produced in various interactions and measured in different experiments from ISR to LHC are considered simultaneously within this model. As a result, it is shown that this model provides a much better description of the available experimental data than other widely used parameterizations. Moreover, the relative contributions of the exponential and power-law components to the spectra vary with the type of the collisions, the type of the produced hadron, the charged multiplicity and the measured pseudorapididty region. The possible mechanism of this effect is discussed: while the thermal component might be produced in the fragmentation of the color string due to the effective event horizon introduced by confinement, the power-law term resembles the Regge theory with the pQCD pomeron. Finally, a universal parameter describing a shape of the spectra in pp-collisions is found. The observed dependences are used to make predictions on the mean transverse momenta, pseudorapidity distributions and double-differential cross-sections at LHC-energies, which are tested on already available experimental data and predictions for future LHC measurements are presented.

44.77 | Poster | Aula & Arcades

Strong couplings of charmed mesons and quarkonia | D. Melikhov[1] – [1]SINP, Moscow State University and HEPHY
We discuss strong couplings g_{VPP} and g_{VVP} (V and P being vector and pseudoscalar mesons, respectively) containing one charm and one light quark (u, d,or s) or two charm quarks. We demonstrate that many existing results from QCD sum rules exhibit an unrealistic picture of $SU(3)$-violating effects. We present new calculations of these couplings from the relativistic dispersion approach based on constituent quark picture and show that our results provide a very reasonable picture of the $SU(3)$-violating effects for a broad set of strong couplings. In many cases our results are substantially larger than those reported by QCD sum rules. We reveal the origin of the discrepancies between the results from the two methods and point the shortcomings of the existing QCD sum-rule calculations.

44.78 | Poster | Aula & Arcades
Study of inclusive charmonium production in e+e- annihilation and B decays at BABAR | N. Arnaud[1] – [1]LAL (CNRS-IN2P3)
In an e+e- B factory charmonium states can be produced through different mechanisms, e.g. in e+e- annihilation, in double charmonium production, and in B-meson decays. Prompt production of J/psi or psi(2S) in association with a second charmonium state has been observed by both the BaBar and Belle experiments in e+e- annihilation at a center-of-mass energy of 10.58 GeV. These processes provide an opportunity to study both perturbative and non-perturbative effects in QCD and to search for new charmonium states recoiling against the reconstructed J/psi or psi(2S). We present a study of such events using the full BaBar dataset. We also present measurements of absolute branching fractions of the two-body decays of B mesons B(B -> K Xcc), where Xcc is a charmonium state. For events in which one B is fully reconstructed, the charmonium spectrum can be observed in an unbiased way by looking at the distribution of the K momentum in the rest frame of the recoiling B.

44.79 | Poster | Aula & Arcades
Study of three-body charmonium decays in BABAR. | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)
We study the reaction e+ e- -> gamma_ISR J/psi, where J/psi -> pi+ pi- pi0, and J/psi -> K+ K- pi0, using events obtained from the Initial State Radiation process. We measure the relative J/psi branching fraction and perform a Dalitz plot analysis of both J/psi decay modes using an isobar and a Veneziano model. We present also an analysis of the process gamma gamma -> K anti-K pi. We observe the decays eta_c -> K_S K+- pi-+ and eta_c -> K+ K- pi0 and perform a Dalitz analysis of both eta_c decay modes. We also extract the mass dependent K_pi S-wave amplitude and phase using a model-independent partial wave analysis approach. These studies have been performed using the entire BABAR dataset collected at the PEP-II e+e- collider.

44.80 | Poster | Aula & Arcades
Gauge Invariant Currents and Hadronization | A. Koshelkin[1] – [1]National Research Nuclear University
The fermion and total currents generated by a gauge field are derived in the framework of the $SU(N)$ gauge theories. Under the condition of gauge invariance, the obtained currents is found to be expressible in terms of the massive vector field generated by the initial gauge field. In this way, the derived contribution to the mass of the vector field depends strongly on the occupancy numbers of the fermion subsystem, whereas the arisen mass term holds the gauge invariance of the modified Lagrangian, which can be reduced to the pure gluodynamics Lagrangian containing a mass term. By breaking the initial $SU(N)$ symmetry, we derive the Lagrangian governing the dynamics of the massive scalar particles, which can be treated as the octet of the pseudoscalar mesons. The contribution of both the quark-gluon interaction and self-interaction gluon field into the masses of the octet particles is considered. Provided that the handronization of the confinement matter into the pion triplet occurs, the coupling constant is evaluated in the developed model.

44.82 | Poster | Aula & Arcades
Study of baryonic decays of B mesons at BABAR | F. Anulli[1] – [1]Universita e INFN, Roma I (IT)
We report on recent searches for baryonic B decays using the whole BABAR dataset of 471 million B anti-B pairs. Although about 7% of all B decays have baryons in the final state, known exclusive decay modes account for only about 10% of these decays, and very little is known about the mechanism of baryon production in weak decays or in the hadronization process. By studing such decays we can learn more about these mechanisms. We will report on recent analyses of several baryonic B decays and their resonant substructure, including the study of s-sbar suppression in such decays, the study of threshold enhancement in the invariant baryon-antibaryon mass, and the observation of the decay B0bar -> Lambda_c pbar K+ K-.

44.83 | Poster | Aula & Arcades
Study of the e+e- -> hadron reactions with the CMD3 detector at VEPP2000 collider | E. Solodov[1] – [1]BudkerINP
The CMD3 detector is taking data at the electron-positron collider VEPP2000. Data from energy scans for center-of-mass energy from 0.32 to 2.0 GeV are available with the world largest data sample. We present new preliminary results of data analysis, including e+e- -> pi+pi- cross section, which is the largest hadronic contribution of the SM calculation of the muon g-2. We also present preliminary results on the pi+pi-pi0, K+K-, KSKL, KSK*(892), K+K-pi+pi-, etagamma. pi0gamma etc. cross sections in all available energy range with precision omega, rho, phi resonances study.

44.84 | Poster | Aula & Arcades

Production of exclusive dijets in diffractive deep inelastic scattering at HERA | M. Wing[1] – [1]UCL
The exclusive dijet production in diffractive deep inelastic $e^{\pm}p$ scattering has been measured with the ZEUS detector at HERA using an integrated luminosity of 372 pb^{-1}. The measurement was performed for $\gamma^* - p$ centre-of-mass energies in the range $90 < W < 250$ GeV and photon virtualities in the range $Q^2 > 25$ GeV^2 . Energy and transverse-energy flows around the jet axis are presented. The cross section is presented as a function of β, the Bjorken variable defined with respect to the diffractive exchange and, in bins of β, as a function of ϕ, the angle between the γ^*-dijet plane and the $\gamma^* - e^{\pm}$ plane in the rest frame of the dijet final state. The results are compared to predictions from models which are based on different assumptions about the nature of the diffractive exchange.

44.85 | Poster | Aula & Arcades
Measurement of beauty and charm production in deep inelastic scattering at HERA and measurement of the beauty-quark mass | M. Wing[1] – [1]UCL
The production of beauty and charm quarks in *ep* interactions has been studied with the ZEUS detector at HERA for exchanged four-momentum squared $5 < Q^2 < 1000$ GeV^2 using an integrated luminosity of 354 pb^{-1}. The beauty and charm content in events with at least one jet have been extracted using the invariant mass of charged tracks associated with secondary vertices and the decay-length significance of these vertices. Differential cross sections as a function of Q^2, Bjorken-x, jet transverse energy and pseudorapidity were measured and compared with next-to-leading-order QCD calculations. The beauty and charm contributions to the proton structure functions were extracted from the double differential cross section as a function of x and Q^2. The running beauty-quark mass is determined from a QCD fit at next-to-leading order to HERA data for the first time and found to be m_b(m_b) = 4.07 +- 0.14 (fit) ∧+0.01_-0.07 (mod.) ∧+0.05_-0.00 (param.) ∧+0.08_-0.05 (theo.) GeV.

44.86 | Poster | Aula & Arcades
Diffractive production of isolated photons at HERA | M. Wing[1] – [1]UCL
Using data from HERA, the ZEUS collaboration present measurements of the diffractive production of isolated ("prompt") photons in photoproduction, with and without a jet First cross sections are evaluated for centrally produced photons with jetsas a function of the photon and jet transverse energy and pseudorapidity, and also for the fraction of incoming photon energy imparted to the photon-jet system. Comparison is made to predictions from Rapgap.

44.87 | Poster | Aula & Arcades
Trijet production in deep inelastic sacttering at HERA | M. Wing[1] – [1]UCL
Trijet production has been measured in neutral cureent deep inelastic ep scattering. The data were taken with the HERA ep collider using the ZEUS detector and correspond to an integrated luminosity of 295 pb∧-1. The measurement was performed in the kinematic region 125 < Q∧2 < 20000 GeV∧2 and 0.2 < y < 0.6, where Q∧2 denotes the virtuality of the exchanged gauge boson (gamma or Z∧0) and y the inelasticity. The jets were required to lie in the kinematic region E_T∧jet(Breit) > 8 GeV and -1 < eta_lab∧jet < 2.5, where E_T∧jet(Breit) is the jet transverse momentum in the Breit frame and eta_lab∧jet the jet pseudorapidity in the laboratory frame. In addition the invariant mass of the two leading jets, M_jj, had to fulfil the condition M_jj > 20 GeV. Differential trijet production cross sections were measured as a function of various event and trijet kinematic observables. QCD predictions at next-to-leading order (NLO) are compared to the results.

44.88 | Poster | Aula & Arcades
Measurement of the cross-section ratio $\sigma_{\psi}(2S)/\sigma_J/\psi$ in deep inelastic exclusive ep scattering at HERA | M. Wing[1] – [1]UCL
The exclusive deep inelastic electroproduction of $\psi(2S)$ and J/ψ has been studied with the ZEUS detector at HERA in the kinematic range $2 \leq Q^2 \leq 80$ GeV^2, $30 \leq W \leq 210$ GeV, and $|t| \leq 1$ GeV^2, where Q^2 is the photon virtuality, W is the photon–proton centre-of-mass energy and t is the squared four-momentum transfer at the proton vertex. The data for $2 \leq Q^2 \leq 5$ GeV^2 were taken in the HERA I running period and correspond to an integrated luminosity of 114 pb^{-1}. The data for $5 \leq Q^2 \leq 80$ GeV^2 are from both HERA I and HERA II periods and correspond to an integrated luminosity of 468 pb^{-1}. The decay modes analysed were $\mu^+\mu^-$ and $J/\psi(1S)\,\pi^+\pi^-$ for the $\psi(2S)$ and $\mu^+\mu^-$ for the $J/\psi(1S)$ and the cross-section ratio $\sigma(\psi(2S))/\sigma(J/\psi(1S))$ has been measured as a function of Q^2, W and t. The measurement is compared to predictions of QCD-inspired models of vector-meson production.

44.89 | Poster | Aula & Arcades
Production of dilepton pairs via photon-photon fusion with proton dissociation. | W. Schaefer[1], A. Szczurek[2] – [1]Institute of Nuclear Physics PAN, [2]Institute of Nuclear Physics PAN/ Rzeszow University
We present a formalism which uses fluxes of equivalent photons including transverse momenta of the intermediate photons. The formalism reminds the familiar kt-factorization approach used, e.g., to study the two-gluon production of cc$^-$ or bb$^-$ pairs. The results of the new method are compared with those obtained using the code LPAIR, and a good agreement is obtained. The inclusion of the photon transverse momenta is necessary in studies of correlation observables. We present distributions for the dimuon invariant mass, transverse momentum of the muon pair and relative azimuthal angle between muons separately for elastic-elastic, elastic-inelastic, inelastic-elastic and inelastic-inelastic mechanisms. Here we discuss especially the depen-

dence on the proton structure function F_2. We will also compare with approaches based on photons as DGLAP partons in a proton. The presentation is based on: G.G. da Silveira, L. Forthomme, K. Piotrzkowski, W. Schafer and A. Szczurek, "Central $\mu^+\mu^-$ production via photon-photon fusion in proton-proton collisions with proton dissociation", JHEP 02 (2015) 159. M. Luszczak, W. Schafer and A. Szczurek, a paper in preparation.

44.90 | Poster | Aula & Arcades

Hadrons vs. QCD | P. Hoyer[1] – [1]University of Helsinki

I discuss an analytic, first principles approach to QCD bound states based on an expansion in α_s. As for QED atoms, the main features (including confinement) appear already at Born level (lowest order in $\hbar$, no loops). The classical gluon field is determined by Gauss' law using as boundary condition a non-vanishing field strength at spatial infinity. In an equal-time, Hamiltonian formulation this implies a linear potential for mesons and a similar confinement for baryons. Poincaré invariance is preserved only for color singlet states. Hence the $O(\alpha_s^0)$ bound states (rather than single quarks and gluons) can serve as *in* and *out* states of the perturbative expansion. The Born states are fully relativistic and have interesting properties under boosts. Quark-hadron duality is observed and the OZI rule is qualitatively understood. Pair production by the confining field leads to string breaking and calculable hadron loop corrections, as required for unitarity at $O(\alpha_s^0)$.

44.91 | Poster | Aula & Arcades

Higher-order QCD corrections to triple collinear splitting functions | G. Sborlini[1], D. De Florian[2], G. Rodrigo Garcia[3] – [1]IFIC-Valencia, [2]Universidad de Buenos Aires, [3]IFIC Valencia

We present splitting functions in the triple collinear limit at next-to-leading order in the strong coupling. We performed the computation in the context of massless QCD+QED, and consider first collinear processes which include at least one photon. The IR divergent structure of the multi-partonic splitting functions agrees with the Catani's formula. Consistency checks based on symmetry arguments have been implemented and results for different configurations have been cross-checked. Studying photon-started processes, we obtained very compact results: this allowed us to simplify the expressions for the remaining splitting functions.

44.92 | Poster | Aula & Arcades

Precision PDFs and α_s at the LHeC | N. Armesto Perez[1] – [1]Universidade de Santiago de Compostela (ES)

The LHeC is a proposed upgrade of the LHC to study ep/eA collisions in the TeV regime, by adding a 60 GeV electron beam through an Energy Recovery Linac. New evaluations are presented on the prospects for precisely determining the proton PDFs, with complete flavour unfolding in a single experiment, and the strong coupling constant with per mille accuracy.

44.93 | Poster | Aula & Arcades

Charm and bottom masses from QCD sum rules | V. Mateu Barreda[1], A. Hoang[2], B. Dehnadi[1] – [1]University of Vienna, [2]U

We present determinations of the MS-bar charm quark mass using relativistic QCD sum rules at O(as∧3) from the moments of the vector and the pseudoscalar current correlators. Our analysis of the theoretical uncertainties is based on different implementations of the perturbative series and on independent variations of the renormalization scales for the mass and the strong coupling. We address the issue that double scale variation could overestimate the perturbative uncertainties by supplementing the analysis with a test that quantifies the convergence rate of each perturbative series by a single number. We find that this convergence test allows to determine an overall and average convergence rate that is characteristic for the series expansions of each moment, and to discard those series for which the convergence rate is significantly worse. The method is also applied to the extraction of the MS-bar bottom quark mass from the vector correlator. We compute the experimental moments including a modeling uncertainty associated to the continuum region where no data is available.

44.94 | Poster | Aula & Arcades

Exclusive $\chi_{bJ}(1P)$ and $\Upsilon(1,2S)$ decays at Belle | Y. Kwon[1] – [1]Yonsei University

Utilizing the data sample containing 158×10^6 and 102×10^6 events of $\Upsilon(2S)$ and $\Upsilon(1S)$ decays, respectively, the Belle collaboration has performed studies of $\chi_{bJ}(1P)$ exclusive decays to light hadrons, and $\Upsilon(1,2S)$ decays to exclusive states including a $\Lambda\bar{\Lambda}$ pair and a number of mesons. We present the results of these studies and the upper limit on the total width of the $\chi_{b0}(1P)$ state.

44.95 | Poster | Aula & Arcades

Measurement of D* photoproduction at three different centre-of-mass energies at HERA | M. Wing[1] – [1]UCL

The photoproduction of $D^{*\pm}$ mesons has been measured with the ZEUS detector at HERA at three different *ep* centre-of-mass energies, $\sqrt{s}$, of 318, 251 and 225 GeV. For each data set, $D^{*\pm}$ mesons were required to have transverse momentum, $p_T^{D^*}$, and pseudorapidity, η^{D^*}, in the ranges $1.9 < p_T^{D^*} < 20$ GeV and $|\eta^{D^*}| < 1.6$. The events were required to have a virtuality of the incoming photon, Q^2, of less than 1 GeV^2. The dependence on $\sqrt{s}$ was studied by normalising to the high-statistics measurement at $\sqrt{s}$ = 318 GeV. This led to the cancellation of a number of systematic effects both in data and theory. Predictions from next-to-leading-order QCD describe the $\sqrt{s}$ dependence of the data well.

44.96 | Poster | Aula & Arcades

Deep inelastic cross-section measurements at large y with the ZEUS detector at HERA | M. Wing[1] – [1]UCL

The reduced cross sections for e∧+p deep inelastic scattering have been measured with the ZEUS detector at HERA at three different centre-of-mass energies, 318, 251 and 225 GeV. The cross sections, measured double differentially in Bjorken x and the virtuality, Q∧2 , were obtained in the region 0.13 =< y =< 0.75, where y denotes the inelasticity and 5 =< Q∧2 =< 110 GeV∧2. The proton structure functions F_2 and F_L were extracted from the measured cross sections.

44.97 | Poster | Aula & Arcades

Further studies of the photoproduction of isolated photons with a jet at HERA | M. Wing[1] – [1]UCL

In this extended analysis using the ZEUS detector at HERA, the photoproduction of isolated photons together with a jet is measured for different ranges of the fractional photon energy, x_gamma(meas), contributing to the photon-jet final state. Cross sections are evaluated in the photon transverse-energy and pseudorapidity ranges 6 < ET(gamma) < 15 GeV and -0.7 < eta(gamma) < 0.9, and for jet transverse-energy and pseudorapidity ranges 4 < E_T(jet) < 35 GeV and -1.5 < eta(jet) < 1.8, for an integrated luminosity of 374 pb∧-1. The kinematic observables studied comprise the transverse energy and pseudorapidity of the photon and the jet, the azimuthal difference between them, the fraction of proton energy taking part in the interaction, and the difference between the pseudorapidities of the photon and the jet. Higher-order theoretical calculations are compared to the results.

44.98 | Poster | Aula & Arcades

Measurement of neutral current ep cross sections at high Bjorken x with the ZEUS detector | M. Wing[1] – [1]UCL

The neutral current ep cross section has been measured up to values of Bjorken x $\approx$ 1 with the ZEUS detector at HERA using an integrated luminosity of 187 pb∧-1 of e∧-p and 142 pb∧-1 of e∧+p collisions at sqrt(s)= 318 GeV. Differential cross sections in x and Q∧2, the exchanged boson virtuality, are presented for Q∧2 >= 725 GeV∧2. An improved reconstruction method and greatly increased amount of data allows a finer binning in the high-x region of the neutral current cross section and leads to a measurement with much improved precision compared to a similar earlier analysis. The measurements are compared to Standard Model expectations based on a variety of recent parton distribution functions.

44.99 | Poster | Aula & Arcades

Automated NLO QCD Corrections with WHIZARD | C. Weiss[1], J. Reuter[2], B. Chokoufe, W. Kilian[3] – [1]DESY, [2]DESY Hamburg, Germany, [3]Universität Siegen

WHIZARD is a multi-purpose event generator for hadron- and lepton-colliders, featuring support for various models. A distinct feature is the description of beamstrahlung and ISR for lepton collisions. Up to now, the program has been able to automatically perform leading-order calculations, contributions of higher virtual orders being only available for some specific kinds of processes. Since many applications require at least next-to-leading order accuracy, this issue has been adressed by us. We present the current state of WHIZARD which can also deal with NLO QCD final-state corrections, using the Frixione-Kunszt-Signer subtraction scheme. For loop amplitudes, either the program GoSam or OpenLoops can be used. In this talk, the setup of the program is briefly explained. Moreover, results for various processes, e.g. $e^+e^- \to t\bar{t}H$ or $e^+e^- \to W^+W^-b\bar{b}$, are presented.

44.100 | Poster | Aula & Arcades

Productions of charmed mesons and charmonium states in B decays at Belle | Y. Kwon[1] – [1]Yonsei University

The Belle collaboration has recently performed extensive studies of charmed hadrons and charmonium states produced from B meson decays utilizing its 711 fb^{-1} data set collected at the $\Upsilon(4S)$ resonance. We present measurement of $B \to D^- D^{\star}_{s0}(2317)$ decay rates and a search for isospin partners of the $D^{\star}_{s0}(2317)^+$. In addition, we present the study of $D^{\star\star}$ production and light hadronic states in the $\overline{B}^0 \to D^{\star+}\omega\pi^-$ decay. We also present inclusive and exclusive measurements of χ_{c1} and χ_{c2} production.

44.101 | Poster | Aula & Arcades

Measurement of jet production cross sections with the ATLAS detector | A. Read[1] – [1]University of Oslo (NO)

The measurements of the jet production cross sections probe the dynamics of QCD and can constrain the parton proton structure. Double-differential cross sections for inclusive, di-, and tri-jet final states are measured for 7 TeV pp collisions with the ATLAS detector and are compared to expectations based on next-to-leading order QCD calculations as well as to next-to-leading order Monte Carlo simulations. First LHC Run-2 results will be included if available. Cross-sections for four-jet production in 8 TeV pp collisions are measured differentially in a variety of kinematic variables, and are compared to a range of leading order Monce Carlo calculations as well as to state-of-the-art next-to-leading order fixed-order calculations. The observables studied include the momenta, masses, minimum and maximum angles between two or three jets, amongst others.

44.102 | Poster | Aula & Arcades

Unpolarized TMD Quark Distribution Functions at Low Q^2 Scales | H. Nematollahi[1], M. Yazdanpanah[1], A. Mirjalili[2] – [1]Faculty of Physics, Shahid bahonar University of Kerman, Kerman, Iran, [2]Physics department, Yazd university, Yazd, Iran

We calculate the unpolarized transverse momentum dependent (TMD) quark distributions in the modified chiral quark model

(χQM). To this end, we use the integrated quark densities which are multiplied by a TMD Gaussian factor[1,2]. These integrated distributions are computed applying the χQM[3] at low Q^2 value ($Q^2 = 0.35 GeV^2$). Finally, we compare our results with corresponding ones which were obtained in our previous work[4] via a different approach. It is shown that our results have appropriate treatment which is expected for the TMD quark densities. [1] Z. Lu and B-Q Ma, Phys. ReV. D 87 (2013) 034037. [2] M. Anselmino and et al., JHEP 04 (2014) 2005. [3] H. Nematollahi, M. M. Yazdanpanah and A. Mirjalili, J. Phys. G: Nucl. Part. Phys. 39 (2012) 045009. [4] H. Nematollahi, M. M. Yazdanpanah and A. Mirjalili, Eur. Phys. J. Plus 129 (2014) 204.

44.103 | Poster | Aula & Arcades

Lowest energy configurations for Near-BPS Skyrme Models | L. Marleau[1], N. Giasson[1] – [1]Université Laval

The original Skyrme model first proposed over half a century ago, is now understood as a low-energy effective theory of QCD where baryons (and nuclei) emerge as topological solitons. It provides a relatively good picture of the nucleons, but it overestimates their binding energies in nuclei by at least an order of magnitude. The present work is based on a recent extension of the original Skyrme model, the so-called near-BPS Skyrme Model. As one departs from the pure BPS limit of the model, the solutions nearly saturate the Bogomol'nyi bound which means that the model can be fine-tuned to obtain small binding energies. However, there remains an open question: what solution configuration minimizes the energy? This is of interest since it has some bearing on the nuclei rotational and Coulomb energies. The lack of accuracy of full 3D numerical calculations does not allow for the unambiguous determination of the lowest energy configuration. Here, instead, we compare the two most prominent configurations, the axial and rational map ansatz, for a class of hybrid model that goes from the original to the pure BPS Skyrme model. Our results suggest that the axial solution is the lowest energy configurations for the set of parameters for which the binding energy per nucleon B/A agrees best with the experimental data thereby supporting even further the idea that nuclei could be near-BPS Skyrmions.

44.104 | Poster | Aula & Arcades

Light hadron spectroscopy at BESIII | BESIII Collaboration[1] – [1]BESIII

The BESIII experiment has accumulated a large sample of J/ψ, ψ' and $\psi(3770)$ data set. Through these charmonium radiative and hadronic decays, we can explore the light hadron spectroscopies. In this talk, we will report our recent results on the properties of the X states, such as X(1835) and X($p\bar{p}$), study of $J/\psi \to$ radiative decays ($J/\psi \to \gamma K_s K_s \eta$, $\gamma\pi^+\pi^-\eta'$, $\gamma\pi^0\pi^0$) and progress on the baryon spectroscopy (Ξ^* states other related topics on baryonic pairs production). In addition, we also present our results on the decays of light mesons η and η' at BESIII.

44.105 | Poster | Aula & Arcades

Measurement of hadron form factor of pair production cross section in e^+e^- annihilations at BESIII | BESIII Collaboration[1] – [1]BESIII

Using a data set of 2.9/fb taken at a center-of-mass energy of $\sqrt{s}$ = 3.773 GeV with the BESIII detector at the BEPCII collider, the $e^+e^- \to \pi^+\pi^-$ cross section in the energy range between 600 MeV and 900 MeV is extracted using the method of Initial State Radiation. The cross section is measured and the pion Form factor is extracted. We also calculate its contribution to the hadronic vacuum polarization of $(g-2)_\mu$. In addition, we measure the cross sections of $e^+e^- \to p\bar{p}$ and $e^+e^- \to \Lambda_c^+\Lambda_c^-$. This data can be used to extract hadron from factors and to understand the final interaction between hadron pairs.

44.106 | Poster | Aula & Arcades

Improving Constraints on Proton Structure using CMS measurements | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

Production of electroweak bosons, heavy quarks and jets in proton-proton collisions probe different aspects of QCD and are sensitive to the details of proton structure, expressed by parton distribution functions (PDFs). Precise measurements of cross sections of these processes are used by the CMS experiment to demonstrate the impact of the LHC data on the PDFs and their precision. The measurements of muon charge asymmetry in W-boson production at a center-of mass of 7 and 8 TeV is used to improve the constraints on the valence-quark distributions, while the associated production of W-boson and charm quark provides information on the s-quark distribution in the proton. Production of inclusive jets as measured by CMS at center-of-mass energy of 7 TeV provide important constraints on the gluon distribution and are used to determine the strong coupling constant.

44.107 | Poster | Aula & Arcades

Baryons as polarimeters for ATLAS and CMS | Y. Kats[1] – [1]Weizmann Institute

Measurements of polarizations of quarks produced in new physics processes could provide crucial information about the structure of the new physics. The b and c-quark polarizations are largely preserved in the lightest baryons they hadronize into, Λ_b and Λ_c, respectively. We show how ATLAS and CMS can measure the b-quark polarization using semileptonic Λ_b decays, and the c-quark polarization using $\Lambda_c^+ \to pK^-\pi^+$ decays. For calibrating both measurements we suggest to use $t\bar{t}$ samples in which these polarizations can be measured with precisions of order 10% using 100 fb^{-1} of data in Run 2 of the LHC.

44.108 | Poster | Aula & Arcades

Differences of masses and widths of the charged and neutral $\rho(770)$, $\rho(1450)$, $\rho(1700)$ mesons from data on electro-

weak processes | E. Bartos[1], S. Dubnicka[2], A. Dubnickova[3], H. Hayashii[4] – [1]Institute of Physics of the Slovak Academy of Sciences, [2]Institute of Physics, [3]Comenius University (SK), [4]nara women's university
The $\rho(770)$, $\rho(1450)$, $\rho(1700)$ mesons exist in three charged states ρ^0, ρ^+ and ρ^-, whereby masses of positively charged mesons are identical with masses of negatively charged mesons, due to the CPT theorem. However, there is no reason for the identity of charged meson masses with neutral meson masses. For determination of differences of masses and decay widths of charged and neutral $\rho(770)$, $\rho(1450)$, $\rho(1700)$ mesons are employed the data on $e^+e^- \to \pi^+\pi^-$ an $\tau^- \to \pi^-\pi^0\nu_\tau$ processes to be analyzed by the Unitary and Analytic models of the electromagnetic and weak pion form factors, respectively.

44.109 | Poster | Aula & Arcades
Gluon and heavy quark perturbative QCD fragmentation functions considering the effects of heavy quarkonium mass | S. Moosavi Nejad[1] – [1]Yazd University
Fragmentation is the dominant production mechanism for heavy-quark-antiquark bound states with large transverse momentum. We analytically calculate the initial scale fragmentation functions (FFs) for a gluon and a heavy quark to split into S-wave heavy quarkonium states using the perturbative QCD. Our analytical expression of FFs depends on the transverse momentum k_T of the partons, and contains most of the kinematical and dynamical properties of the process. The analyses of this paper differ in that we present, for the first time, an analytical form of the transverse momentum dependent FFs, using a different model (Suzuki's model) in comparison with the numerical results presented in other references where the Braaten's model have been used. These k_T dependent FFs are necessary to calculate the differential cross sections $d\sigma/dk_T$, for which there are experimental data. We also incorporate, for the first time, hadron mass effects in our calculations to improve the FFs at the small z regions, where z is the fragmentation parameter. These effects modify the relations between partonic and hadronic variables and reduce the available phase space and are responsible for the low-z threshold.

44.110 | Poster | Aula & Arcades
On relevance of triple gluon fusion in J/ψ hadroproduction | M. Sadzikowski[1], L. Motyka – [1]Jagiellonian University
A contribution to J/psi hadroproduction is analyzed in which the meson production is mediated by three-gluon partonic state, with two gluons coming from the target and one gluon from the projectile. This mechanism involves double gluon density in one of the protons, hence this contribution enters at a non-leading twist. It is, however, relevant due to an enhancement factor coming from large double gluon density at small x. We calculate the three-gluon contribution to J/Psi hadroproduction within perturbative QCD in the kT - factorization framework. The rescattering contribution is found to provide a significant correction to the standard leading twist cross-section at the energies of the Tevatron or the LHC at moderate pT . We suggest J/Psi production in proton-nucleus collision as a possible probe of the triple gluon mechanism.

44.111 | Poster | Aula & Arcades
Glueball decay patterns in top-down holographic QCD | A. Rebhan[1], F. BrÜnner[1], D. Parganlija[1] – [1]Vienna University of Technology
We report recent results on the spectrum and the decay patterns of scalar and tensor glueballs in the top-down holographic Witten-Sakai-Sugimoto model. This model, which has only one free dimensionless parameter, gives semi-quantitative predictions for the vector meson spectrum, their decay widths, and also a gluon condensate in agreement with SVZ sum rules. The predictions for glueball decay are compared with experimental data for some of the widely discussed glueball candidates in the meson spectrum.

44.112 | Poster | Aula & Arcades
Spin structure of the "forward" nucleon charge-exchange reaction $n + p \to p + n$ and the deuteron charge-exchange breakup | V. Lyuboshitz[1], V. Lyuboshitz[1] – [1]Joint Institute for Nuclear Research, Dubna
The structure of the nucleon charge-exchange process $n + p \to p + n$ is theoretically investigated on the basis of the isotopic invariance of the nucleon-nucleon scattering. By using the operator of permutation of the spin projections of the neutron and proton, the connection between the spin matrices, which describe the amplitude of the "forward" nucleon charge-exchange process and the amplitude of the neutron-proton elastic scattering in the "backward" direction, has been obtained. Due to the optical theorem, the spin-independent part of the differential cross-section of the process $n + p \to p + n$ at zero angle for unpolarized particles is expressed through the difference of total cross-sections of unpolarized proton-proton and neutron-proton scattering. Meantime, the spin-dependent part of this cross-section is proportional to the differential cross-section of the "forward" deuteron charge-exchange breakup $d + p \to (pp) + n$ at the deuteron momentum $\mathbf{k}_d = 2\mathbf{k}_n$ ($\mathbf{k}_n$ is the initial neutron momentum). As shown by the performed analysis, it is just the spin-dependent term that provides the main contribution into the differential cross-section of the "forward" process $n + p \to p + n$ in the wide range of neutron laboratory momenta $k_n > 700$ MeV/c .

44.113 | Poster | Aula & Arcades
Evolution of TMD parton distributions up to NNLO approximation. | A. Mirjalili[1], T. Roghayeh[1] – [1]Yazd university
The transverse momentum dependent (TMD) of parton distributions will provide us new insights into the substructure of nucleon beyond the one-dimensional (longitudinal) picture. Evidence for TMDs are accessible in processes such as semi-inclusive

DIS (SIDIS) or dileptons produced in the Drell-Yan process. Here we are investigating the evolution the the unpolarized TMDs up to NNLO approximation. The calculations are based on Collins-Sopper-Sterman formalism. The unknown parameters of non-perturbative part is being extracted via the fitting to the BNLY group experimental data. Comparison the evolved TMDs with each other at the NLO and NNLO approximations, indicates that the contribution of NNLO approximation will be dominated at the high energy scale. This is expecting since at higher energy scale the gluon radiation is increasing and consequently the effect of parton transverse momentum would be outstanding.

44.114 | Poster | Aula & Arcades

Development of a cryogenic x-ray detector and an application for kaon mass measurement. | K. Phelan[1], K. Suzuki[2], J. Zmeskal[3] – [1]Stefan Meyer Institute for Subatomic Physics, [2]Stefan Meyer Institute, Austrian Academy of Sciences, [3]Austrian Academy of Sciences (AT)

The ASPE!CT project (a collaboration of industrial and research companies, and the Stefan-Meyer Institute in Vienna) aims to develop a commercially viable, cryogenic detector platform. The first phase of the project will produce a cryogen-free, single-stage, adiabatic demagnetisation refrigerator for use at ≈500mK. The project aims to advance the technology into the realm of reliable, compact, black-box, touch-button devices, which can be used for a wide range of cryogenics sensors. Later stages of the project will push the temperature range to 30mK, and introduce continuous, high-power, low-temperature cooling. At the Stefan-Meyer Institute, we plan to use the detector system to make an improved measurement of the mass of the kaon. Though the kaon mass is an essential input for strangeness hadron physics, it is determined as an average of two largely separated measurements (≈3 sigma, 60 eV) [1]. To this end we will be testing various designs of cryogenic detectors working at 500mK with a view to achieving the necessary resolution at ≈10 keV x-ray energies created in kaonic atoms. Later stages of the project should see lower temperatures and higher resolutions, with improved count rates in an optimised experimental set-up.

44.115 | Poster | Aula & Arcades

Search for exclusive photoproduction of $Z_c(3900)$ at COMPASS | A. Guskov[1] – [1]Joint Inst. for Nuclear Research (RU)

The $Z_c(3900)$ hadron state has been found by the BES-III experiment in the decay of a hadron state with higher mass. The first attempt to search for the direct exclusive production of the $Z_c^{\pm}(3900)$ hadron by virtual photons has been performed in the channel $Z_c^{\pm}(3900) \to J/\psi\pi^{\pm}$ at COMPASS. The data cover the range from 7 GeV to 19 GeV in the centre-of-mass energy of the photon-nucleon system. The full set of the COMPASS data set collected with a muon beam between 2002 and 2011 has been used. An upper limit for the ratio $BR(Z_c^{\pm}(3900) \to J/\psi\pi^{\pm}) \times \sigma_{\gamma\ N\to Z_c^{\pm}(3900)\ N}/\sigma_{\gamma\ N\to J/\psi\ N}$ of 3.7×10^{-3} has been established at the confidence level of 90%.

44.116 | Poster | Aula & Arcades

Connecting amplitudes in different gauges beyond perturbation theory: a canonical flow approach | A. Quadri[1] – [1]INFN, Sez. di Milano

It sometimes happens that particular gauges are computationally more suited than others in the study of several properties of gauge theories. QCD provides a number of examples of such a feature: for instance, evolution equations in the Color Glass Condensate picture are usually derived in the Light-Cone gauge. A more striking example is given by massive solutions of appropriate truncations to the QCD Schwinger-Dyson equations, that have been shown to exist in the Landau gauge, confirming lattice simulations carried out in the same gauge. Since physical quantities have to be gauge invariant, it is important to establish an approach allowing the comparison of computations carried out in different gauges even beyond perturbation theory. We show that the dependence on the gauge parameter α in Yang-Mills theories is controlled by a canonical flow that explicitly solves the Nielsen identities of the model. Green's functions in the α gauge are given by amplitudes evaluated in the theory at $\alpha = 0$ (e.g., in the example of Lorentz-covariant gauges, in terms of Landau gauge amplitudes) plus some contributions induced by the α-dependence of the generating functional of the canonical flow. Explicit formulas are presented and an application of the formalism to the gluon propagator is discussed.

44.117 | Poster | Aula & Arcades

Selected decays of heavy hadrons in Covariant quark model | A. Liptaj[1], M. Ivanov[2], D. Dubnicka[1], A. Dubnickova[3] – [1]Slovak Academy of Sciences (SK), [2]Joint Institute for Nuclear Research, Dubna, Moscow region, [3]Comenius University (SK)

Covariant quark model is an effective theory approach to hadron physics with several appealing features. The model is based on a non-local Lagrangian density which gives the model a full Lorentz invariance. It has limited number of free parameters and provides nice description of experimental measurements. It is well suited for description of rare decays of (heavy) hadrons, an important area or research in experimental particle physics nowadays.

44.118 | Poster | Aula & Arcades

Quark ACM with topologically generated gluon mass | I. Dutta Choudhury[1], A. Lahiri[2] – [1]S N Bose National Centre for Basic Sciences, [2]S N Bose National Centre for Basic Sciences, Kolkata-700098,India

We investigate the effect of a small gauge-invariant mass of the gluon on anomalous chromomagnetic moment of quarks (ACM), by perturbative calculations at one-loop. We use the topological mass generation mechanism, in which the gluon ac-

quires a mass via an interaction with an antisymmetric tensor field $B_{\mu\nu}$. For a small gluon mass ($M_g < 10$ MeV), we give our results at momentum transfer $q^2 = -M_Z^2$. We find that the gluon mass dependence is most evident for the up quark ACM. For other light quarks, the variation of ACM is around 20 percent. Among heavy quarks, the top quark ACM shows significant variation with gluon mass. Reference: Ishita Dutta Choudhury, Amitabha Lahiri, arXiv:1409.0073v2 [hep-ph], (Accepted for publication in Mod. Phys. Lett. A).

44.119 | Poster | Aula & Arcades

Preservation of the D0 Wmass measurement to incorporate future PDF and physics models | J. Cuth[1], D0 Collaboration[2] – [1]Johannes Gutenberg Universitat Mainz (DE), [2]DZero Experiment, Fermilab

The D0 experiment at the Tevatron collider provided in recent years one of the most accurate measurements of the W boson mass. The precise knowledge of the W boson mass, together with the mass of the Higgs Boson and the top quark, provides one of the most crucial tests of the Standard Model of particle physics. The uncertainties of this measurement are dominated by the limited knowledge of the parton density functions, which will improve in future years. Therefore, a dedicated effort of the D0 collaboration aims at the preservation of the W boson mass analysis for a future reevaluation with improved proton descriptions and other improvements in the model of W boson production and decay. In this poster, we give an overview of this effort and discuss the underlying technical infrastructure. We also present a reevaluation of the W boson mass measurement based on $\int Ldt = 4.3 fb^{-1}$ with an updated PDF-set as an example for future applications.

44.120 | Poster | Aula & Arcades

Measurement of the differential top quark pair production cross section in pp collisions at 8 TeV | M. Aldaya Martin[1], A. Meyer[2] – [1]DESY, [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

Normalized differential top quark pair production cross sections are measured in pp collisions at a centre-of-mass energy of 8 TeV at the LHC using the CMS detector. The dataset used for these measurements corresponds to an integrated luminosity of 19.7 fb-1. The measurements are performed in the lepton+jets (e+jets and mu+jets) and in the dilepton (ee, mumu, and emu) decay channels. The ttbar production cross section is measured as a function of kinematic properties of the charged leptons, the jets associated to b quarks, the top quarks, and the ttbar system. The data are compared with several predictions from perturbative QCD calculations up to approximate next-to-next-to-leading-order precision. No significant deviations are observed relative to the standard model predictions

44.121 | Poster | Aula & Arcades

Measurement of the inclusive top pair production cross section using Multivariate analysis techniques | J. Franc[1], D0 Collaboration[2] – [1]Czech Technical University in Prague, [2]DZero Experiment, Fermilab

We present the measurement of the inclusive top pair production cross section in proton anti-proton collisions at 1.96 TeV employing the full RunII data (9.7/fb) collected with the D0 detector at the Fermilab Tevatron Collider. We consider the final state of the top quark pair containing one electron or muon and at least two jets. We select variables according to statistical tests and separate the signal from the background by the application of TMVA Boosted Decision Trees (BDT). The inclusive cross section is derived by a nuisance fit to the BDT discriminant output distribution and combined with results in the dilepton channel. Results are compared to predictions by the standard model.

44.122 | Poster | Aula & Arcades

Measurement of the top quark polarization with the D0 detector | K. Augsten[1], D0 Collaboration[2] – [1]Czech Technical University (CZ), [2]DZero Experiment, Fermilab

We present new measurements of the top quark polarization using the D0 detector at the Fermilab Tevatron Collider. We use the lepton+jets decay channel to measure angular distributions and extract the polarization of the top quark in different basis and compare to the SM expectation. The full Run II D0 data sample is used for this measurement, which corresponds to an integrated luminosity of 9.7 fb^{-1}.

44.123 | Poster | Aula & Arcades

Search for FCNC single top-quark production at 8 TeV with the ATLAS detector | O. Arslan[1], J. Katzy[2] – [1]Universitaet Bonn (DE), [2]DESY, HAMBURG

No abstract available

44.124 | Poster | Aula & Arcades

Search for s-channel single top-quark production in pp collisions | M. Merola[1], A. Meyer[2] – [1]Universita e INFN, Napoli (IT), [2]Rheinisch-Westfaelische Tech. Hoch. (DE)

A search for single top quark production in the s channel in proton-proton collisions with the CMS detector at the LHC is presented. Leptonic decay modes of the top quark with an electron or muon in the final state are considered. The signal is extracted by performing a maximum-likelihood fit to the distribution of a multivariate discriminant defined using Boosted Decision Trees to separate the expected signal contribution from the background processes. The analysis is based on data collected in 2011 at a centre-of-mass energy of 7 TeV and in 2012 at 8 TeV, corresponding to an integrated luminosity of 5.1 / fb and 19.7

/ fb, respectively.

44.125 | Poster | Aula & Arcades

Performance of the CMS Jets and Missing Transverse Energy trigger for the upgraded LHC | F. Zhang[1] – [1]Universite Libre de Bruxelles (BE)

In preparation for collecting the pp collisions from the upgraded LHC at an unprecedented energy (13 TeV) and rate (40MHz), the CMS collaboration has prepared an array of triggers utilizing jets and missing transverse energy for searches for new physics at the energy frontier. The CMS trigger system must be able to sift through the collision events in order to extract events of interest at a rate of 1kHz, applying sophisticated algorithms adapted for fast and effective operation. Particularly important is the calibration of the trigger objects, as corrections to the measured energy may be substantial. Equally important is the development of improved reconstruction algorithms to mitigate negative effects due to high numbers of overlapping proton-proton collisions. Recent work by the CMS collaboration on upgrading the high-level trigger for jets and missing transverse energy for the 25ns LHC operation will be presented, along with the improved performance of these triggers.

44.126 | Poster | Aula & Arcades

Status of vertex and tracking detector R&D at CLIC | E. Firu[1] – [1]ISS - Institute of Space Science (RO)

The physics aims at the future CLIC high-energy linear e+e- collider set very high precision requirements on the performance of the vertex and tracking detectors. Moreover, these detectors have to be well adapted to the experimental conditions, such as the bunch train structure of the beam and the presence of beam-induced backgrounds. The principal challenges are: a point resolution of a few micron, ultra-low mass (≈0.2% X0 per layer for the inner vertex region), very low power dissipation (compatible with air-flow cooling in the inner vertex region) and pulsed power operation, complemented with ≈10 ns time stamping capabilities. An overview of the R&D program for pixel and tracking detectors at CLIC will be presented, including recent results on an innovative hybridisation concept based on capacitive coupling between active sensors (HV-CMOS) and readout ASICs (CLICpix).

44.127 | Poster | Aula & Arcades

Module Production and Qualification for the Phase I Upgrade of the CMS Pixel Detector | B. Freund[1] – [1]KIT - Karlsruhe Institute of Technology (DE)

After consolidation of the LHC in 2013/14 its centre-of-mass energy will increase to 13TeV and the luminosity will reach $2 \cdot 10^3$ cm² s¹, which is twice the design luminosity. The latter will result in more simultaneous particle collisions, which would significantly increase the dead time of the current readout chip of the CMS pixel detector. Therefore the entire CMS pixel detector is replaced in 2016/17 and a new digital readout with larger buffers will be used to handle increasing pixel hit rates. An additional fourth barrel-layer provides more space points to improve track reconstruction. Half of the required modules for layer four is being produced at Karlsruhe Institute of Technology (KIT). This poster deals with the smallest discrete subunit of the pixel detector, the module and its assembly process. Moreover first production experience will be shown.

44.128 | Poster | Aula & Arcades

A comprehensive PMT characterization system | J. Xia[1], S. Qian[1] – [1]Institute of High Energy Physics, Chinese Academy of Sciences

Photomultiplier tubes are intensively used in high energy physics experiments such as the time-of-flight detector and neutrino observatory. A comprehensive performance evaluation system for Photomultiplier tubes has been built up. The system is able to review diverse cathode and anode properties for PMTs with different sizes and dimensions. Relative and direct methods were developed for the quantum efficiency measurement and the results are consistent with each other. Two-dimensional and three-dimensional scanning platforms were built to test both the cathode and anode uniformity for either the plane type or spherical type photocathode. A Flash Analog-to-Digital Convertor module is utilized to achieve high speed waveforms sampling. The entire system is highly automatic and flexible.

44.129 | Poster | Aula & Arcades

Instrumentation of ILC detectors forward region | S. Schuwalow[1] – [1]DESY, Hamburg

The objective of FCAL Collaboration is to design and optimize the very forward region of future Linear Collider detectors. This comprises the development a luminosity calorimeter, LumiCal, for precise luminosity measurement, and a development of a radiation hard beam monitor detector, BeamCal, for a fast luminosity determination and beam parameters control. Together with low angle hadronic calorimeter, LHCAL, these devices should also ensure the detector hermeticity in the forward region. We present R&D activities focused on development and beam tests of prototype detectors and readout ASICs.

44.131 | Poster | Aula & Arcades

Studies on ageing effects of small-Strip Thin Gap Chamber for the ATLAS New Small Wheel Muon Upgrade | M. Gignac[1] – [1]University of British Columbia (CA)

The instantaneous luminosity of the Large Hadron Collider at CERN will be increased up to a factor of five with respect to the design value by undergoing an extensive upgrade program over the coming decade. The largest upgrade project for the

ATLAS Muon System is the replacement of the present first station in the forward regions with the so-called New Small Wheels (NSWs), to be installed during the LHC long shutdown in 2018/19. Small-Strip Thin Gap Chambers (sTGC) detectors are one chosen technology to provide fast trigger and high precision muon tracking under the high luminosity LHC conditions. We study ageing effects of sTGC detectors with a gas mixture of 55% of CO2 and 45% of n-pentane. A sTGC detector was irradiated with beta-rays from a Sr-90 source. Three different gas flow rates were tested. We observed no deterioration on pulse height of the sTGC up to an accumulated charge of 2.5 C/cm. By July of this year, we plan to have collected 6 C/cm.

44.132 | Poster | Aula & Arcades

Luminosity measurement in the CMS experiment | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

The luminosity is a key parameter as its uncertainty translates directly to the uncertainty of the measurement of cross sections and background rate predictions, essential to establish the Higgs and search for new particles. During the first three years of data taking at the LHC, CMS used the Hadron Forward calorimeters and the pixel tracking detector for the luminosity measurement. In dedicated Van der Meer scans the visible cross section of these devices were used to measure the luminosity at any beam intensity. Considerable progress is made in understanding and controlling systematic effects originating both from the detector and the accelerator. The precision achieved in proton-proton scattering at 8 TeV is unprecedented at a hadron collider. In this talk, the Van der Meer methodology for the determination of the visible cross section and the estimate of the systematic uncertainties will be discussed. Furthermore, the stability of the luminosity measurements is estimated using the rate of the standard candle process of vector boson production. The determination of the luminosity for the physics program of Run II will be discussed.

44.133 | Poster | Aula & Arcades

The CMS Level-1 Tau algorithm for the LHC Run II | L. Cadamuro[1] – [1]LLR - Ecole Polytechnique

The CMS experiment implements a sophisticated two-level online selection system that achieves a rejection factor of nearly 1E5. The first level (L1) is based on coarse information coming from the calorimeters and the muon detectors while the High Level Trigger combines fine-grain information from all sub-detectors. During Run II, the centre-of-mass energy of the LHC collisions will be increased up to 13 or 14 TeV and progressively reach an instantaneous luminosity of 2e34 cm-2s-1. To guarantee a successful and ambitious physics program in this intense environment, the CMS Trigger and data acquisition system must be upgraded. In particular the L1 Calorimeter Trigger hardware and architecture will be upgraded, allowing sophisticated algorithms to be deployed, better exploiting the calorimeter granularity and opening the possibility of making correlations between different parts of the detector. In this context, an optimised tau algorithm, implementing an innovative dynamic clustering technique, has been developed for the selection of hadronically decaying taus, which represents a real challenge for an electronics trigger system. The performance of this tau trigger will be demonstrated, both in terms of efficiency and rate reduction. The different handles to control rate in different pile-up scenarios will be described. Finally, the plans for the commissioning with the first Run II data will be presented and the expected impact on the physics potential assessed.

44.135 | Poster | Aula & Arcades

R&D for the upgrade of the CMS muon system | M. Abbrescia[1] – [1]Universita e INFN, Bari (IT)

The CMS muon system is based on three types of gaseous detectors, RPC, CSC and DT. While operating very well in the present conditions, upgrades are foreseen for each of the subsystems, necessary to guarantee its delicate role of muon triggering and tracking also in the High Luminosity phase of LHC, foreseen to start after Long Shutdown 3 in 2024 and to last for about 10 years. Studies devoted to asses the system perfomance stability for the future will be presented, and the plans about the new DT and CSC electronics will be outlined. In addition, the stategy - which is being developed - to complement the existing system with new detectors, based on GEM or improved RPC technologies, will be shown.

44.136 | Poster | Aula & Arcades

The ATLAS Upgrade Planar Pixel Sensors R&D Project: Status and Overview | A. Macchiolo[1], D. Muenstermann[2] – [1]Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D, [2]Universite de Geneve (CH)

To investigate the suitability of pixel sensors using the proven planar technology for the upgraded tracker, the ATLAS Planar Pixel Sensor R&D Project was established comprising 18 institutes and more than 80 scientists. Main areas of research are • performance assessment of planar pixel sensors at HL-LHC fluences to drive design and process improvements. • establishment of reliable device simulations for severely radiation-damaged pixel detectors • the exploration of possibilities for cost reduction to enable the instrumentation of large areas with pixel detectors The presentation will give an overview of the most recent achievements of the R&D project, among them • beam test results with planar sensors irradiated up to HL-LHC fluences at different eta angles providing new insight into efficiencies and cluster sizes under realistic b-layer conditions • comparisons of these experimental findings with initial TCAD device simulations • update on prototyping efforts for large areas: sensor design improvements, 6” wafer production yields, characterisations and rad-hardness confirmations • Possible designs for planar pixel sensors compatible with the new read-out chip in 65 nm CMOS technology. On the base of these results, a discussion on the possible ways implementing planar pixel sensors in the different layers of the new ATLAS pixel system will be given.

44.138 | Poster | Aula & Arcades

The Barrel TOF detector for PANDA | D. Steinschaden[1] – [1]Stefan Meyer Institute
The PANDA experiment addresses fundamental questions in hadron and nuclear physics via interactions of antiprotons with nucleus / nuclei. The experiment is currently under construction at the Facility for Antiproton and Ion Research (FAIR) in Darmstadt, Germany. The High Energy Storage Ring will provide an antiproton beam with a momentum range of 1.5 – 15 GeV/c and an average collision rate on the fixed target of 20 MHz is envisaged. The barrel-shaped scintillator tile hodoscope, covering the central region of the detector, plays a crucial role in determining the time origin of the track. An online data reduction of factor ≈1000 is necessary where the timing information of the scintillator tile hodoscope will be one of the key components. The detector provides particle identification for slow particles below 700 MeV/c. In order to achieve this goal, plastic scintillator tiles with minimum material budget read out by Silicon Photomultiplier (SiPM) have been selected and the time resolution will be < 100 ps. In this presentation, an overview of the current development status with a particular focus on Monte Carlo based simulation studies will be given.

44.139 | Poster | Aula & Arcades
Performance of the ATLAS Calorimeters and Commissioning for LHC Run-2 | V. Rossetti[1], ATLAS Collaboration[2], Y. Yamazaki[3] – [1]Stockholm University (SE), [2]ATLAS, [3]Kobe University (JP)
The ATLAS general-purpose experiment at the Large Hadron Collider (LHC) is equipped with electromagnetic and hadronic liquid-argon (LAr) calorimeters and a hadronic scintillator-steel sampling calorimeter (TileCal) for measuring energy and direction of final state particles in the pseudorapidity range $|\eta| < 4.9$. The calibration and performance of the calorimetry system was established during beam tests, cosmic ray muon measurements and in particular the first three years of pp collision data-taking. During this period, referred to as Run-1, approximately 27≈fb^{-1} of data have been collected at the center-of-mass energies of 7 and 8≈TeV. Results on the calorimeter operation, monitoring and data quality, as well as their performance will be presented, including the calibration and stability of the electromagnetic scale, response uniformity and time resolution. These results demonstrate that the LAr and Tile calorimeters perform excellently within their design requirements. The calorimetry system thus played a crucial role in the Run-1 physics programme, and in the discovery of a Higgs boson. Furthermore, the outcome from the detector consolidation after Run-1 and the major improvements for the upcoming Run-2 will be discussed. First results from the detector commissioning using early LHC beam-splash events in 2015 will be reported.

44.140 | Poster | Aula & Arcades
Recovery Time Measurements of Silicon Photomultipliers Using a Pulsed Laser | L. Gruber[1], S. Brunner[1], C. Curceanu[2], J. Marton[1], A. Romero Vidal[3], A. Scordo[2], K. Suzuki[1], O. Vazquez Doce[4] – [1]Stefan Meyer Institute, Austrian Academy of Sciences, [2]LNF-INFN, [3]University of Santiago de Compostela (ES), [4]TU-Munich, Excellence Cluster Universe
In recent years, the Silicon Photomultiplier (SiPM) started to replace the vacuum PMT in many of the photosensing demands, ranging from high energy physics to medical imaging. One of the important parameters of photodetectors, especially with regard to the usage in modern particle physics experiments, is the performance in high rate environments. In order to characterize the rate capability and double hit resolution, we performed an experimental study to determine the cell recovery time for various SiPMs and its dependency on the operating voltage. Using a fast pulsed laser we tested three Hamamatsu MPPCs with 25 μm, 50 μm and 100 μm pixels and a sensitive area of 1 mm². These are also the most promising devices for photon detection in the AMADEUS trigger system inside the KLOE detector at LNF. The recovery time is evaluated by measuring the sensor response to two consecutive laser pulses with a varying relative time difference of a few ns up to a few 100 ns. The method represents a direct measurement of the recovery time, which is contrary to the standard method using after-pulses. The results show that the SiPM recovery time constant is in the range of a few ten ns, depending on the pixels size. With small pixel devices two adjacent light pulses separated by only 2-3 ns could be resolved. Experimental data are compared with Monte Carlo simulations to investigate the individual effects influencing the recovery process, such as after-pulsing, cross-talk and dark-noise.

44.141 | Poster | Aula & Arcades
Future physics potential of CMS phase-II detector | N. Pozzobon[1] – [1]Universita e INFN, Padova (IT)
To extend the LHC physics program, it is foreseen to operate the LHC in the future with an unprecedented high luminosity. To maintain the experiment's physics potential in such harsh environment, the detector will need to be upgraded. At the same time the detector acceptance will be extended and new features such as a L1 track trigger will be implemented. Simulation studies evaluated the performance of the new, proposed detector components in comparison to the present detector with the expected aging after 1000/fb. The impact of the expected phase-II performance on representative physics channels is studied. The sensitivity to find new physics beyond the SM is significantly improved and will allow to extend the SUSY reach, search for dark matter and exotic long-lived signatures. Precision Higgs and standard model measurements will gain substantially due to the improved performance.

44.142 | Poster | Aula & Arcades
Muon reconstruction performance in ATLAS at Run-II | H. Herde[1] – [1]Brandeis University (US)
The ATLAS muon reconstruction has been improved for the Run-II of the LHC. In this presentation, we will discuss the new reconstruction algorithm and its performance as measured during the early run of the LHC in 2015 at sqrt(s)= 13 TeV using

samples of J/ψ–>$\mu\mu$ and Z–>$\mu\mu$ decays. Reconstruction efficiency, transverse momentum resolution and momentum scales are measured in the various regions of the detector and for muon momenta between 5 and hundreds of GeV.

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Electron and Photon performance in ATLAS at the LHC | K. Grevtsov[1], A. Read[2] – [1]Centre National de la Recherche Scientifique (FR), [2]University of Oslo (NO)

An excellent electron and photon performance is crucial for precision results from high energy proton-proton collisions with electrons and photons in the final state. Identification, energy calibration, response uniformity and linearity for electrons and photons with the ATLAS detector during the LHC run I will be presented. Events with W and Z bosons and J/psi mesons are employed to benchmark these performance parameters. The uncertainties of the measured identification efficiencies are at the few per mil level for electron transverse energy greater than 30 GeV and in the range of 1-2% for high energy photons The achieved calibration for electrons from Z decays is typically accurate to 0.05% in most of the detector acceptance, rising to 0.2% in regions with large amounts of passive material and is on average 0.3% for photons. The stability of the electron energy response as a function of the mean number of interactions per bunch crossing and as a function of time show stability at the level of 0.05%. Early Run2 results will be presented if available.

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Electron and Photon performance with the upgraded CMS detector for HL-LHC | A. Meyer[1] – [1]Rheinisch-Westfaelische Tech. Hoch. (DE)

For the LHC High Luminosity phase (HL-LHC) the CMS Collaboration is planning to upgrade the detector to cope with the extreme particle rates and to reduce the impact on the physics performance due to the large number of pileup events. The most important upgrades will involve new and thinner Silicon Tracker, with extended rapidity coverage, and a new Silicon High Granularity Calorimenter in the Endcap. Additional changes to the Electromagnetic Calorimeter in the barrel will allow to recover from the loss of performance due to the large irradiation of the existing detector. A detailed simulation of the new detector has been succecssfully integrated in the official CMS software, allowing physics studies to be carried out with optimized reconstruction algorithms. The contribution will review the status of the CMS upgrade project with the usage of the new detector geometry with particular emphasis on the reconstruction and identification performance of electrons and photons and the impact on physics analyses.

44.145 | Poster | Aula & Arcades

The CMS inner tracker – transition from LHC Run I to Run II and first experience of Run II | B. Vormwald[1] – [1]Hamburg University (DE)

The CMS silicon pixel and strip trackers provide high efficiency charged particle reconstruction and superb momentum resolution over three decades in energy, and thus play a key role in the CMS physics program. In this talk, the readiness of the silicon tracking detectors for Run II data taking as well as first performance studies will be presented. In light of improvements to the tracker operating environment and repairs of defective pixel channels during the LHC long shutdown, the Run II tracker is expected to have a larger yield of active channels than during Run I and to continue to perform well at the foreseen luminosities.

44.146 | Poster | Aula & Arcades

The ATLAS Jet Trigger for LHC Run 2 | N. Goncalves Dos Anjos[1] – [1]Universitat Autònoma de Barcelona (ES)

The new centre of mass energy and high luminosity conditions expected for Run 2 at the Large Hadron Collider (LHC) impose more demanding constraints on the ATLAS online trigger than ever before. An immense rate of proton-proton collisions must be reduced from the bunch-crossing rate of 40 MHz to approximately 1 kHz before data can be written on disk for offline analysis. The ATLAS trigger system performs real-time reconstruction and selection of these events in order to achieve this reduction. The selection of events containing jets is uniquely challenging at a hadron collider where nearly every event contains significant hadronic activity. It is, however, of crucial importance to exploit the new data in many physics topics in the new kinematic regime, ranging from early Standard Model measurements to searches for New Physics. Following the very successful first LHC run in 2010/12, the ATLAS trigger was much improved, including a new hardware topological processor and the restructuring of the High Level Trigger system, which merges two previously separated software-based processing levels. After briefly summarising the overall performance of the jet trigger during the first LHC run, the design choices, use of the topological processor, and expected capabilities will be reviewed. The expected performance of upgraded jet trigger will be described and compared with the first trigger results from initial Run 2 data.

44.147 | Poster | Aula & Arcades

Real-time Flavour Tagging Selection in ATLAS | J. Hetherly[1] – [1]Southern Methodist University (US)

In high-energy physics experiments, online selection is crucial to select interesting collisions from the large data volume. ATLAS b-jet triggers are designed to identify heavy-flavour content in real-time and provide the only option to efficiently record events with fully hadronic final states containing b-jets. In doing so, two different, but related, challenges are faced. The physics goal is to optimise as far as possible the rejection of light jets, while retaining a high efficiency on selecting b-jets and maintaining affordable trigger rates without raising jet energy thresholds. This maps into a challenging computing task, as tracks and

their corresponding vertices must be reconstructed and analysed for each jet above the desired threshold, regardless of the increasingly harsh pile-up conditions. We present an overview of the ATLAS strategy for online b-jet selection for the LHC Run 2, including the use of novel methods and sophisticated algorithms designed to face the above mentioned challenges. A first look at the performance in Run 2 data is shown and compared to the performance during Run 1. The ATLAS FastTracKer (FTK) system does global track reconstruction for each event accepted at Level 1 to enable early access to tracking information for the High Level Trigger. We also present the status of the FTK commissioning (expected to be completed in 2016) and discuss how the system can be exploited to improve the current b-jet trigger performance.

44.148 | Poster | Aula & Arcades

The Upgrade and Performance of the ATLAS Tau Triggers towards Run 2 | A. Karamaoun[1] – [1]University of Alberta (CA)

Tau triggers are used in a variety of highly anticipated ATLAS physics analyses, including the measurement of the Higgs boson coupling to fermions and searches for Higgs boson partners or heavy resonances decaying into pairs of tau leptons. As proton-proton collisions at the LHC reach instantaneous luminosities of over 10∧34cm∧ -2s-1, the strategies for triggering have become more sophisticated than in Run 1. In these conditions single tau lepton triggers suffer from severe rate limitations, despite the advancements in algorithms used in the tau identification. Further fast algorithms and the design of topological selections are the main developments to allow a large program of physics analysis. In Run 2 topological criteria can be applied already at the first trigger level, due to the addition of the L1 topological processor. This makes it possible to use detailed information from sub-detectors in order to apply real-time event topology cuts. The evolution of the ATLAS tau trigger and its performance will be presented, including initial results from the early days of the LHC Run 2 operation.

44.149 | Poster | Aula & Arcades

The Upgrade of the ATLAS Electron and Photon Triggers towards LHC Run 2 and their Performance | S. Kahn[1] – [1]Centre de Physique de Particules de Marseille (CPPM) (FR)

Electron and photon triggers covering transverse energies from 5 GeV to several TeV are essential for signal selection in a wide variety of ATLAS physics analyses to study Standard Model processes and to search for new phenomena. Final states including leptons and photons had, for example, an important role in the discovery and measurement of the Higgs particle. Dedicated triggers are also used to collect data for calibration, efficiency and fake rate measurements. The ATLAS trigger system is divided in a hardware-based (Level 1) and a software based high level trigger, both of which were upgraded during the long shutdown of the LHC in preparation for data taking in 2015. The increasing luminosity and more challenging pile-up conditions as well as the planned higher center-of-mass energy demanded the optimisation of the trigger selections at each level to control the rates and keep efficiencies high. The evolution of the ATLAS electron and photon triggers and their performance will be presented, including initial results from the early days of the LHC Run 2 operation.

44.150 | Poster | Aula & Arcades

The ATLAS Transverse Momentum Trigger Evolution at the LHC towards Run 2 | ATLAS Collaboration[1] – [1]ATLAS

The transverse momentum triggers of the ATLAS experiment at the CERN Large Hadron Collider (LHC) are designed to select collision events with non-interacting particles passing through the detector. Such events provide an interesting probe new physics interactions beyond the Standard Model, but also provide the basis for precise measurements of Standard Model parameters such as Higgs couplings. The transverse momentum used in the trigger system is calculated from calorimeter-based global energy sums and supplemented with information from the Muon detection system. The trigger was successfully operating during the first running period of the LHC. In 2015 the LHC will start up again at a higher centre-of-mass energy and increased luminosity, both making it challenging to improve on the run period one performance. In this talk a summary of the first run period performance will be presented, as well as a summary of the software and hardware-based improvements for the second run period. A brief summary of the Run 1 performance studies will be presented, together with the Run 2 software and hardware-based improvements as well as some initial results from the early days of Run 2 data-taking period.

44.151 | Poster | Aula & Arcades

Use of Fibre Bragg Grating sensors for Gas Electron Multiplier HEP detectors | M. Caponero[1] – [1]Istituto Nazionale Fisica Nucleare Frascati (IT)

Fibre Gragg Grating (FBG) sensors were used to develop a distributed structural sensing system devoted to assess and validate the mounting procedure of the Gas Electron Multiplier (GEM) films of the GE1/1 chambers of the Compact Muon Solenoid (CMS) experiment at LHC. The large (1m by 0.5m) GEM films must be mechanically stretched to optimal mechanical tension to assure flatness. FBG technology was adopted in consideration of the stringent requirements of lightness asked for the sensing system to be deployed on thin GEM foils to be monitored, and to several advantages compared to non-optical sensors, such as radiation hardness, long term reliability, precision, accuracy. FBGs are optical strain gauges embedded in the core of an optical fibre. Quasi-punctual sensing occurs at the FBG position and the signal is delivered to the acquisition unit through the fibre length. Multiple FBGs can be placed in-series along one optical fibre. For this work we deployed a custom array of FBGs placed in-series along an optical fibre and installed on the surface of the GEM foil. A full size GE1/1 chamber was instrumented, installing one array of FBGs on each of its three GEM foils. Experimental measurements were done to correlate parameters such as flatness of GEM foil, distributed strain of GEM foils, tensioning applied on GEM foil border by mounting brackets.

Preliminary results will be presented and discussed.

44.152 | Poster | Aula & Arcades

Upgrade of the ATLAS Muon Barrel Trigger for HL-LHC | S. Biondi[1] – [1]Universita e INFN, Bologna (IT)

The present ATLAS muon trigger in the barrel region (|eta|<1.05) is based on three layers of RPC chambers. It was designed to run for 10 years at the LHC luminosity of 10∧34 cm∧-2s∧-1 and operated successfully and with high selectivity during the first run of the LHC. In order to ensure a stable performance of the RPCs until 2035 at the higher rates and at luminosities of 5-7x10∧34 cm∧-2s∧-1 provided by HL-LHC, the chambers will have to be operated with reduced gas gain to respect the original design limits on currents and integrated charge. The ATLAS muon collaboration proposes an upgrade of the system by installing an inner layer of new generation RPCs during the LHC shutdown expected for the year 2023. This new layer will increase the system redundancy and therefore allow operation with high efficiency and high selectivity during the HL-LHC phase. The insertion of this new layer will also increase the geometrical acceptance in the barrel region from 75% to 95%. Moreover, the additional measurements along the muon track provided by he inner layer will improve the resolution on the muon momentum. The trigger electronics will be upgraded with a more flexible system capable to operate at the expected level-0 rate of 1 MHz. The first 10% of the system, corresponding to the edges of the inner barrel even sectors (BIS), has been already approved by ATLAS and will be installed in 2018, to reinforce the trigger in the region between barrel and endcap.

44.153 | Poster | Aula & Arcades

Precision electromagnetic calorimetry at the energy frontier: The CMS ECAL at the LHC Run 2 | B. Marzocchi[1] – [1]Universita & INFN, Milano-Bicocca (IT)

The LHC Run 2 has recently begun, with proton-proton collisions at an unprecedented centre-of-mass energy of 13 TeV and will soon move to a reduced bunch spacing of 25ns. After the successful quest for a Higgs boson via its electromagnetic decays, and the subsequent measurement of its mass, the CMS electromagnetic calorimeter (ECAL) is at the forefront of precision measurements and the search for new physics from analysis of the several hundred inverse femtobarns of data which will be recorded over the coming 7-8 years. In this talk we present new reconstruction algorithms and calibration strategies which aim to maintain, and even improve, the excellent performance of the CMS ECAL under the new challenging conditions of Run 2. The CMS ECAL is a high-resolution, hermetic, and homogeneous electromagnetic calorimeter made of 75,848 scintillating lead tungstate crystals. Its exceptional precision, as well as its timing performance, are invaluable tools for the discovery of new physics with the CMS detector at the LHC. The excellent performance of the calorimeter relies on precision calibration maintained over time, despite severe irradiation conditions. A set of inter-calibration procedures using different physics channels is carried out at regular intervals to normalize the differences in crystal light transparency and photodetector response between channels, which can change due to accumulated radiation. The timing precision achieved is better than 200ps.

44.154 | Poster | Aula & Arcades

Implementation of Level-1 trigger algorithms on the upgraded CMS Global Trigger System | B. Arnold[1] – [1]Austrian Academy of Sciences (AT)

The Global Trigger is the final step of the CMS Level-1 Trigger and implements a trigger menu, a set of selection requirements applied to the final list of objects from calorimeter and muon triggers. The conditions for trigger object selection including topological requirements on multi-object triggers, invariant-mass calculations and other complex operations are combined by simple combinatorial logic to form the algorithms. To improve the performance of the Level-1 trigger system at high luminosity with large numbers of pile-up events expected at LHC Run 2, the electronics for the calorimeter, muon and Global Trigger systems will be replaced. The upgraded system will be flexible for implementing further rate reduction and efficiency improvements as algorithms improve. The flexibility will be accomplished by using high bandwidth optical links for most of the data communication between trigger cards, and by using modern, large FPGAs and large memory resources for the trigger logic. In order to handle the increased complexity of the trigger menu implemented on the upgraded Global Trigger as well as to make the menu implementation more flexible, a set of rules has been defined to express Level-1 algorithms. The system to realise the trigger menu on FPGA from Level-1 trigger algorithms expression based on the rules has been developed. The design and implementation of the system for preparing a menu for the upgraded CMS Global Trigger system will be presented.

44.155 | Poster | Aula & Arcades

Construction and Performance Studies of Large Resistive Micromegas Quadruplets | T. Lin[1], C. Valderanis[1], G. Sekhniaidze[2], O. Sidiropoulou[3], F. Kuger[3], M. Bianco[4], P. Iengo[4], M. Schott[1], J. Wotschack[5] – [1]Johannes-Gutenberg-Universitaet Mainz (DE), [2]Universita e INFN, Napoli (IT), [3]Bayerische Julius Max. Universitaet Wuerzburg (DE), [4]CERN, [5]Aristotle Univ. of Thessaloniki (GR)

In view of the use of micromegas detectors for the upgrade of the ATLAS muon system, we have constructed two detector quadruplets with an area of 0.5 m2 per plane serving as prototypes for future ATLAS chambers. They are based on the resistive-strip technology and thus spark tolerant. The detectors were built in a modular way. The quadruplets consist of two double-sided readout panels and three support (or drift) panels equipped with the micromesh and the drift electrode. The panels are bolted together such that the detector can be opened and cleaned, if required. Two of the readout planes are equipped with readout strips inclined by 1.5 degree. In this poster, we present the results of detailed performance studies based on

X-Ray measurements, cosmic ray- and test-beam measurements that have been conducted in the past months. In addition, we foresee to present preliminary results on aging studies, conducted at the GIF++ facility.

44.156 | Poster | Aula & Arcades

Improvements to ATLAS track reconstruction for Run-2 | H. Oide[1] – [1]CERN

Run-2 of the LHC will provide new challenges to track and vertex reconstruction with higher energies, denser jets and higher rates. In addition, the Insertable B-layer (IBL) is a fourth pixel layer, which has been inserted at the centre of ATLAS during the shutdown of the LHC. We will discuss improvements to track reconstruction developed during the two year shutdown of the LHC. These include novel techniques developed to improve the performance in the dense cores of jets, optimisation for the expected conditions, and a big software campaign which lead to a factor of three decrease in the CPU time needed to process each recorded event. The commissioning of the detector in preparation for Run-2 using cosmic data and, if available, collision data will also be discussed.

44.157 | Poster | Aula & Arcades

b-tagging performance for ATLAS in LHC Run II | T. Calvet[1], A. Read[2] – [1]CPPM, Aix-Marseille Université, CNRS/IN2P3 (FR), [2]University of Oslo (NO)

The insertion of the IBL (Insertable B-Layer) allows the ATLAS Experiment to significantly improve the b-tagging performance during the LHC Run-II. As well as the IBL, a significant effort has gone into improving the b-tagging algorithms. The expected performance improvement from both these updates, as well as the first results from commissioning the b-tagging with the new data, will be discussed in detail, together with the impact on physics analysis.

44.158 | Poster | Aula & Arcades

Dedicated Trigger for Highly Ionising Particles at ATLAS | A. Katre[1] – [1]Universite de Geneve (CH)

In 2012, a novel strategy was designed to detect signatures of Highly Ionising Particles (HIPs) such as magnetic monopoles, dyons or Qballs with the ATLAS trigger system. With proton-proton collisions at a centre of mass enegy of 8 TeV, the trigger was designed to have unique properties as a tracker for HIPs. It uses only the Transition Radiation Tracker (TRT) system, applying an algorithm distinct from standard tracking ones. The unique high threshold readout capability of the TRT is used at the location where HIPs in the detector are looked for. In particular the number and the fraction of TRT high threshold hits is used to distinguish HIPs from background processes. The trigger requires significantly lower energy depositions in the electromagnetic calorimeters as a seed unlike previously used trigger algorithms for such searches. Thus the new trigger is capable of probing a large range of HIP masses and charges. We will give a description of the algorithms for this newly developed trigger for HIP searches and present results on its performance during the 2012 data-taking, comparing them to previously used triggers for HIP searches. Furthermore, presented will be higher signal efficiencies in the challenging Run 2 environment of the Large Hadron Collider (LHC) due to increased centre of mass energy and luminosity despite of demanding pile-up conditions.

44.159 | Poster | Aula & Arcades

The ATLAS Muon Trigger Performance: Run 1 and Initial Run 2 Performance | K. Kasahara[1] – [1]University of Tsukuba (JP)

Events with muons in the final state are an important signature for many physics topics at the Large Hadron Collider (LHC). An efficient trigger on muons and a detailed understanding of its performance are required. In 2012, the last year of Run 1, the instantaneous luminosity of the LHC reached 7.7x10∧33 cm -2s-1 and the average number of events that occur in a same bunch crossing was 25. The ATLAS Muon trigger has successfully adapted to this changing environment by making use of isolation requirements, combined trigger signatures with electron and jet trigger objects, and by using so-called full-scan triggers, which make use of the full event information to search for di-lepton signatures, seeded by single lepton objects. A stable and highly efficient muon trigger was vital in the discovery of Higgs boson in 2012 and for many searches for new physics. The performance of muon triggers during the LHC Run 1 data-taking campaigns is presented, together with an overview and preliminary results of the new muon strategy and algorithms, designed to face the demanding and challenging environment, which will be adopted during Run 2.

44.161 | Poster | Aula & Arcades

The Kaon identification system at the NA62 CERN experiment | E. Maurice[1], C. Lazzeroni[2] – [1]University of Liverpool (GB), [2]University of Birmingham (GB)

The main goal of the NA62 experiment at the CERN SPS accelerator is to measure the branching ratio of the ultra-rare K+ –> $\pi+\nu\nu$ decay with 10% accuracy. This will be achieved by detecting about 100 K+ –> $\pi+\nu\nu$ decays with a ratio signal/background 10 in 2-3 years of data taking. NA62 will use a 750MHz high-energy un-separated charged hadron beam, with kaons corresponding to 6% of the beam, and a kaon decay-in-flight technique. Since pions and protons cannot be separated efficiently from kaons at the beam level, the identification of kaons within the high-intensity NA62 beam is mandatory. The time information is also essential to reconstruct the K+ decay and to guarantee the rejection of background induced by accidental overlap of events in the detector. A differential Cherenkov detector (CEDAR) filled with Nitrogen gas, and placed in the incoming beam, will perform the fast identification of kaons, before their decays, with an efficiency of at least 95%. The CEDAR is insensitive to pions and protons and will provide precise time information with a resolution of at least 100ps. To stand the particle rate

and to meet the performances required, an upgraded version (CEDAR-KTAG) with new photon detectors, readout, mechanics, cooling and safety systems has been realised for NA62. The measured time resolutions and efficiency will be presented.

44.163 | Poster | Aula & Arcades

ATLAS LUCID detector upgrade for LHC Run 2 | O. Viazlo[1] – [1]Lund University (SE)

The new ATLAS luminosity monitor got several major innovations. Its photomultipliers tubes are used as detector elements by using the Cherenkov light produced by charged particles above threshold crossing the quartz windows. In order to cope with the 25 ns bunch spacing of the LHC machine the analog shaping of the readout chain has been significantly improved. The main readout card represents a quite general processing unit based on 12 bit - 500 MS/s Flash ADC and on FPGAs, delivering the processed data to 1.3 Gb/s optical links. The talk will describe all improvements and will outline future perspectives of the readout card for next generation high energy physics experiments.

44.164 | Poster | Aula & Arcades

CMS tracking challenges yesterday, today and tomorrow | E. Brondolin[1] – [1]Austrian Academy of Sciences (AT)

The Compact Muon Solenoid (CMS) is one of the two general purpose experiments at the LHC. Until 2012 (Run1), pp collisions have been delivered with a minimal bunch time separation of 50 ns and a mean of about 15 collisions per bunch crossing. After the end of the long shut-down this year, LHC is foreseen to ultimately exceed an instantaneous luminosity of 10∧34 cm∧-2s∧-1, which means a bunch time separation of 25 ns with a mean of more than 25 inelastic collisions superimposed on the event of interest (Run2). In this high-occupancy environment, obtaining a precise particle momentum reconstruction is one of the biggest challenges. To this end, the CMS collaboration has constructed the largest silicon tracker ever and has developed a sophisticated tracking software, that is able to successfully reconstruct the hundreds of tracks produced in each beam crossing.However, more challenges lie ahead. CERN is planning an upgrade program of the LHC collider which will bring the luminosity up to 5x10∧34 cm∧-2s∧-1 after 2020. In order to face this new scenario (called Phase2), CMS will build a completely new silicon-tracker detector and will need to implement new approaches to track finding in addition to the algorithms already in use. This poster gives an overview of the iterative track reconstruction used in CMS with the performance obtained yesterday (Run1), recent tracking improvements for today (Run2), and some ideas (and foreseen results) for tomorrow (Phase2).

44.165 | Poster | Aula & Arcades

Construction of a Precision Four-Layer Floating Strip Micromegas Chamber | J. Bortfeldt[1], B. Flierl[2], R. Mueller[2], O. Biebel[1], P. Loesel[1], A. Zibell[3], R. Hertenberger[1] – [1]Ludwig-Maximilians-Univ. Muenchen (DE), [2]LMU Munich, [3]Bayerische Julius Max. Universitaet Wuerzburg (DE)

Floating strip Micromegas detectors have proven to be discharge sustaining and versatile high-rate capable tracking detectors. They exhibit a spatial resolution of 50 μm and a single strip temporal resolution on the order of 5 ns. Up to particle fluxes of 7 MHz/cm^2 single particle tracking at an efficiency above 95% is possible. Recently we have further increased the high-rate capability by using alternative Neon based detector gases. We constructed a four-layer floating strip Micromegas detector with an active area of 55 $\times$ 33 cm^2 subdivided into 768 strips per layer. Each readout plane consists of two separate printed circuit boards. The anode and cathode panels are realized as stiff aluminum honeycomb sandwich panels with 0.5 mm thick copper-clad, structured FR4 boards. The panels are assembled on a precisely planar table, that carries a high-precision alignment frame. The assembly procedure shall ensure the relative alignment of the two readout boards per layer and the correct inter-plane alignment. The construction and assembly procedures of the quadruplet chamber are presented. They can serve as a proof-of-concept study for the construction of large-area multi-layer Micromegas chambers. Planarity measurements with a laser distance sensor equipped coordinate measuring machine and first measurements with the chamber are discussed.

44.168 | Poster | Aula & Arcades

Radiation hardness tests of Avalanche Photodiodes used in High Energy Nuclear Physics Experiments | V. Kushpil[1], V. Mikhaylov[1], S. Kushpil[1], V. Ladygin[2], O. Svoboda[1], P. Tlusty[1], A. Kugler[1] – [1]Nuclear Physics Institute ASCR, [2]Joint Institute for Nuclear Research (JINR)

Modern avalanche photodiodes (APDs) with high gain are excellent device candidates for the light readout from detectors used for the high energy physics experiments. We report the results of the APDs radiation hardness study. Properties of APDs manufactured by Zecotek, Ketek and Hamamatsu companies are studied in terms of internal defects accumulation. Test setups for offline and online APD irradiation measurements are described. Simplified models estimating contribution of various noise components are discussed in comparison with data achieved by static and dynamic characteristics analysis and Fourier analysis. The results of the APDs investigations after irradiation using secondary neutrons from the cyclotron facility U120M at the Nuclear Physics Institute of ASCR in Řež are presented. The results of the investigations can be used for the design of the Projectile Spectator Detector (PSD) for the CBM experiment at the future FAIR facility, the Forward Wall Detector (FWD) for the Baryonic Matter Spectrometer (BM@N) and the Multi Purpose Detector (MPD) at the future NICA facility.

44.169 | Poster | Aula & Arcades

The Belle II Pixel Detector: How to deal with high occupancy | M. Valentan[1] – [1]Austrian Academy of Sciences (AT)

The innermost Pixel Detector (PXD) of the Belle II experiment makes use of the DEPFET (Depleted P-channel Field Effect

Transistor) technology to provide the accurate position measurements that are needed for the reconstruction of B meson decay vertices. It has to work in very challenging conditions: The instantaneous luminosity of 8x10∧35 cm∧2s∧-1 expected at SuperKEKB causes a high event rate and a large background, the resulting sensor occupancy is furthermore increased by the PXD's close proximity to the interaction point. A general introduction of the PXD can be found in talk 396 "Inner tracking devices at the Belle II experiment". As a complement, this poster presents the strategies of how to deal with the aforementioned challenging conditions in terms of sensor layout and electronic readout. Highlights include the four-fold rolling shutter readout (making readout four times as fast), segmenting the sensor to allow different operating voltages (to deal with inhomogeneous irradiation), zero-suppressed readout focussed on small "Regions of Interest" (to suppress background hits), and a fast electronic shutter, the so-called "Gated Mode" (to make the sensor blind during short periods of increased background particle flow).

44.170 | Poster | Aula & Arcades

The FNAL E989 g-2 straw tracker detectors | M. Lancaster[1] – [1]University College London (UK)

The FNAL E989 experiment is seeking to measure the anomalous magnetic moment (a_μ) of the muon to a precision (0.14 ppm): four times better than previously achieved and to extend the sensitivity to a muon electric dipole moment (EDM) by two orders of magnitude. The experiment will re-use the E821 BNL storage ring but will be upgraded with new detectors, kicker magnets, collimators and improved quadrupoles and field monitoring. The detector system comprises 24 lead-fluoride calorimeters and 3 straw tracker stations. The straw trackers are essential in measuring the beam profile, identifying lost-muons and pile-up and provide the means to probe the muon EDM. In this talk the design of the E989 straw trackers will be described and recent results of their performance from test-beams will be shown highlighting how the trackers will improve the systematic error determination in the a_μ measurement.

44.171 | Poster | Aula & Arcades

SoLid construction and calibration poster | C. Moortgat[1] – [1]UGent

The SoLid experiment aims to resolve the reactor anti neutrino anomaly by searching for short baseline neutrino oscillations. The experiment makes use of a novel detector technology based on the combination of 5cm×5cm×5cm PVT cubes and 6LiF:ZnS screens. This technology provides an improvement for the background rejection capabilities, the neutron identification and the localization of the inverse beta decay compared to the standard liquid scintillators + Gd detectors. This poster discusses the construction and commissioning of the first module installed at the BR2 research reactor in SCK-CEN, Mol, Belgium. Radioactive sources are used to study the light attenuation and to calibrate the energy response of the detector as well as to control its uniformity and stability.

44.172 | Poster | Aula & Arcades

Anti-neutrino measurements in SNO+ | S. Andringa[1] – [1]LIP

SNO+ is a new neutrino physics experiment, that will start collecting data in 2016, reusing the SNO detector with 780 tons of liquid scintillator as an active medium. It will perform several low energy measurements, namely the search for neutrinoless double beta decay, for which the scintillator will be loaded with tellurium. Anti-neutrino interactions can be identified through a characteristic delayed coincidence signature, between a positron annihilation and a neutron capture. SNO+ will measure anti-neutrinos from nuclear reactors, useful for oscillation studies, and geo-neutrinos, useful for Geophysics studies. The reactor and geo-neutrinos have very different energy spectra, which is the main variable to disentangle them. We explore the possibility to use time variations of the expected fluxes and some direction sensitivity to increase the separation between the anti-neutrino sources, for example between geo-neutrinos from crust and mantle. The main advantage of SNO+ for the anti-neutrino analysis is that the flux is dominated by reactors in two different directions and two distances of the order of 100 kms, which give rise to sharp spectral features in the oscillated energy spectrum and a high sensitivity to the neutrino squared mass difference parameter. On the other hand, the small number of near-by reactors implies also a small background for the geo-neutrino measurement, to be done in a new geological location.

44.173 | Poster | Aula & Arcades

Muons at SoLid - Detector Commissioning | D. Saunders[1], D. Saunders[2] – [1]University of Bristol (GB), [2]Bristol University.

The SoLid experiment aims to make a measurement of very short distance neutrino oscillations using reactor antineutrinos. Key to its sensitivity are the experiment's excellent spatial and energy resolution, combined with a highly suitable reactor source and good background rejection. The fine segmentation of the detector, and ability to resolve signals in space and time, gives SoLid the capability to track cosmic muons. In principle a source of background, these turn into a valuable calibration source if they can be cleanly identified. We present the results of our muon analyses with the recent SoLid prototype (SM1). This includes our methodology of tracking at SoLid, cosmic ray angular analyses at the reactor site, and estimates of the timing and energy resolutions.

44.174 | Poster | Aula & Arcades

A rephasing invariant study of neutrino mixing | S. Chiu[1], T. Kuo[2] – [1]Chang Gung University, Taiwan, [2]Purdue University, USA

Three-flavor neutrino mixing is studied through the sets of evolution equations which are based on a rephasing invariant parametrization. These equations are found to preserve some characteristic features of the mixing matrix. Applications to the neutrinos in matter and the RGE running of the neutrino parameters are investigated.

44.175 | Poster | Aula & Arcades
Status of the Hyper-Kamiokande Project | M. Catanesi[1] – [1]INFN Bari
Hyper-Kamiokande (Hyper-K), a proposed one-megaton water Cherenkov detector to be built in Japan, is the logical continuation of the highly successful program of neutrino (astro)physics and proton decay using the water Cherenkov technique. In its baseline design, the Hyper-K detector consists of two cylindrical tanks lying side-by-side, the outer dimensions of each tank being 48m x 54m x 250m. The inner detector region will be instrumented with 99,000 20-inch photo-sensors. Hyper-K will offer a broad program of physics and astrophysics, such as precise measurements of the lepton mixing matrix and leptonic CP asymmetry with accelerator and atmospheric neutrinos, a search for the nucleon decay with an order of magnitude better sensitivity, and other researches in particle and astroparticle physics with extraterrestrial neutrinos. An international collaboration has been intensively working on the R&D of key components such as optimization of cavern and tank construction, development of high performance photosensors, calibration, readout and trigger systems, design of new near detectors, J-PARC neutrino beam improvement, and development of simulation and reconstruction software. The overview of R&D and the status of project will be presented

44.176 | Poster | Aula & Arcades
Measurements at the T2K near detector | K. Scholberg[1] – [1]Duke University
The near detector complex of T2K consists of a set of scintillating tracking detectors spanning the beam axis (INGRID) along with a magnetized detector system with fine-grained tracking and calorimetry (ND280). Together, ND280 and INGRID offer unique opportunities for the study of $\approx$1 GeV neutrino interactions, including the possibility to study the energy dependence of the cross section using the varying energy spectrum resulting from detectors spanning different off-axis angles, and precise kinematic reconstruction and particle identification with which neutrino interactions can be studied in detail. We report new studies of charged-current muon neutrino interactions in both INGRID and ND280 in final states with zero or one pion, including coherent scattering leading to pion production, and measurements of the inclusive cross section.

44.177 | Poster | Aula & Arcades
Neutron identification in the SoLid experiment | S. Vercaemer[1] – [1]SoLid
The SoLid experiment aims to make a measurement of very short baseline neutrino oscillations using reactor anti-neutrinos. For this purpose, a highly segmented detector was build out of PVT cubes lined with a ^{6}LiF:ZnS(Ag) layer. Unlike neutrino experiments conducted deep underground, neutrino detectors used in a reactor environment need to tolerate high levels of background radiation. Therefore, a reliable distinction between the neutrons produced in inverse beta decay events and signals caused by other background interaction is crucial. This poster presents a unique neutron identification method used in the SoLid experiment: The composite of scintillation material with different time constants enables the efficient use of pulse-shape analysis to discriminate against electromagnetic signals.

44.178 | Poster | Aula & Arcades
Muonless Events in ICAL at INO | A. Ajmi[1], S. Umasankar[2] – [1]HBNI, [2]IIT Bombay
The primary physics signal events in the Iron Calorimeter at India-based Neutrino Observatory are the ν_μ charged current (CC) interactions with a well defined muon track. Apart from these events, the Iron Calorimeter can also detect other types of neutrino interactions, i.e. the electron neutrino charged current interactions and the neutral current events. It is possible to have a dataset containing mostly ν_eCC events, by imposing appropriate selection cuts on the events. The ν_μCC and the neutral current events form the background to these events. This study uses Monte Carlo generated neutrino events, to design the necessary selection cuts to obtain a ν_eCC rich dataset. An optimized set of constraints are developed which balance the need for improving the purity of the sample and having a large enough event sample. Depending on the constraints used, one can obtain a neutrino data sample with the purity of ν_e events varying between 55

44.179 | Poster | Aula & Arcades
Probing the dipole moments of the tau-neutrino at high-energy γe^- and $\gamma\gamma$ collisions: ILC and CLIC | A. Gutierrez-Rodriguez[1], M. Koksal[2], A. Billur[2] – [1]Universidad Autónoma de Zacatecas, [2]Deparment of Physics, Cumhuriyet University, Turkey
In this work we study the potential of the processes $e^+e^- \to e^+\gamma e^- \to e^+\tau\bar{\nu}_\tau\nu_e$ and $e^+e^- \to e^+\gamma\gamma e^- \to e^+\nu_\tau\bar{\nu}_\tau e^-$ at a future high-energy and high-luminosity linear electron positron collider, such as the ILC and CLIC to study the sensibility on the anomalous magnetic and electric dipole moments of the tau-neutrino. For integrated luminosity of 590 fb^{-1} and center-of-mass energy of 3 *TeV*, we derive 95% C. L. limits on the dipole moments: $\mu_{\nu_\tau} \leq 1.44 \times 10^{-6}\mu_B$ and $d_{\nu_\tau} \leq 2.78 \times 10^{-17}$ *e cm* in the γe^- collision mode and of $\mu_{\nu_\tau} \leq 3.4 \times 10^{-7}\mu_B$ and $d_{\nu_\tau} \leq 6.56 \times 10^{-18}$ *e cm* with the $\gamma\gamma$ collision mode, improving the existing limits.

44.180 | Poster | Aula & Arcades
A minimal seesaw model with the mu-tau symmetry | D. Jurciukonis[1], A. Juodagalvis[1], T. Gajdosik[1] – [1]Vilnius University (LT)

Assuming a minimal seesaw model with two right-handed singlet Majorana neutrinos we analyse light neutrino masses and oscillation angles induced by the μ-τ symmetry. A general neutrino mass matrix, that is invariant with respect to the μ-τ symmetry, gives θ_{23} = 45 degree and θ_{13} = 0. Applying radiative corrections we break this flavor symmetry and reproduce the observed neutrino oscillation phenomenology. The Higgs sector of our model is constructed with two Higgs doublets and a CP-invariant Higgs potential which allows to establish the conditions for the Higgs mixing angles. We assume an auxiliary symmetry Z_2 for the Higgs sector. The second Higgs doublet breaks the μ-τ symmetry spontaneously. We analyse the light neutrino masses numerically as functions of the heavy neutrino masses. Both normal and inverted hierarchies of the light neutrino masses are discussed. We choose values for the parameters of the model at tree-level by numerical scans, where we look for the best agreement between the computed and experimental neutrino oscillation angles. In addition, the influence of different Yukawa coupling strengths to the Higgs mass distributions and the neutrino oscillation phenomenology is analysed.

44.181 | Poster | Aula & Arcades
Monitoring Reactor Anti-neutrinos with T2K-ND280 Technolgy | J. Coleman[1] – [1]University of LIverpool
Preventing nuclear proliferation is a high priority for the international community. Monitoring of nuclear facilities to detect unauthorised removal of fissile materials from operational cores is central to this. Anti-neutrino flux and spectral information can be used to determine instantaneous reactor power, and, relative core content of uranium and plutonium. A tonne-scale prototype device has been developed and demonstrated at the University of Liverpool based on the design of the T2K Near Detector Calorimeter. The detector design has proven to be robust and reliable while the use of plastic scintillator and SiPMs is ideal for use in close proximity of nuclear reactors. The prototype detector is currently undergoing field tests at the Wylfa Magnox Reactor, Anglesey, UK . This talk will give an overview of the project motivation, detector commissioning and field-testing progress.

44.182 | Poster | Aula & Arcades
Approach to the time developpement of parton fragmentation | M. Rohrmoser[1] – [1]SUBATECH
It is the central goal of our studies to describe parton fragmentation in the hot and dense medium of a quark gluon plasma. Under the assumption that the medium is not static and homogeneous, knowledge about the temporal evolution of the processes involved can be of essential importance. Therefore, parton fragmentation has been studied with a Monte-Carlo algorithm that approximates the DGLAP-evolution of fragmentation functions via a set of parton cascades. The presented work consists mainly of the implementation of such an algorithm and the application of a simple approximation, which gives the time developpement of partonic cascades. A first model uses the leading-log approximation to parton splitting processes of gluons and massless quarks in the vacuum, while extensions to this model are also being investigated. Furthermore, the temporal evolutions of quantities related to partonic cascades have been examined: To our understanding, especially variables (like, e.g.: parton multiplicities or virtualities) that give insight, when parton splittings take place are of high interest, as they allow to identify the parts of the fragmentation process that will be the ones most affected by medium interactions.

44.183 | Poster | Aula & Arcades
Blast-wave fits with resonances to pt spectra from Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV | I. Melo[1], B. Tomasik[2] – [1]University of Zilina (SK), [2]Univerzita Mateja Bela (SK)
We fit the single-hadron transverse-momentum spectra measured in Pb+Pb collisions at $\sqrt{s_{NN}}$ = 2.76 TeV with the blast-wave model that includes production via resonance decays. Common fit to pions, kaons, (anti)protons, and lambdas yields centrality dependence of the freeze-out temperature and transverse expansion velocity. Multistrange baryons seem to decouple at higher temperature and weaker transverse flow. Within our model we observe hints of chemical potential for the charged pions. We analyse how resonances with different masses contribute to various pt intervals in the pion spectrum.

44.185 | Poster | Aula & Arcades
J/ψ production in U+U collisions at the STAR experiment | J. Fodorova[1] – [1]Czech Technical University in Prague
Quark-gluon plasma (QGP), a novel state of deconfined nuclear matter, has been extensively studied in high-energy heavy-ion collisions at the Relativistic Heavy Ion Collider (RHIC). Suppression of heavy quarkonium production (e.g. J/ψ, Υ) in heavy-ion collisions compared to proton-proton collisions due to the color screeening of the quark-antiquark potential is expected to be an indicator of the partonic phase. However, there are also other effects that may influence the expected suppression pattern of heavy quarkonia (e.g. secondary production in the QGP, cold-nuclear-matter effects). To understand those different contributions we need to study production of heavy quarkonia in various colliding systems. At RHIC, effects of the hot medium on heavy quarkonia have been studied in Au+Au and U+U collisions. Since U nuclei are larger than Au nuclei and are non-spherical, it is expected that in the most central U+U collisions the energy density of the created medium is higher than in Au+Au collisions. Thus they allow for further testing of the color screening hypothesis. In this poster we will present preliminary results on nuclear modification factor of J/ψ production reconstructed at midrapidity via di-electron decay channel in minimium-bias U+U collisions at $\sqrt{s_{\mathrm{NN}}}$ = 193 GeV at the STAR experiment and current status of analysis of J/ψ production in central U+U collisions.

44.186 | Poster | Aula & Arcades
Femtoscopic correlations of two identical particles with nonzero spin in the model of one-particle multipole sources | V. Lyuboshitz[1], V. Lyuboshitz[1] – [1]Joint Institute for Nuclear Research, Dubna
The process of emission of two identical particles with nonzero spin *S* and different helicities in relativistic heavy-ion collisions is theoretically investigated within the model of one-particle multipole sources. Taking into account the unitarity of the finite rotation matrix and the symmetry relations for *d*–functions, the general expression for the probability of emission of two identical particles by two multipole sources with angular momentum *J*, averaged over the angular momentum projections and over the space-time dimensions of the multiple particle generation region, has been obtained. For unpolarized particles, the additional averaging over helicities is performed and the formula for two-particle correlation function at sufficiently large 4-momentum difference *q* is derived. For particles with nonzero mass, this formula is considerably simplified in the case when the angle β between the particle momenta equals zero, and also in the case when *J* = *S*. In addition, the special cases of emission of two

unpolarized photons by dipole and quadrupole sources, and emission of two "left" neutrinos ("right" antineutrinos) by sources with arbitrary *J* have been also considered, and the respective explicit expressions for the correlation function are obtained .

44.187 | Poster | Aula & Arcades
Particle Flow and Reaction Plane reconstruction performance in the CBM experiment | V. Mikhaylov[1], V. Kushpil[1], A. Kugler[1], S. Seddiki[2], I. Selyuzhenkov[2], P. Tlusty[1] – [1]Nuclear Physics Institute ASCR, [2]GSI Helmholtzzentrum für Schwerionenforschung, Germany
Particle flow and reaction plane reconstruction performance using the Projectile Spectator Detector (PSD) in the CBM experiment at the future FAIR facility will be presented. The PSD is a compensating lead-scintillator calorimeter designed to measure the energy distribution of the forward going projectile nucleons and nuclei fragments (spectators) produced close to the beam rapidity. The main purpose of the PSD is to provide experimental estimates of heavy-ion collision centrality and reaction plane orientation. Direct proton flow is studied for Au+Au collisions using four heavy-ion collision event generators: UrQMD, DCM-QGSM, LA-QGSM and HSD. Reaction plane reconstruction performance was investigated for produced particles transported with the GEANT Monte-Carlo through realistic CBM detector geometry. Simulations are performed for the range of beam energies between 2 and 30 AGeV, which covers the expected beam energy range of the SIS100 and the SIS300 accelerator rings at FAIR. Performance of the reaction plane determination is shown with the PSD as a standalone detector and in a combination with other CBM subsystems. Results are compared with the experimental data from AGS E877, E895 and STAR.

44.188 | Poster | Aula & Arcades
Modification of Meson Properties in External Field | P. Filip[1] – [1]Slovak Academy of Sciences (SK)
We suggest, that specific decay channels of mesons can be influenced by external electromagnetic field of sufficient strength. In particular, CP - violating decay of Eta meson Eta–> Pi+Pi-, which is limited to BR < 10∧-27 in Standard Model, can become enhanced in the magnetic field, and strong decay channel of Rho(770) meson may become suppressed. For heavy Quarkonium-type mesons external electromagnetic field may influence production and decay channels, which can be relevant in heavy ion collisions, where extremal magnetic fields are produced for a short time.

44.189 | Poster | Aula & Arcades
The MICE Demonstration of Muon Ionization Cooling | A. Blondel[1] – [1]Universite de Geneve (CH)
Muon beams of low emittance provide the basis for the intense, well characterised, neutrino beams necessary to elucidate the physics of flavour at the Neutrino Factory and to provide lepton-antilepton collisions up to several TeV at the Muon Collider. The international Muon Ionization Cooling Experiment (MICE) will demonstrate ionization cooling, the technique proposed to reduce the phase-space volume of the muon beam at such facilities. In an ionization cooling channel, the muon beam traverses a material (the absorber) loosing energy, then replaced by reaccelerating RF cavities. The combined effect is to reduce the transverse emittance (transverse cooling). The rebaselined project will deliver a demonstration of ionization cooling by September 2017. In the revised configuration 1) a central lithium hydride absorber provides the main cooling effect 2) the magnetic lattice is two SC focus-coil modules 3) acceleration is provided by two 201 MHz single-cavity modules. The phase space of the muons in and out of the cooling cell will be measured by two SC solenoidal spectrometers. All the SC magnets for the ionization-cooling demonstration are available at RAL and the first singlecavity prototype has been tested successfully in the MuCool Test Area at Fermilab. The design of the cooling demonstration experiment, a summary of the performance of each of its components and the cooling performanceof the revised configuration will be described.

44.190 | Poster | Aula & Arcades
The status of MICE Step IV | Y. Karadzov[1] – [1]University of Geneva
Muon beams of low emittance provide the basis for the intense, well-characterised neutrino beams of the Neutrino Factory and for lepton-antilepton collisions at energies of up to several TeV at the Muon Collider. The international Muon Ionization Cooling Experiment (MICE) will demonstrate ionization cooling – the technique by which it is proposed to reduce the μ-beam phase-space volume. MICE is being constructed in a series of steps. At Step IV, MICE will study the properties of liquid hydrogen and lithium hydride that affect cooling. A solenoidal spectrometer will measure emittance up and downstream of the absorber vessel, where a focusing coil will focus muons. The construction of Step IV at RAL is nearing completion. The status of the project will be described together with a summary of the performance of the principal components. Plans for the commissioning and operation and the Step IV measurement programme will be described.

44.192 | Poster | Aula & Arcades
Progress of the MICE experiment | M. Bonesini[1] – [1]Universita & INFN, Milano-Bicocca (IT)
Muon beams of low emittance provide the basis for the Neutrino Factory and the Muon Collider. The international Muon Ionization Cooling Experiment (MICE) will demonstrate the reduction through ionization cooling of the phase-space volume occupied by a muon beam. Ionization cooling combines isotropic deceleration by absorbing materials with RF acceleration in the beam direction. MICE is being constructed in a series of steps. Starting this summer, Step IV will allow the properties of absorber materials, liquid hydrogen and lithium hydride, to be studied. Subsequently, the configuration required to demonstrate ionization cooling will be implemented by September 2017. In this configuration, a central lithium hydride absorber will provide the main cooling effect, two superconducting focus-coil modules will provide the magnetic lattice and acceleration will be provided by two 201 MHz singlecavity RF modules. The status, performance, plan of measurements and ultimate reach will be described.

44.193 | Poster | Aula & Arcades
The Large Hadron-electron Collider at CERN | F. Zimmermann[1], N. Armesto Perez[2], E. Nissen[1] – [1]CERN, [2]Universidade de Santiago de Compostela (ES)
The LHeC is a proposed upgrade of the LHC to study ep/eA collisions in the TeV regime, by adding a 60 GeV electron beam through an Energy Recovery Linac (ERL). The LHeC is designed to run synchronously with the LHC. Recent advances in

the design and simulations of the ERL will be presented, with focus on the goal for a luminosity of order 10^{34} $cm^{-2}s^{-1}$ as is desirable for Higgs precision physics. The talk will include design considerations for an intense ERL facility in the basic LHeC 3-pass configuration, which is dedicated to SCRF developments at CERN and opens prospects for low energy electron and photon-nucleon physics applications.

44.194 | Poster | Aula & Arcades
The FCC-ee design study: luminosity and beam polarization | M. Koratzinos[1] – [1]Universite de Geneve (CH)
The FCC-ee accelerator is under study within the FCC design study as a possible first step towards the ultimate goal of a 100 TeV hadron collider. It is a high luminosity e+e- storage ring collider, designed to cover energies of around 90, 160, 240 and 350GeV ECM (for the Z peak, the WW threshold, the ZH and ttbar cross-section maxima respectively) leading to different operating modes. We report on the current status of the design study, on the most promising concepts and relevant challenges. The expected luminosity performance at all energies, and first results on transverse polarization for beam energy calibrations will be presented.

44.195 | Poster | Aula & Arcades
art@CMS: Expanding Science Education and Outreach through the Arts | A. Alexopoulos[1], M. Hoch[2], M. Storr[3], A. Petrilli[1] – [1]CERN, [2]Austrian Academy of Sciences (AT), [3]University of Birmingham (GB)
art@CMS is an education and outreach programme of the CMS Experiment at CERN. Since 2012, art@CMS has been a springboard for engagement with scientific research in physics and particle physics in an exciting and inspiring way, through the development of creative and participatory experiences for the public, especially aimed at young people. art@CMS achieves this through two complementary projects: art exhibitions, and science and art workshops. Art exhibitions are the outcome of collaboration between artists, art institutes, scientists and CMS institutes, and act as catalysts for promoting public understanding of science. Interdisciplinary in their nature, science and art workshops enable young people to discover the wonders of science and technology at CMS and CERN, to be inspired and encouraged, and to develop skills that are critical to the challenges of the 21st century. Through these two projects, art@CMS has so far helped 100,000 people, including hundreds of school students, in 12 countries to gain a better understanding of how science works and how the public can engage with it.

44.196 | Poster | Aula & Arcades
Your Higgs number—how fundamental physics is connected to technology and societal revolutions | S. LidstrÖm[1] – [1]Uppsala University and Royal Swedish Academy of Sciences
Fundamental physics, as exemplified by the recently discovered Higgs boson, often appears to be disconnected from practical applications and ordinary human life. But this is certainly not the case, because science, technology, and human affairs are profoundly integrated in ways that are not immediately obvious. We illustrate this by defining a 'Higgs number' through overlapping activities. Following three different paths, which end respectively in applications of the World Wide Web, digital photography, and all modern electronic devices, we find that most people have a Higgs number of no greater than 3.

44.197 | Poster | Aula & Arcades
XMaS Scientist Experience: Promoting Careers for Women in Science | K. Lampard[1], A. Caldecote[1], T. Hase[1], S. Lidstrom[2], M. Cooper[1] – [1]University of Warwick, [2]Uppsala University
XMaS ran a project taking 14 female Physics students, aged 16-17 years, to Grenoble, France in April 2015. They visited the EPN Campus where they were introduced to possible science careers at such research facilities, as well as introducing them to the inspirational scientists working there. As a result of the trip, the students were truly inspired, their perceptions and stereotypes of people working in STEM careers were changed. The most influential part of the trip was meeting the scientists, who were honest about their experiences and life choices and the students gained confidence to follow similar paths. The trip impacted a far wider audience than the group of students who went. A highlight of the project was a public evening where the students presented videos and presentations on 'what scientists do' to Warwick staff, teachers, parents and peers. It was clear the activity had enhanced the enthusiasm and engagement of all of those who attended. Many of the students had not heard of synchrotron science before and were surprised and delighted by the opportunities and the amount of collaborative work. As a direct result of the interactions with the inspirational and passionate people they met, the students strongly agreed that the activity made them more likely to choose to study STEM related subjects in the future. We report how the project aims to continue supporting these students and plans for future projects.

44.198 | Poster | Aula & Arcades
A multilingual poster about the elementary constituents of matter | N. Arnaud[1], C. Baudouin[2], G. Wormser[3], J. Chauveau[4], Y. Coadou[5], S. Crepe-Renaudin[6], S. Descotes-Genon[7], S. Kerhoas-Cavata[8], J. Leveque[9], B. Mazoyer[10], M. Piezel[11] – [1]LAL (CNRS-IN2P3), [2]Labex OCEVU (Origines, Constituants et EVolution de l'Univers), Centre de physique des particules de Marseille (CPPM), [3]LAL Orsay, [4]Centre National de la Recherche Scientifique (FR), [5]CPPM, Aix-Marseille Université, CNRS/IN2P3 (FR), [6]Laboratoire de Physique Subatomique et de Cosmologie de Grenoble (FR), [7]CNRS, [8]CEA IRFU, [9]LAPP (Annecy-Le-Vieux), [10]Laboratoire de l'Accélérateur Linéaire (CNRS/IN2P3 & Université Paris-Sud), [11]Lycée Camille Claudel et Université de Technologie de Troyes
This poster provides an overview of the current understanding of matter at the smallest scales and it is meant to be used as a pedagogical resource at high-school level. Teachers and pupils will find information about the Standard Model, the elementary fermions (classified by family and by flavor), the fundamental interactions and the Higgs boson. This poster was created in France by a team of physicists, teachers and outreach experts. More than 1,000 French high schools and higher education institutes (located in metropolitan France, French overseas territories and abroad) have registered to receive free copies of this poster. A pedagogical leaflet describing the poster contents goes along with the French version. Through the IPPOG (International Particle Physics Outreach Group) network and the help of native speakers, translated versions of the poster with the exact same layout may be provided. These posters can be customized further by adding institute or funding agency logos, plus

a QR code pointing to a particular website. Once translated, the high-definition poster can be used free of charge by anyone for educational activities. This poster is already translated in several languages including English, German, Spanish, Portuguese, Slovak and Hebrew – with more versions to come: Arabic, etc. Help for creating a version of the poster in other languages is welcome: just send an e-mail to affiche ComposantsElementaires@in2p3.fr.

44.199 | Poster | Aula & Arcades
The CMS "Higgs Boson Goose Chase" | F. Cavallo[1] – [1]INFN (IT)
Building and operating the CMS Detector is a complicated endeavour! Now, more than 20 years after the detector was conceived, the CMS Bologna group proposes to follow the steps of this challenging project by playing "The Higgs Boson Goose Game", illustrating CMS activities and goals. The concept of the game is inspired by the traditional "Game of the Goose". The underlying idea is that the progress of building and operating a detector at the LHC is similar to the progress of the pawns on the game board: it is fast at times, bringing rewards and satisfaction, while sometimes unexpected problems cause delays or even a step back requiring CMS scientists to use all of their skill and creativity to devise new solutions.

44.200 | Poster | Aula & Arcades
Analysis of the CMS visitors feedback | E. Vazquez Valencia[1] – [1]Universidad Iberoamericana (MX)
CMS welcomed over 5500 visitors underground during the 2013 CERN Open Days and more than 4500 during the Neighbourhood Days of 2014 on the occasion of CERN's 60th anniversary. During the latter event, visitors gave their feedback on the visit experience by answering three questions: • In one sentence, what will you tell your friends about what you saw today? • What fact or story that you heard today impressed you the most? • Describe the CMS detector in three words. This poster will show the analysis of the answers given by visitors.

List of authors

Social Events

Social events included in the conference fee

Welcome Reception @ Conference Venue

Welcome Reception is offered in connection with the registration at the University of Vienna in the arcade courtyard with canapés and drinks.

Date	Wednesday, 22 July
Time	16:00 - 21:00
Address	Universitätsring 1, 1010 Vienna
Place	arcade courtyard

Heurigen reception @ Winery Fuhrgassl-Huber

The Heurigen Reception at the Winery Fuhrgassl-Huber will be offered by the mayor and govenor of Vienna and the local organizing committee, which includes a "Heurigen" buffet, wine, and other drinks. A "Heuriger" is a typical Austrian wine tavern, which is traditionally run by a wine farmer who sells his own wine. Located in the heart of Neustift am Walde between vineyards and the Vienna Woods the Winery Fuhrgassl-Huber with its cosy parlours and romantic patio has been a popular wine tavern for almost 30 years. Transportation to the location and back to the conference venue will be provided by buses. The architect of the Winery Fuhrgassl-Huber was Professor Walter von Hoesslin, a stage designer of the Vienna Opera House.

Date	Thursday, 23 July
Departure time	19:30
From	near the conference venue (by bus)
Address	Neustift am Walde 68, 1190 Vienna
Return	from the Heurigen at 22:00 / 22:30 / 23:00 / 23:30 (by bus)
Public transport	tram 38 from station "Schottentor" deep basement to station "Gatterburggasse", change to bus 35 A Salmannsdorf to station "Neustift am Walde" - takes approx. 40 min.

Portraittheater @ Conference Venue
Maximum number of participants: 300 persons

CURIE_MEITNER_LAMARR_INDIVISIBLE" -
Radiation. Nuclear fission. Frequency hopping.

Three outstanding pioneers represent the achievements of women in the field of science and technology: The double Nobel Price winner and discoverer of radioactivity Marie Curie (1867-1934), the Austrian-Swedish nuclear physicist Lise Meitner (1878-1968) and the Viennese Hollywood actress Hedy Lamarr (1914-2000) with the invention of frequency hopping. Incidents of their lives, achievements and impediments as well as the contents of their research and the passion for their work are in the centre of the theatre play "Curie_Meitner_Lamarr_indivisible". Illustrated with music and videos with three girls the performance shows an entertaining portrait of extraordinary women in history. Please register for this event - no admission fee.

Date	Friday, 24 July
Time	19:30
Address	Universitätsring 1, 1010 Vienna
Place	Grosser Festsaal, 1st Floor

Excursion to MedAustron
Maximum number of participants: 120 persons

MedAustron in Wiener Neustadt is one of the most cutting-edge centres for ion-beam therapy and research in Europe, currently in the commissioning phase. First treatments are scheduled for the upcoming year 2016 with a steady increase of patient numbers up to 1,200 per year, once the facility is in full operation. Besides clinical research, the synchrotron-based centre also offers opportunities for non-clinical research activities, especially in medical radiation physics, radiation biology, and experimental physics. Worldwide, there are only three other centres like MedAustron that offer radiation therapy with both protons and carbon ions in one place.

This excursion is sponsored by MedAustron.

Date	Sunday, 26 July
Time	09:45
Duration	approximately 6 hours
Location	Departure and final destination at the conference venue (by bus)
AGENDA	
09:45	Departure at the conference venue
11:00	Innovative Cancer Treatment & Research at MedAustron; Talks on current developments and future outlook
12:30	Break (refreshments will be served)
13:00	Guided Tour
15:00	Departure at MedAustron (arrival time at the conference venue app. 16:00)

Conference Gala Dinner @ Orangerie Schönbrunn

Schönbrunn Palace is a World Cultural Heritage site and Austria's most visited sight. This Baroque synthesis of different arts, consisting of a palace and gardens, has been the summer residence of the Habsburg dynasty, and today presents itself largely in its original historical condition. The Orangerie building was added to the Palace around 1750 for the purpose of providing a winter shelter for orange plants.

Date	Tuesday, 28. July
Time	19:30
Address	Schönbrunner Schloßstraße 47, 1130 Vienna
Place	Orangerie Schönbrunn
Public transport	Subway U2 from station "Schottentor" to station "Karlsplatz", then change to U4 to station "Schönbrunn" - takes approx. 20 min.

Social events and tours to be paid separately

Classical Concert @ Austrian Academy of Sciences
Maximum number of participants: 300

The main building of the Austrian Academy of Sciences is located in a baroque building which originally was home of the University of Vienna. The building, designed by the Lorrainese architect Jean Nicolas Jardot de Ville-Issey, was erected in 1753-1755. Johann Enzendorfer, Daniel Christoph Dietrich and Johann Adam Münzer carried out its construction. The inauguration by Emperor Franz I. and Empress Maria Theresia took place on April 10th, 1756. Since 1857, it hosts the administration of the Academy and a few of its numerous research units. This building has a festive hall with an impressive ceiling fresco, which will be the location of the concert.

Date	Monday, 27 July
Time	19:30
Address	Dr. Ignaz Seipel Platz 2, 1010 Vienna
Ticket costs	10,00 Euros (bookable at the online registration)
Public transport	Subway U2 "Schottentor" (direction Karlsplatz) to station "Volkstheater", then change to subway U3 (direction Simmering) to station "Stubentor" - takes approx. 11 min.

Schönbrunn Palace Tour before Dinner

This tour of the imperial apartments which will take you on a journey through the centuries starts behind a massive door at the top of the Blue Staircase. It begins in the west wing of the palace, with the apartments of Emperor Franz Joseph and his wife, Elisabeth, which are furnished in 19th-century style, and continues through the state rooms in the central wing. From there the tour proceeds to the richly-appointed apartments once occupied by Maria Theresa. The Franz Karl Apartments, which were occupied by Emperor Franz Joseph's parents, Archduchess Sophie and Archduke Franz Karl, conclude the tour. All the rooms in the palace have their own stories to tell, stories on the margins of great historical events which are indicative of the lifestyle, atmosphere and world view of the imperial era.

Date	Tuesday, 28 July
Time	18:15
Duration	approximately 1 hour
Address	Schönbrunner Schloßstraße 47, 1130 Vienna
Place	Schönbrunn Palace
Ticket costs	22,00 Euros (bookable at the online registration)
Public transport	Subway U2 from "Schottentor" to station "Karlsplatz", change to subway U4 (direction Hütteldorf) to station "Schönbrunn" - takes approx. 20 min.

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