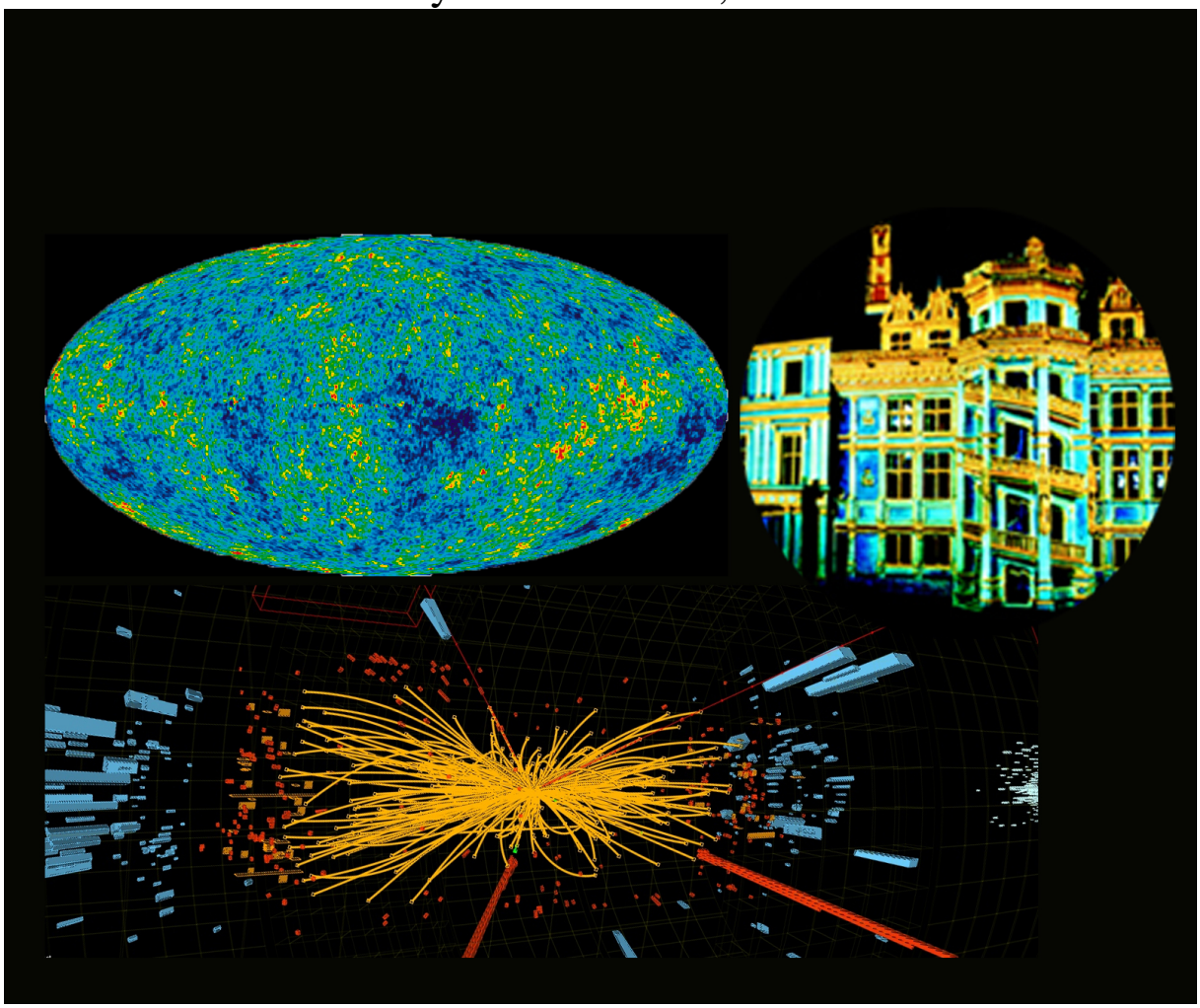
28th Rencontres de Blois
Particle Physics
and
Cosmology

May 29th - June 3rd, 2016



Preliminary Program

+

Abstracts

+

List of Participants

Plenary Sessions

MONDAY		
09:00	**Opening Session**	
Jean Trân Thanh Vân	Welcome	
Marc Gricourt	Welcome address from the Mayor of Blois	
10:30	**First Session**	**Chair: Karl Jacobs**
Karl Jakobs	Introduction	
Gigi Rolandi	Status / highlights of LHC Run 2	
Aristeidis Noutsos	Pulsars	
Bruce Allen	Gravitational waves	
12:30	**Lunch**	
14:00	**The Higgs Boson**	**Chair: Gigi Rolandi**
Marc Escalier	Higgs bosons: production and decays into bosons	
Michal Bluj	Higgs boson parameters and fermionic decays	
Daniel Enrique de Florian Sabaris	Status of Higgs precision studies	
Shinya Kanemura	Extended Higgs sector	
17:15	**Conference Photograph**	
18:00	**Visit of the Chateau de Blois**	
20:00	**Dinner at the Chateau**	

TUESDAY		
09:00	**QCD+EW+Top Physics+Heavy Ions**	**Chair: Géraldine Servant**
Shima Shimizu	Test of QCD at Colliders	
Aleko Khukhunaishvili	Status of electroweak physics	
Maria Aldaya Martin	Top Quark production and properties	
11:00	**QCD+EW+Top Physics+Heavy Ions**	**Chair: Sébastien Descotes-Genon**
Barbara Jaeger	Progress in precision calculation	
Eero Aleksi Kurkela	Far-from-equilibrium plasmas	
12:00	**Beyond the Standard Model Physics**	**Chair: Ian Brock**
Andrew J. Whitbeck	Status of the Search for SUSY	
12:30	**Lunch**	
14:00	**Beyond the Standard Model Physics**	**Chair: Ian Brock**
Claire Lee	Search for Exotics	
Bertrand Martin dit Latour	Search for TOP partner	
Andrea Wulzer	Implications of LHC results for BSM physics	
Géraldine Servant	A cosmological solution to the hierarchy problem	
16:30	**BSM+DM: Parallel Session**	
16:30	**Neutrinos: Parallel Session**	
16:30	**QCD+Heavy Flavour: Parallel Session**	
16:30	**EW+Top+Higgs: Parallel Session**	
20:00	**Dinner at the Chateau**	

WEDNESDAY		
08:30	**Excursion to Château de Chambord and Château Beauregard**	
12:30	**Lunch**	
14:00	**BSM+DM: Parallel Session**	
14:00	**Astro+Cosmo: Parallel Session**	
14:00	**QCD+Heavy Flavour: Parallel Session**	
14:00	**EW+Top+Higgs: Parallel Session**	
20:00	**Dinner at the Chateau**	
22:00	**Son et Lumière**	

THURSDAY		
08:30	**Neutrinos**	**Chair: Sotiris Loucatos**
Kate Scholberg	Status of neutrino parameters and future prospects	
Ana Teixeira	Lepton Flavor Violation and neutrino physics Beyond the Standard Model	
Stephen King	Theoretical models for the neutrino mass and mixing pattern	
Adam Ritz	Light dark matter and neutrino experiments	
11:00	**Heavy Flavour Physics**	**Chair: Bolek Pietrzyk**
Tatsuya Nakada	CP violation and rare decays	
Sébastien Descotes-Genon	Heavy Flavour tensions in the Standard Model	
Sheldon Stone	Pentaquarks, Tetraquarks, Glueballs	
12:30	**Lunch**	
14:00	**The High Energy Universe**	**Chair: Thomas Lohse**
Eli Waxman	Neutrino astronomy: Where are we now, what did we learn?	
Stefano Gabici	The origin of cosmic rays	
Petra Huentemeyer	Gamma ray astronomy	
15:30	**The ICISE Centre and presentation of conferences in 2016**	
16:30	**Hot Topics Parallel Sessions**	
20:00	**Cocktail and Conference Dinner at the Chateau Chair:**	

FRIDAY		
09:00	**The Dark Universe**	**Chair: Jodi Cooley**
Lauren Hsu	Recent results and status of direct detection dark matter experiments	
Brandon Anderson	Indirect dark matter searches	
Davide Franco	New ideas in the detection of dark matter	
11:00	**Cosmology**	**Chair: Dorothea Samtleben**
Akito Kusaka	The Cosmic Microwave Background Radiation - past and future	
Ramon Miquel	Large Scale Structure Surveys - results from DES	
Alessandra Silvestri	Theoretical problems in cosmology	
12:30	**Lunch**	
14:00	**Summary and Conclusion**	**Chair: Jean Trân Thanh Vân**
Pierre Binétruy	Conference Summary and Perspectives	
Jean Trân Thanh Vân	Closing remarks	

TUESDAY PARALLEL SESSIONS		
16:30	**BSM + DM: Parallel Session**	**Chair: Lauren Hsu**
Kenichi Saikawa	Axion dark matter in the post-inflationary Peccei-Quinn symmetry breaking scenario	
Marek Lewicki	Enabling Electroweak Baryogenesis trough Dark Matter	
Giuliano Gustavino	Dark matter searches at ATLAS	
Ashok Kumar	Dark matter searches at CMS	
Masahiro Yoshimoto	NEWS: Nuclear Emulsions for WIMP Search	
Eric Armengaud	Status of DM searches with EDELWEISS	
Fabio Ferrarotto	Searching for dark photons with the PADME experiment at the DAFNE Linac	
Jelena Maricic	DarkSide experiment: present results of the dark matter search and steps toward the 20 ton LAr detector	
Kevin Micheneau	Latest results and status of the XENON program	
16:30	**Neutrinos: Parallel Session**	**Chair: Jacques Dumarchez**
Andrew Missert	Recent Results From the T2K Experiment	
Thiago Sogo Bezerra	Results of Double Chooz	
Joao Coelho	Status and Prospects of the KM3NeT-ORCA experiment	
Pedro Machado	Beyond standard neutrinos	
Richard Hill	Effective theories, dark matter and neutrinos	
Tobias Bode	The Gerda neutrinoless double beta decay experiment: First data from Phase II	
Davide Chiesa	CUORE-0 background analysis and evaluation of the 130Te DB2nu decay half-life	
Laura Segui	The SNO+ Experiment: status and future prospects	
Maria Martinez	CUPID-0: a step forward exploring the inverted hierarchy region of the neutrino mass	
16:30	**QCD + Heavy Flavours: Parallel Session**	**Chair: Tatsuya Nakada**
Eluned Smith	Rare decays at LHCb	
Guy Wormser	Recent results on B-meson decays at BaBar and Belle	
Wolfgang Walkowiak	Rare Decays of B0(s) Mesons to Muon Pairs with the ATLAS Detector (Run 1)	
Dario Barberis	Heavy flavour production and properties at ATLAS and CMS	
Simon Akar	CP violation in B and charm decays at LHCb	
Peilian Liu	Charmed hadron physics at BESIII	
Anna Vinokurova	Recent results on bottomonium studies at Belle	
Rick van Kooten	Recent heavy flavor results from the Tevatron	
Greig Cowan	Heavy flavour spectroscopy, including exotic states at LHCb	
16:30	**EW + Top + Higgs: Parallel Session**	**Chair: Stephen Sekula**
Norbert Neumeister	Inclusive and differential W/Z at ATLAS and CMS	
Wouter Hulsbergen	Electroweak physics and QCD in the forward direction at LHCb	
Jochen Meyer	Diboson production at ATLAS and CMS	
Alexander Huss	Electroweak corrections	
Jonatan Piedra Gomez	Electroweak precision observables (m_W, m_{top}, ...) from ATLAS and CMS	
Gregorio Bernardi	Precision Measurements of Electroweak Parameters with Z Bosons at the Tevatron	
Jorge de Blas Mateo	Electroweak precision constraints with HEPfit	
Benoit Hespel	ZH associated production through gluon fusion in the SM and 2HDM	
Raquel Gomez Ambrosio	VBF and Vector Boson Scattering at 13 TeV, the EFT approach	

WEDNESDAY PARALLEL SESSIONS		
14:00	**QCD + HEAVY FLAVOURS: Parallel Session**	**Chair: Eero Kurkela**
Guofa Xu	Hadron spectroscopy at BESIII	
Ilya Komarov	LHCb results on 13 TeV pp collisions	
Venelin Kozhuharov	Probing new physics with rare kaon decays at CERN SPS	
Marcin Kucharczyk	Results on heavy ion collisions at LHCb	
Maxime Guilbaud	Heavy Ion measurements at ATLAS and CMS	
Tatyana V. Dimova	Recent results from VEPP-2000-collider in Novosibirsk	
16:30	**QCD + HEAVY FLAVOURS: Parallel Session**	**Chair: Shima Shimizu**
Sahal Yacoob	Soft QCD at ATLAS and CMS	
Niki Saoulidou	QCD with jets and photons at ATLAS and CMS	
Valery V. Lyuboshitz	On the pair correlations of neutral K, D, B and B_s mesons with close momenta produced in inclusive multiparticle processes	
Angelo Raffaele Fazio	On-shell helicity methods for soft-collinear effective field theories	
Sophia Borowka	Higgs Pair Production in gluon fusion at NLO with full top mass dependence	
Marius Wiesemann	Transverse-momentum resummation of colorless final states at the NNLL+NNLO	
14:00	**EW + Top + Higgs: Parallel Session**	**Chair: Bertrand Martin dit Latour**
Lidija Zivkovic	Top quark studies at the Tevatron	
Antonio Sidoti	Top quark pair production cross-section measurements and measurements of ttbar+X with the ATLAS detector	
Jeremy Andrea	Single top production at ATLAS and CMS	
Ian Brock	Top quark properties at ATLAS and CMS	
Eleni Vryonidou	Probing top-quark interactions at NLO in QCD	
Giacomo Cacciapaglia	Top partners / vector-like fermions	
16:30	**EW + Top + Higgs: Parallel Session**	**Chair: Daniel de Florian**
Mauro Donega	Higgs boson production (cross sections, inclusive and differential) of the h(125) from Run 1	
Tatjana Lenz	The profile of the h(125) from Run 1	
Gionata Luisoni	Higgs + 3-jet-production in NLO QCD	
Elisabetta Furlan	Interference in H-mediated ZZ+jet production	
Archil Kobakhidze	Electroweak phase transition and baryogensis with anomalous Higgs couplings	
Maddalena Giulini	Results on BSM Higgs boson searches at ATLAS	
Pascal Vanlaer	Results on BSM Higgs boson searches at CMS (Run 1 and Run 2)	
Paolo Torrielli	Higgs production in association with bottom quarks at NLO+PS	
Olivier Pierre Mattelaer	Multi-Higgs production	
14:00	**Astro + Cosmo: Parallel Session**	**Chair: Julian Rautenberg**
Clement Pryke	The search for inflationary B-modes: latest results from BICEP/Keck	
Jeffrey Filippini	SPIDER: Exploring the Dawn of Time from Above the Clouds	
Mikhail Stolpovskiy	QUBIC	
Mickael Rigault	Results from the Nearby Supernova factory	
Alberto Guffanti	Marginal evidence for cosmic acceleration from Type Ia supernovae	
Ulrich Feindt	Measuring anisotropy in the local universe with type Ia supernovae	

WEDNESDAY PARALLEL SESSIONS		
16:30	**Astro + Cosmo: Parallel Session**	**Chair: Ramon Miquel**
Hélion du Mas des Bourboux	Baryonic Acoustic Oscillation Correlations at z=2.4 with SDSS-III Lyman-α Forests	
Pauline Zarrouk	QSO clustering with the SDSS-IV eBOSS survey	
Mike Richman	Astrophysical Neutrinos in IceCube: Observations and Prospects	
Irene Di Palma	Latest results in data from the ANTARES experiment	
Albino Perego	Neutrinos in neutron star mergers	
Javier Barrios Marti	KM3NeT/ARCA. Status and perspectives	
Julian Rautenberg	The Pierre Auger Observatory: challenge of ultra high energetic cosmic rays	
Andrew Smith	Recent Results from the HAWC Experiment	
Martin Will	The MAGIC Telescopes – Recent Results & Experimental Upgrades	
Henrike Fleischhack	Recent Highlights from VERITAS	
14:00	**BSM + DM: Parallel Session**	**Chair: Andrew Whitbeck**
Gianantonio Pezzullo	Mu2e: coherent $\mu \to e$ conversion experiment at Fermilab	
Elena Graverini	SHiP: a new facility with a dedicated detector to search for new long-lived neutral particles and study the tau neutrino properties	
Guiseppe Iacobellis	Stationary configurations of the SM potential: EW stability and Higgs inflation	
Tommi Alanne	Radiatively Induced Fermi Scale and Unification	
Alejandro Celis	Implications of Higgs data for the EW chiral Lagrangian	
Mateo García Pepin	Light stops from extra dimensions	
16:30	**BSM + DM: Parallel Session**	**Chair: Andrea Wulzer**
Luc Darmé	Di-photon excess in perturbative SUSY with Dirac gauginos	
Stefano Di Chiara	Large loop-coupling enhancement of a 750 GeV pseudoscalar from a light dark sector	
Thomas Dieter Flacke	Singlets in Composite Higgs Models in light of the LHC di-photon and di-boson searches	
Pietro Baratella	A closer look to the sgoldstino interpretation of the diphoton excess	
Isabel Trigger	SUSY searches at 13 TeV at ATLAS	
Isabell Melzer-Pellmann	SUSY searches at 13 TeV with the CMS Experiment	
Edward Laird	New physics searches with taus	
Ruggero Turra	Searches for exotics at ATLAS	
Luisa Alunni Solestizi	Exotics searches at CMS	

THURSDAY PARALLEL SESSIONS		
16:30	**Hot Topics in Particle and Astroparticle Physics 1**	**Chair: Gregorio Bernardi**
Simone Michele Mazza	Search for di-photon resonances with the ATLAS experiment	
Livia Soffi	Is there a X(750) signal?	
Sebastian Ellis	Theoretical interpretations of the diphoton excess	
16:30	**Hot Topics in Particle and Astroparticle Physics 2**	**Chair: Kate Scholberg**
Julien Baur	Constraints on Neutrino Mass from the Lyman-alpha Forest	
Holger Kluck	Current status of the CRESST experiment	
Aion Viana	Search for Galactic Pevatrons with H.E.S.S.	

28èmes Rencontres de Blois

Particle Physics and Cosmology

May 29 - June 3, 2016

Parallel Sessions

Abstracts

EW

+

Top

+

Higgs

Tuesday Session

Wednesday Session I

Wednesday Session II

Thursday Session

Inclusive and differential W/Z at ATLAS and CMS

Norbert Neumeister (Purdue University, West Lafayette)

The data recorded by the ATLAS and CMS detectors allow for precision studies of Standard Model physics. We report the LHC measurements of single W and Z boson production at different centre-of-mass energies. We report both differential cross sections and ratios of W boson and Z boson measurements. These results allow tests of the performance of different parton distribution functions (PDFs), and can be used to further constrain the PDFs. In addition, the results are compared to predictions from different Monte Carlo generators, testing different approaches to modeling QCD effects. We also report measurements of the forward-backward asymmetry in Z boson decays, and measurements of angular coefficients, which provide sensitivity to the electroweak mixing angle.

Electroweak physics and QCD in the forward direction at LHCb

Wouter Hulsbergen (NIKHEF, Amsterdam)

The LHCb experiment provides a unique probe to scattering processes at high rapidity at the LHC. In this talk LHCb measurements of electroweak boson and top quark production and the Z forward-backward asymmetry will be presented.

Diboson production at ATLAS and CMS

Jochen Meyer (NIKHEF, Amsterdam)

The ATLAS and CMS collaborations have carried out a set of measurements that provide stringent tests of the electroweak sector of the Standard Model in proton-proton collisions at different centre-of-mass energies from 7 to 13 TeV. Differential and total production cross sections for di-boson processes, including vector boson fusion and vector boson scattering, are derived and compared to higher order predictions of the Standard Model. Model-independent constraints on new physics are determined, by setting limits on anomalous triple and quartic gauge-boson couplings.

Electroweak Corrections

Alexander Huss (ETH, Zurich)

In view of the unprecedented energy regime that is now accessible at the LHC and the continuous increase in luminosity, having the most accurate theory predictions to compare against the experimental data is becoming more and more important. Although electroweak corrections are typically less pronounced compared to higher-order QCD corrections, they can be enhanced in various situations such as in the high-energy tails of distributions. In this talk I will briefly outline the general features of electroweak corrections and present some recent calculations.

Electroweak precision observables (m_W, m_{top}, ...) from ATLAS and CMS

Jónatan Piedra Gómez (Instituto de Fisica de Cantabria, Santander)

We present ATLAS and CMS measurements of the top quark mass including (novel) alternative methods, using data collected at the CERN LHC at center-of-mass energies of 7 and 8 TeV. We also present recent electroweak mixing angle results, together with improvements towards a high-precision measurement of the W boson mass.

Precision Measurements of Electroweak Parameters with Z Bosons at the Tevatron

Gregorio Bernardi (LPNHE, Paris)

The extraction of $sin^2\theta^{lept}_{eff}(M_Z)$ and an indirect measurement of the mass of the W boson from the forward-backward asymmetry of dilepton events in the Z boson mass region at the Tevatron are presented. The data sample of e^+e^- events collected by the $D0$ detector corresponds to the full 9.7 fb^{-1} run II sample, yielding an effective electroweak mixing angle $sin^2\theta^{lept}_{eff}(M_Z) = 0.23146 \pm 0.00047$. The CDF collaboration uses data samples of e^+e^- and $\mu^+\mu^-$ events, corresponding to the full 9.3 fb^{-1} run II sample to obtain an effective electroweak mixing angle $sin^2\theta^{lept}_{eff}(M_Z) = 0.23222 \pm 0.00046$. The CDF collaboration also extracts the on-shell electroweak mixing angle $sin^2\theta_W = 0.22401 \pm 0.00044$ which corresponds to an indirect measurement of the W boson mass $M_W(indirect) = 80.327 \pm 0.023 GeV$. The quoted uncertainties include both statistical and systematic contributions.

Electroweak precision constraints with HEPfit

Jorge de Blas (University of Rome La Sapienza)

We revisit the global fit to electroweak precision observables in the Standard Model (SM), including the indirect determination of the SM parameters and a detailed analysis of the compatibility between the SM and experimental data. We present updated constraints on general new physics scenarios (oblique parameters, modified Zbb couplings, modified Higgs couplings to vector bosons, and dimension 6 gauge-invariant operators built with SM fields). We also present the projection of the fit with the expected experimental improvements at future e+e- colliders. All results have been obtained with the HEPfit code.

ZH associated production through gluon fusion in the SM and 2HDM

Benoît Hespel (Université Catholique de Louvain)

In this talk I will analyze the associated production of Higgs and Z boson via heavy-quark loops at the LHC in the Standard Model and beyond. After briefly talking about the main features of the born 2 to 2 production, I will consider the effects of extra QCD radiation. I will show how merged samples of 0 and 1 jet multiplicities matched to a parton shower can provide a reliable description of differential distributions in ZH production. In addition to the SM case, results in a generic 2HDM will be shown for a set of representative and experimentally viable benchmarks for both the scalar and pseudoscalar cases. I will finally conclude by discussing the interesting features coming from the resonant enhancement and interference patterns between resonant and non-resonant contributions.

VBF and Vector Boson Scattering at 13 TeV

Raquel Gómez Ambrosio (Università degli studi di Torino)

For the analysis of LHC run-II results some subleading production channels, in particular vector boson fusion (VBF), will be of great importance in the search of new physics in terms of small deviations with respect to the Standard Model couplings and masses.

Here we address the strategy for such an analysis. On the one hand in terms of exact calculation of NLO-EW corrections and its implementation in the Monte Carlo generators, and on the other hand in terms of a bottom-up Effective Field theory. This is a very challenging analysis due to the introduction of many new parameters in the theory and needs of new strategies for a successful comparison between experiment and theory.

Top quark studies at the Tevatron
Lidija Zivkovic (Institute of Physics, Belgrade)

We will present an overview of the top quark studies from the D0 and CDF experiments, which represent Tevatron legacy measurements. The measurements that are complementary to the LHC will include ttbar cross section measurement, top quark polarization measurements, new measurements of the forward-backward $t\bar{t}$ asymmetry and a new analysis of $t\bar{t}$ spin correlation, and the recent measurements of the top quark mass.

Top quark pair production cross-section measurements and measurements of $t\bar{t} + X$ with the ATLAS detector
Antonio Sidoti (INFN Sezione di Bologna)

Measurements of the inclusive and differential top-quark pair production cross sections in proton-proton collisions with the ATLAS detector at the Large Hadron Collider are presented at a center of mass energy of 8 TeV and 13 TeV. The inclusive measurements reach high precision and are compared to the best available theoretical calculations. Differential measurements of the kinematic properties of top quark pair 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. The production of top-quark pairs in association with W and Z bosons is also presented. The measurement uses events with multiple leptons and in particular probes the coupling between the top quark and the Z boson. The cross-section measurement of photons produced in association with top-quark pairs is also discussed. The production cross-section of top-quark pairs in association with additional light or heavy jets is presented. These processes are important backgrounds to searches for new physics and are all compared to the best available theoretical calculations.

Single top production at ATLAS and CMS
Jérémy Andrea (IPHC, Strasbourg)

Measurements of single top quark production are presented, performed using ATLAS and CMS data collected in 2011, 2012 and 2015 at centre-of-mass energies of 7, 8 and 13 TeV [twiki.cern.ch] respectively. The inclusive cross sections for the electroweak production of single top quarks in the t- and s-channels and in association with W bosons are measured. The three channels are used to place constraints on the CKM matrix element V_{tb}. The t-channel cross section is also measured differentially, as a function of the kinematic variables of the top quark, and the ratio of top and anti-top production cross sections is determined and compared with predictions from different parton density distribution functions. Fiducial measurements allow also test to the signal modelling. Measurements of top quark properties in single top quark production are also presented, such as the top-quark polarisation, the probe of tWb vertex through the W-helicity measurement in top quark decay and the searches for anomalous couplings to gluons, photons or Z bosons.

Top quark properties at ATLAS and CMS
Ian Brock (Physikalisches Institut, Bonn)

Recent results from ATLAS and CMS connected to the properties of the top quark are presented. The talk concentrates on asymmetries connected with top-quark production and the measurement of spin correlations between the top quark and antiquark. A search for CP violation in top-quark-antiquark production is also discussed.

Probing top-quark interactions at NLO in QCD
Eleni Vryonidou (CP3 Université Catholique de Louvain)

In this talk I review recent progress in the computation of processes involving top quarks in the framework of Standard Model Effective Theory (SMEFT) at NLO in QCD. In particular I will discuss the impact of higher-dimensional operators on top pair production, single top production, and top pair production in association with a photon, a Z boson and a Higgs. Results are obtained within the automated framework of MadGraph5_aMC@NLO.

Top partners/vector-like fermions
Giacomo Cacciapaglia (IPNL, Lyon)

In this talk I will review the motivations behind the introduction of top partners (aka vector-like quarks) in BSM models, and discuss their phenomenology at the LHC. Particular attention will be dedicated to single and electroweak production, which may be most relevant at Run-II. I will present preliminary results from a new QCD-NLO implementation.

Higgs boson production (cross sections, inclusive and differential) of the h(125) from Run 1
Mauro Donega (ETH, Zurich)

The combined ATLAS and CMS measurements of the Higgs boson production and decay rates and constraints on its couplings will be presented together with differential distributions. The results are based on pp collision data collected at centre-of-mass energies of 7 and 8 TeV corresponding to integrated luminosities of 5/fb and 20/fb respectively of the Run 1 of the LHC.

The profile of the h(125) from Run 1
Tatjana Lenz (Physics Institute, Bonn)

This presentation reviews the h(125) boson measurements at LHC in Run-1. I will focus on latest results on the width and spin/parity (and CP invariance tests) as well searches for the non-SM decay modes of the h(125) boson. For example searches for lepton flavor violating decays of the Higgs boson and constraints on new phenomena via Higgs couplings and invisible decays will be discussed.

Higgs+3jet production in NLO QCD
Gionata Luisoni (CERN, Geneva)

After the discovery of a Higgs boson during Run I at the LHC, Higgs physics has entered an era of precision measurements. Among the different production channels, gluon-gluon fusion (ggf) is the largest one and, in the presence of additional jets, constitutes also an irreducible background to the very important vector boson fusion process. A precise knowledge of the ggf channel is therefore fundamental. In this talk I will present NLO QCD results for the production of a Standard Model Higgs boson in association with up to three jets in ggf.

Interference in Higgs-mediated $ZZ + jet$ production
Elisabetta Furlan (ETH, Zurich)

We study interference effects in the production channel $ZZ + jet$, in particular focusing on the role of the Higgs boson. This production channel receives contributions both from Higgs-mediated diagrams via the decay $H \to ZZ$, as well as diagrams where the Z bosons couple directly to a quark loop. For an invariant mass of the Z pair larger than 300 GeV, we find that the interference in the $ZZ + jet$ channel is qualitatively similar to interference in the inclusive ZZ channel. Moreover, the rates are sufficient to study these effects at the LHC once jet-binned data become available.

Electroweak phase transition and baryogenesis with anomalous Higgs couplings

Archil Kobakhidze (The University of Sydney)

The electroweak phase transition provides an intriguing link between particle physics and cosmology. I will discuss the electroweak phase transition and baryogenesis in an effective model for electroweak symmetry breaking based on nonlinearly realised electroweak gauge symmetry. Some implications for measurements of Higgs couplings at the LHC and beyond will be also discussed.

Results on BSM Higgs boson searches at ATLAS

Maddalena Giulini (Heidelberg University)

The coupling measurements of the particle discovered in 2012 by the ATLAS and CMS Collaborations suggest no deviation from the Higgs boson as expected from the Standard Model (SM). However, many beyond the SM theories (BSM) foresee a more complex Higgs sector and hence additional Higgs bosons. These new scalar particles could appear as excesses in events containing two bosons or two fermions. Direct searches for BSM Higgs bosons in final states with tau leptons or vector bosons have been performed by the ATLAS experiment. Recent results of these searches are presented.

Results on BSM Higgs bosons searches at CMS (Run 1 and Run 2)

Pascal Vanlaer (Université Libre de Bruxelles)

Recent results on BSM scalar boson searches and their interpretations in different BSM models will be presented. The first results of searches for high-mass scalar bosons with 13 TeV data will be presented, already extending slightly the mass reach of LHC Run 1 at 8 TeV. The summary of Run 1 high-mass searches will also be shown. Recent results of searches for BSM decays of the m_H = 125 GeV scalar will be presented. BSM production of H boson pairs will be discussed. Eventually, recent searches for invisible decays of scalar bosons will also be shown.

Higgs production in association with bottom quarks at NLO+PS

Paolo Torrielli (Università di Torino and INFN)

This talk presents results for the production of a Higgs boson in association with a bottom-quark pair at NLO, and matched to parton showers in the MC@NLO framework. A phenomenological comparison is carried out between the four- and the five-flavour-scheme simulations of the process, as well as between the matchings to different parton showers.

Multi-Higgs production

Olivier Pierre Mattelaer (Durham University)

In this talk, I will present two recent updates of the MadGraph5_aMC@NLO framework. First I will present the possibility to compute cross-sections / generate events for loop-induced processes and second how re-weighting can be performed at NLO accuracy. Those two methods can then be combined to have a very good approximation of the multi-higgs production at NLO accuracy.

Search for di-photon resonances with the ATLAS experiment

Simone Michele Mazza (INFN Milano)

In this talk a search for a resonance in the two photons channel with the ATLAS detector at LHC will be reviewed. The presented analyses are based on 3.2 fb^{-1} of 13 TeV collision delivered by the LHC in 2015. Two searches were performed in this channel, one optimized for an hypothetical spin 0 particle and one optimized for a spin 2 Randall-Sundrum Graviton. The maximum deviation from the background only hypothesis has been observed around 750 GeV, the local significance was estimated. Also the global significance was evaluated taking into account the LEE effect. Updated limits for the two signal hypothesis are also reported.

Is there a $X(750)$ signal?

Livia Soffi (Cornell University, Ithaka)

Searches for new physics in high-mass diphoton and Zgamma final states are presented. The analyses are performed by looking for bumps on the continuum mass spectra. These clean signatures are sensitive to high-mass gravitons predicted by models with extra dimensions and to scalar resonances arising from many extensions of the standard model. The talk focuses on the recent results obtained using data collected during the 2015 run.

Theoretical interpretations of the diphoton excess

Sebastian Ellis (University of Michigan, Ann Arbor)

Recent reports by the CMS and ATLAS collaborations of a possible $X(750)\ GeV$ state decaying into two photons may present the strongest indication yet from collider physics of new physics beyond the Standard Model (SM). We investigate the possibilities that the signal is due to a scalar or pseudoscalar electroweak isoscalar state produced by gluon-gluon fusion mediated by loops of new heavy fermions. We present a review of the experimental constraints on such new vector-like fermions. We consider several models of new vector-like fermions that are compatible with these constraints, and may offer the possibility that $X(750)$ is a dark matter mediator, with a neutral vector-like dark matter particle. The decays $X \to ZZ, Z\gamma$ and W^+W^- are interesting prospective signatures that may help distinguish between different vector-like fermion models.

Beyond the Standard Model

and

Dark Matter

Tuesday Session

Wednesday Session I

Wednesday Session II

Thursday Session

Axion dark matter in the post-inflationary Peccei-Quinn symmetry breaking scenario

Ken'ichi Saikawa (DESY)

The axion arises as a pseudo Nambu-Goldstone boson from the spontaneous breaking of a hypothetical global Peccei-Quinn symmetry introduced to provide a solution to the strong CP problem, and is one of the best candidates of dark matter of the universe. However, the prediction of the axion dark matter abundance depends strongly on the early history of the universe. In this talk, we discuss the cosmological scenario in which the Peccei-Quinn symmetry is broken after inflation and its implications for present and future experimental tests.

EW baryogenesis via DM

Marek Lewicki (Warsaw University)

I will discuss the impact of a swifter cosmological expansion induced by modified cosmological history of the universe on scenarios realising electroweak baryogenesis. I will also detail the experimental bounds that one can place on such models. The modifications can be sizeable if the expansion rate of the Universe increases by several orders of magnitude. I will focus on the Standard Model supplemented by a dimension six operator directly modifying the Higgs boson potential and show that due to the modified cosmological history, electroweak baryogenesis can be realized, while keeping deviations of the triple Higgs coupling below HL-LHC sensitivies.

Dark matter searches at ATLAS

Giuliano Gustavino (Università di Roma La Sapienza)

Although the existence of Dark Matter is a well-established hypothesis to explain a range of astrophysical and cosmological measurements, its nature and particle properties still remain one of the greatest unsolved puzzles of particle and astro-particle physics. The collider experiments have developed a comprehensive search program in this sector looking at a wide spectrum of channels in which a Dark Matter evidence can be traced. In this context the last results using the data sample collected at LHC at the new centre-of-mass energy of 13 TeV will be presented giving an outlook of the Dark Matter search status in the ATLAS experiment.

Dark matter searches at CMS

Ashok Kumar (Delhi University)

This talk describes searches for directly produced Dark Matter particles in CMS. The searches are performed using the datasets recorded with the CMS detector in proton-proton collisions at center-of-mass energies of 8 and 13 TeV. Final states with a monojet, monophoton, and monolepton signature are among the final states considered, as well as dark-matter particles produced in association with bottom and top quarks.

NEWS: Nuclear Emulsions for WIMP Search

Masahiro Yoshimoto (Nagoya University)

Nowadays there is compelling evidence for the existence of dark matter in the Universe. A general consensus has been expressed on the need for a directional sensitive detector to confirm, with a complementary approach, the candidates found in ?conventional? searches and to finally extend their sensitivity beyond the limit of neutrino-induced background. We propose here the use of a detector based on nuclear emulsions to measure the direction of WIMP-induced nuclear recoils. The production of nuclear emulsion films with nanometric grains has been recently established. Several measurement campaigns have demonstrated the

capability of detecting sub-micrometric tracks left by low energy ions in such emulsion films with nanometric grains. Innovative analysis technologies with fully automated optical microscopes have made it possible to achieve the track reconstruction for path lengths down to one hundred nanometres and there are good prospects to further exceed this limit. The detector concept we propose foresees the use of a bulk of nuclear emulsion films surrounded by a shield from environmental radioactivity, to be placed on an equatorial telescope in order to cancel out the effect of the Earth rotation, thus keeping the detector at a fixed orientation toward the expected direction of galactic WIMPs. We report the performances and the schedule of the NEWS (Nuclear Emulsions for WIMP Search) experiment, with its one-kilogram mass pilot experiment, aiming at delivering the first results on the time scale of five years.

Status of DM searches with EDELWEISS

Éric Armengaud (CEA, Saclay)

The EDELWEISS experiment is operating an array of bolometric detectors for the direct search of WIMP dark matter in the Modane Underground Laboratory. After a brief discussion on the performances of the latest generation "FID" detectors, I will present the results of a recently published search for low-mass WIMPs which is in tension with hints of WIMP signals from other experiments. I will also present ongoing R&D developments which will allow to explore in a short timescale uncharted parameter space for WIMPs in the few GeV/c^2 mass range.

Searching for dark photons with the PADME experiment at the DAFNE Linac

Fabio Ferrarotto (INFN Roma 1)

Recently, the idea of the existence of a hidden sector of particles, connected with the SM only through a vector mediator - dark photon - was revived. The PADME experiment aims to search for dark photon, A', in positron-on-target annihilation ($e^+e^- \rightarrow \gamma A'$) exploiting the 550 MeV positron beam from the DAΦNE Linac. The reconstruction of the missing mass through the detection of the recoil photon allows to probe invisible A' final states. The experiment aims to collect $\sim 10^{13}$ positrons on target by the end of 2018, allowing to probe for dark photon with mass up to $\sim 24MeV$ and a relative coupling down to $\epsilon \sim 10^{-3}$. PADME was formally approved by the INFN at the end of 2015 and is in its construction phase.

DarkSide experiment: present results of the dark matter and steps towards the 20 ton LAr detector search

Jelena Maricic (University of Hawaii)

DarkSide-50 is a direct dark matter experiment operating in the underground Laboratori Nazionali del Gran Sasso (LNGS). DarkSide experiment published the first dark matter search performed with low radioactivity argon in the DarkSide-50 detector. Results of this search will be presented along with the physics potential for the future 20 ton detector. The 20 ton detector is made possible by breakthroughs in Si photomultiplier technology and a very low radioactivity levels of 39Ar present in argon from underground sources among other advances.

Latest results and status of the XENON program
Kevin Micheneau (SUBATECH, Nantes)

The XENON program aims for direct WIMP detection with a dual phase xenon time projection chambers (TPCs). The XENON100 detector is still tacking data at Laboratori Nazionali del Gran Sasso (LNGS), since 2009, and it is now being used as a test-bench for new method of calibrations for the next generation, XENON1T, that will be the first experiment to use liquid xenon in a time projection chamber at the ton scale. It is designed to achieve two orders of magnitude higher sensitivity than its predecessor. The most recent results of the collaboration will be presented: from XENON100 calibration measurements to XENON1T status and its projected sensitivity, that has been recently evaluated to reach a minimum cross section of $1.6 \times 10^{47} cm^2$ at $m_\chi = 50 GeV/c^2$ after 2 years exposure and 1 ton of fiducial volume.

Mu2e: coherent $\mu \to e$ conversion experiment at Fermilab
Gianantonio Pezzullo (Università di Pisa)

The Mu2e experiment will search for Charged Lepton Flavor Violation (CLFV) looking at the conversion of a muon into an electron in the field of an aluminum nucleus. About 7×10^{17} muons, provided by a dedicated muon beam line in construction at the Fermi National Accelarator Laboratory (Fermilab), will be stopped in 3 years in the Aluminum target. The corresponding single event sensitivity will be 2.5×10^{-17}.

The Standard Model of particle physics, even extendend to include the finite neutrino masses, predicts the ratio $R_{\mu e}$ between muon conversions and muon nuclear captures to be $\sim 10^{-52}$. Several extensions of the Standard Model predict $R_{\mu e}$ to be in the range of $10^{-14} - 10^{-18}$. The current best experimental limit, set by the SINDRUM II experiment is 7×10^{-13} 90% CL. The Mu2e experiment plans to improve this experimental limit by four order of magnitude to test many of the possible extensions of the Standard Model. To reach this ambitious goal, the Mu2e experiment is expected to use an intense pulsed muon beam, and rely on a detector system composed of a straw tube tracker and a calorimeter made of pure CsI crystals.

SHiP: a new facility with a dedicated detector to search for new long-lived neutral particles and studying tau neutrino properties
Elena Graverini (Universität Zürich)

SHIP is a new general purpose fixed target facility, whose Technical Proposal has been recently reviewed by the CERN SPS Committee, who recommended that the experiment proceeds further to a Comprehensive Design phase. 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 O(10) GeV/c^2. The main focus will be the physics of the so-called Hidden Portals, 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. Another dedicated detector will allow the study of neutrino cross-sections and angular distributions. 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 and allow for new tests of lepton non-universality with sensitivity to BSM physics.

Stationary configurations of the SM potential: EW stability and Higgs inflation
Giuseppe Iacobellis (University of Ferrara & INFN)

We extrapolate the Standard Model Higgs potential at very high energies. Starting from the most updated experimental data, the calculation is done according to the present state-of-the-art, namely at NNLO in the matching conditions and also in the running of the couplings. An improved two-loop RG effective

potential is taken into account. Our goal is to study in detail the stability of the model and the gauge independent observables (e.g. the highness of the potential, which is related to the primordial tensor-to-scalar ratio) associated with two stationary configurations of particular interest: a second degenerate minimum and a rising inflection point. In these frameworks, the viability of a Higgs-driven primordial inflation is considered.

Radiatively Induced Fermi Scale and Unification

Tommi Alanne (CP3-Origins University of Southern Denmark)

We propose a framework, where the hierarchy between the unification and the Fermi scale emerges radiatively. This work tackles the long-standing question about the connection between the low Fermi scale and a more fundamental scale of Nature. As a concrete example, we study a Pati-Salam-type unification of Elementary Goldstone Higgs scenario, where the SM scalar sector is replaced by an SU(4)-symmetric one, and the observed Higgs particle is an elementary pseudo-Goldstone boson. We construct a concrete model where the unification scale is fixed to a phenomenologically viable value, while the Fermi scale is generated radiatively. This scenario provides an interesting link between the unification and Fermi scale physics, and opens up prospects for exploring a wide variety of open problems in particle physics, ranging from neutrinos to cosmic inflation.

Implications of Higgs data from the Electroweak Chiral Lagrangian

Alejandro Celis (Ludwig Maximilian University of Munich)

I discuss the implications of Higgs data within the Electroweak Chiral Lagrangian, making emphasis on the role of chiral counting.

Light stops from extra dimensions

Mateo García Pepin (IFAE, Barcelona)

In supersymmetric models the mass of the stops can be considered as a measure of the naturalness of the theory. Roughly, the lighter the stops are, the more natural the theory is. Both the absence of supersymmetric signals at experiment and the measurement of the Higgs mass, put scenarios with light stops under increasing tension. In this talk I will present a supersymmetry breaking mechanism of the Scherk-Schwarz type that, by introducing extra $SU(2)_L$ triplets in the Higgs sector, is able to generate the correct Higgs mass while keeping stops light.

Di-photon excess in perturbative SUSY with Dirac gauginos

Luc Darmé (LPTHE, Paris)

Supersymmetric models with Dirac masses for the gauginos have both a solid top-down theoretical motivation and a rich phenomenology. In this talk, we show that thescalar singlet presents in such models is a sound candidate for the750 GeV diphoton excess as we can have simultaneously: perturbativity up to the GUT scale, vacuum stability and compatibility with other LHC searches. This is furthermore achieved with the ”minimal” field content for such scenarios.

Large loop-coupling enhancement of a 750 GeV pseudoscalar from a light dark sector

Stefano Di Chiara (NICPB University of Tallinn)

In this talk I will first show how the relatively large effective couplings required by the 750 GeV diphoton signal are the result of a threshold enhancement in the loop coupling between a heavy pseudoscalar particle and new leptons and quarks with masses of about 375 and 700GeV, respectively. I will then present a model in which the new charged leptons avoid detection by decaying to a natural dark matter candidate, and demonstrate that such model is able to fit the observed diphoton signal while satisfying the experimental bounds on the other decay channels and retaining perturbativity up to scales as high as $10^9 GeV$. Finally, I will show that the dark matter experimental bounds are satisfied in the same parameter space region viable at LHC.

Singlets in Composite Higgs Models in light of the LHC di-photon and di-boson searches

Thomas Flacke (Korea University, Seoul)

Models of compositeness can successfully address the origin of the Higgs boson, as a pseudo-Goldstone of a spontaneously broken global symmetry, and flavour physics via the partial compositeness mechanism. If the dynamics is generated by a simple underlying theory defined in terms of a confining gauge group with fermionic matter content, there exists only a finite set of models that have the correct properties to account for the Higgs and top partners at the same time. As a prediction, one obtains additional light scalars. We explore the theory space of composite Higgs models and their compatibility and predictions for di-photon and di-boson searches at LHC.

This presentation is based on: arXiv:1512.04508, 1512.07242, and work to appear, soon.

A closer look to the sgoldstino interpretation of the diphoton excess

Pietro Baratella (SISSA, Trieste)

We revisit the sgoldstino interpretation of the diphoton excess in the context of gauge mediation: we show that the interpretation is viable in a thin, near critical region of the parameter space. This regime gives rise to drastic departures from the standard gauge mediation picture. While the fermion messengers lie in the 10-100 TeV range, some scalar messengers are significantly lighter and are responsible for the sgoldstino production and decay. Their effective coupling to the sgoldstino is correspondingly enhanced, and a non-perturbative regime is triggered when light and heavy messenger masses differ by a factor $\sim 4\pi$.

SUSY searches at 13 TeV at ATLAS

Isabel Trigger (TRIUMF, Vancouver)

Despite the absence of experimental evidence, weak-scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarizes recent ATLAS results from searches for supersymmetric (SUSY) particles, using the 3.2 fb-1 of proton-proton collision data recorded in 2015 by the ATLAS experiment at a centre-of-mass energy of 13 TeV. These searches targeted strong production in R-Parity-conserving SUSY scenarios, with final states including jets, missing transverse momentum, with or without leptons, as well as long-lived particle signatures.

SUSY searches at 13 TeV with the CMS Experiment
Isabell Melzer-Pellmann (DESY, Hamburg)

Searches for Supersymmetry with 13 TeV data taken in 2015 will be presented, with focus on searches for gluino-gluino production, direct top-squark, and direct bottom-squark pair production. All-hadronic final states as well as final states including one or more leptons, or photons, are discussed.The results are interpreted within R-parity conserving simplified SUSY models.

New physics searches with taus
Edward Laird (Institute)

No abstract received

Searches for exotics at ATLAS
Ruggero Turra (Università di Milano and INFN)

The ATLAS detector has collected 3.2 fb^{-1} of proton-proton collisions at 13 TeV centre of mass energy during the 2015 LHC run. A selected review of the recent result are presented in the context of the direct search for BSM, not SUSY, not BSM Higgs.

Exotics searches at CMS
Luisa Alunni (University of Perugia)

Although the Standard Model (SM) has been achieving brilliant experimental successes so far, it doesn't solve some questions, such as the dark matter composition, the inclusion of gravity and the hierarchy problem. Beyond Standar Model (BSM) physics is needed to accurately describe our Universe. Many such new physics models exist, conventionally separated into supersymmetry models and all other BSM models, referred to as exotica. A review is presented of the most recent results at the energy of 13 TeV, obtained by the CMS detector, in the exotics sector. We focus on the analyses of the exotics and beyond two generation groups, the latter includes models featuring the decay of new resonances to heavy standard model objects (t, b, W, Z, H). These searches, categorized here by search method more then by theoretical models, look for diphoton and dijet heavy resonances, heavy bosons (Z' and W'), dark matter and other signatures. The first collected data of Run 2 have not yielded any discovery in the exotics field, but have given an interesting excess of events in the diphoton signature and have allowed to greatly constrain a wide range of theoretical scenarios.

Current status of the CRESST experiment
Holger Kluck (HEPHY and TU Vienna)

CRESST is a cryogenic experiment directly searching for dark matter interactions using scintillating $\mathrm{CaWO_4}$ crystals. The previous CRESST-II phase 2 established leading limits on the spin-independent dark matter-nucleon cross section down to masses for the dark matter particle candidate below $1\,\mathrm{GeV/c^2}$.

We report the status of the current CRESST-III phase 1 which started this spring. It operates an upgraded detector set-up with enhanced sensitivity for low-mass dark matter due to a reduced detection threshold for nuclear recoils. The improvements in detector design and crystal production will be discussed. In addition, we will give an outlook on the potential of the next CRESST-III phase 2.

QCD

+

Heavy Flavours

Tuesday Session

Wednesday Session I

Wednesday Session II

Rare decays at LHCb
Eluned Anne Smith (Imperial College London)

Among rare B decays, flavour changing neutral current processes are particularly interesting because they are loop-suppressed in the Standard Model. New particles in SM extensions can therefore give significant contributions, modifying branching fractions and angular distributions. Consequently, rare decays are sensitive probes for New Physics (NP). A review of recent results on rare decay measurements at the LHCb experiment will be presented.

Recent results on B-meson decays at BaBar and Belle
Guy Wormser (LAL, Orsay)

This talk will present recent BELLE and BABAR results from B decays that bring very relevant new information from both experiments on the two B physics areas where strong hints of a deviation from the Standard Model are present : semi-tauonic B decays, and $B \to s l^+ l^-$ transitions. These results are complementary to the ones obtained by LHCb. This combined angle of attack is the key to future success in this field

Rare Decays of B_s^0 Mesons to Muon Pairs with the ATLAS Detector (Run 1)
Wolfgang Walkowiak (University of Siegen)

The large amount of Heavy Flavor data collected by the ATLAS experiment at the LHC is potentially sensitive to New Physics, which could be evident in processes that are naturally suppressed in the Standard Model. The most recent results for the rare decays of B_s^0 and B^0 to two muons based on the full sample of data (Run 1) collected by the ATLAS detector at 7 and 8 TeV of collision energy are presented. The consistency with the Standard Model and with other available measurements is discussed.

Heavy flavour production and properties at ATLAS and CMS
Dario Barberis (Università di Genova)

Recent results by the ATLAS and CMS experiments at LHC are presented on the production and properties of heavy-flavour states. In the charm sector, cross-sections for the prompt and non-prompt production of J/ψ and ψ' are presented, as well as the production of open charm states. The b-quark fragmentation, $B^{\pm}$ production cross-section and several B-meson decay properties are also studied. The used data include LHC Run 1 (at a centre-of-mass energy of 7 and 8 TeV) and also Run 2 (13 TeV) samples collected in 2015.

CP violation in B and charm decays at LHCb
Simon Akar (CPPM, Marseille)

The LHCb experiment has collected large samples of heavy flavoured hadrons during Run 1, corresponding to an integrated luminosity of 3.0 fb^{-1} at pp centre-of-mass energy of 7 and 8 TeV. This talk gives an overview of the CP violation measurements the LHCb collaboration performed using Run 1 data, with an emphasis on the latest measurements on the CKM angle γ in a diverse range of decay modes. We also present the combination of all LHCb γ related measurements, which is the most precise single experiment combination to date. Measurements are also presented of direct CP violation in D^0 meson decays in LHCb, using the ΔA_{CP} technique as well as the recent LHCb measurement of the CP asymmetry in $B_s^0 - \overline{B}_s^0$ mixing, $a_{\rm sl}^s$, using semileptonic B_s^0 and $\overline{B}_s^0$ decays, corresponding to the most precise measurement of this quantity to date.

Charmed hadron physics at BESIII
Peilian Liu (IHEP, Beijing)

The BESIII Experiment at the Beijing Electron Positron Collider (BEPCII) has accumulated the word's largest e^+e^- collision samples at ψ(3770) peak, around the ψ(4040) nominal mass, and at the $\Lambda_c^+\overline{\Lambda}_c^-$ mass threshold which allow us to study decays of charmed mesons and baryons in a uniquely clean background. In this talk, we will review our recent results including: (1) the extractions of the $D_{(s)}^+$ decay constants, the form factors of D semi-leptonic decays, and the CKM matrix elements $|V_{cs(d)}|$; (2) the determinations of the absolute branching fractions of the hadronic and semi-leptonic decays of Λ_c^+.

Recent results on bottomonium studies at Belle
Anna Vinokurova (Budker Institute of Nuclear Physics, Novosibirsk)

We report new measurements of the total cross sections for $e^+e^- \to \Upsilon(nS)\pi^+\pi^-$ (n = 1, 2, 3) and $e^+e^- \to b\bar{b}$ from a high-luminosity fine scan of the c.m. energy range 10.63-11.05 GeV and determine masses and widths of the Upsilon(10860) and Upsilon(11020) resonances as well as their relative phase.
For the first time we observe the transition $\Upsilon(4S) \to \eta h_b(1P)$ and update the $h_b(1P)$ mass. Also revised are the branching fraction of $h_b(1P) \to \gamma\eta_b(1S)$ and the $eta_b(1S)$ mass and width.
We measure energy dependence of the $h_b(nP)\pi^+\pi^-$ (n = 1, 2) cross sections, where we find clear $\Upsilon(10860)$ and $\Upsilon(11020)$ peaks. We find evidence that $\Upsilon(11020) \to h_b(nP)\pi^+\pi^-$ transitions proceed entirely via the $Z_b(10610)$ and $Z_b(10650)$ states.
We report the analysis of the three-body $e^+e^- \to B^{(*)}\overline{B}^{(*)}\pi$ processes, including the Born cross sections measurements and the first observations of the $Z_b(10610) \to B\overline{B}^*$ and $Z_b(10650) \to B^*\overline{B}^*$ transitions.

Recent heavy flavor results from the Tevatron
Rick van Kooten (Institute)

Recent heavy flavor physics results in proton-antiproton collisions in Run 2 of the Tevatron from from the CDF and D0 Collaborations are presented. Results will cover new spectroscopy results including new states, charm cross sections, and properties of heavy hadrons such as lifetimes and CPT violation tests, and forward-backward production asymmetries.

Heavy flavour spectroscopy, including exotic states at LHCb
Greig Cowan (The University of Edinburgh)

The LHCb experiment is designed to study the decays and properties of heavy flavoured hadrons produced in the forward region from pp collisions at the CERN Large Hadron Collider. During Run1, it has recorded the world?s largest data sample of beauty and charm hadrons, enabling precise studies into the spectroscopy of such particles, including discoveries of new states and measurements of their properties such as masses, width and quantum numbers. In particular the discovery of the first pentaquark states and the first determination of the Zc(4430) as a tetra quark state have increased the interest for exotic spectroscopy. An overview of the recent LHCb results in this area is presented.

Hadron spectroscopy at BESIII
Guofa Xu (IHEP CAS, Beijing)

The BESIII experiment in Beijing started data taking for physics since 2009. For the moment the world largest samples of J/ψ, $\psi(3686)$, $\psi(3770)$ and $\psi(4040)$ data have been collected. The hadron spectroscopy, as one of the main physics goals, was extensively studied and many important progresses were achieved these years. The recent results of scalar $f_0(1710)$, pseudoscalar $\eta(1440/1405/1475)$, and $X(18xx)$ were presented in this report.

LHCb results on 13 TeV pp collisions
Ilya Komarov (EPFL, Lausanne)

Being inalienable part of the vast majority of high energy physics calculations, Quantum Chromodynamics (QCD) still has many external parameters and competing phenomenological models. Presented analyses of data collected by the LHCb experiment in proton-proton collisions at yet inaccessible energy of 13 TeV define differential production cross-sections of heavy boson, quarkonia, beauty and charm quarks. These results allow to put new constraints on parton distribution functions, obtain a new precision in tests of perturbative QCD approaches and descriptions of charmonium production mechanisms and are essential for the description of the Standard Model backgrounds in a wide range of experiments, from LHCb to IceCube.

Probing new physics with rare kaon decays at CERN SPS
Venelin Kozhuharov (LNF, Frascati)

The kaon physics has a long standing tradition at CERN SPS and the rare kaon decays offer a unique possibility to probe a large variety of Standard Model extensions. The NA48/2 experiment at CERN SPS performed searches for the lepton number violating decay $K^{\pm} \to \pi^{\mp}\mu^{\pm}\mu^{\pm}$, for new heavy or Majorana neutrinos in $K^{\pm} \to \mu^{\pm}N$, $N \to \pi^{\pm}\mu^{\mp}$, and for new degrees of freedom in the channel $K^{\pm} \to \pi^{\pm}X$ with X decaying into two muons.
The primary goal of the NA62 experiment is the measurement of the branching fraction of the ultra rare decay $K^{+} \to \pi^{+}\nu\overline{\nu}$ with 10% precision. About 10^{13} kaon decays will be collected allowing a diverse programme of searches for rare and exotic processes. The obtained results from the NA48/2 experiment and the expected performance of the NA62 experiment will be presented and discussed.

Results on heavy ion collisions at LHCb
Marcin Kucharczyk (Institute of Nuclear Physics, Krakow)

The forward acceptance of the LHCb detector allows it to probe proton-ion collision in a unique kinematic range, complementary to the other LHC experiments. A selection of LHCb results on heavy quarkonia production, together with the production of D^0 mesons is presented in proton-lead collision data at $\sqrt{(s_{NN})} = 5\ TeV$. The nuclear modification factor and the forward-backward production ratio have been determined for J/Ψ, $\Psi(2S)$, $\Upsilon(1S)$ and D^0 mesons. A sizable suppression is observed in proton-lead collisions at forward rapidities, only a slight suppression is seen in lead-proton collisions at backward rapidities. In the second part the results on two-particle angular correlations in proton-lead collisions are discussed. The correlations are measured as a function of relative pseudorapidity and azimuthal angle, denoting long-range correlations on the near side, which extends previous observations into the forward region up to pseudorapidity = 4.9. In the last part preliminary results are summarized for operation of the LHCb experiment in the fixed-target mode, collecting data from collisions of the proton or lead beams with nuclei of a noble gas injected into the interaction region.

Heavy Ion measurements at ATLAS and CMS
Maxime Guilbaud (Rice University, Houston)

The Quantum ChromoDynamics (QCD) under extreme conditions in temperature or pressure predicts a new state of nuclear matter where quarks and gluons are not confined in hadrons: the quark and gluon plasma (QGP). This state is thought to have existed a few microseconds after the Big Bang. The QGP is created in the laboratory using heavy ion collisions, and its properties have been extensively studied at the SPS, the RHIC, and now at the LHC. In particular, it was shown at RHIC that QGP behaves as a perfect fluid. With 20 times higher energy, the LHC is a perfect tool to improve our knowledge of the strong interaction and QCD properties under extreme conditions. In addition, smaller colliding systems at LHC energies, like proton-proton (pp) and proton-nucleus (pA) collisions, exhibited similar behavior to nucleus-nucleus (AA)

collisions. The LHC experiments have collected a large amount of data in pp, pA and AA collisions for different center of mass energies. Especially last year, proton-proton and heavy ion collisions at the highest energy delivered so far were recorded. Therefore, more precise studies and search for more rare probes of the hot and dense matter created at the collision is now possible. In this talk, the latest results from the ATLAS and CMS experiments in small systems and heavy ion collisions will be presented.

Recent results from VEPP-2000-collider in Novosibirsk

Tatyana V. Dimova (Budker Institute of Nuclear Physics, Novosibirsk)

Starting from 2010, experiments with the SND and CMD-3 detectors are carrying out at the VEPP-2000 e^+ee^--collider in the energy range 0.3-2.0 GeV. The already collected data sample corresponds to 70 pb^{-1} per detector. The latest results on hadron processes including nucleon anti-nucleon production will be reported. Further plans on data taking after VEPP-2000 upgrade will be presented.

Soft QCD at 13 TeV at ATLAS and CMS

Sahal Yacoob (University of Cape Town)

The talk will summarise measurements of the total inelastic proton-proton cross-section and charged particle distributions by ATLAS and CMS at 13 TeV. These measurements provide necessary inputs to non-perturbative models of soft QCD, and the transition region between non-perturbative and perturbative calculations. The results are compared to popular Monte-Carlo generators in collider, and cosmic shower physics.

QCD with jets and photons at ATLAS and CMS

Niki Saoulidou (University of Athens)

I will first briefly present the ATLAS and CMS experimental apparatus and details on the luminosity and centre-of-mass energy used for the presented results. Then, I will briefly discuss jet reconstruction, energy scale and resolution measurements along with their systematic uncertainties for both experiments. I will continue with presenting few selected QCD results using jets and photons. In particular I will discuss jet cross section measurements at several center-of-mass energies, using both inclusive and dijet samples. These are useful in testing perturbative QCD in new energy regimes, constraining and tuning PDFs, measuring the running of the strong coupling constant, and tuning of MC generators. Then I will also discuss the measurement of dijet azimuthal decorrela-tions with CMS, indirectly probing multijet topologies. I will present the measurement of charged particle jet multiplicities with ATLAS, a major ingredient in quark-gluon jet separation which is an important tool for many standard model (SM) and new physics (NP) searches. I will finish with the measurement of the inclusive photon production with ATLAS, a critical SM measurement for many Higgs and NP measurements and searches.

On the pair correlations of neutral K, D, B and B_s mesons with close momenta produced in inclusive multiparticle processes

Valery V. Lyuboshitz (JINR, Dubna)

The phenomenological structure of inclusive cross-sections of the production of two neutral K mesons in hadron–hadron, hadron–nucleus and nucleus–nucleus collisions is theoretically investigated taking into account the strangeness conservation in strong and electromagnetic interactions. Relations describing the dependence of the correlations of two short-lived and two long-lived neutral kaons $K^0_S K^0_S$, $K^0_L K^0_L$ and the correlations of "mixed" pairs $K^0_S K^0_L$ at small relative momenta upon the space-time parameters of the generation region of K^0 and $\overline{K}^0$ mesons, involving the contributions of Bose statistics and S-wave strong final-state interaction, have been obtained. It is shown that under the strangeness conservation the correlation functions of the pairs $K^0_S K^0_S$ and $K^0_L K^0_L$, produced in the same inclusive process, coincide, and

the difference between the correlation functions of the pairs $K^0_S K^0_S$ and $K^0_S K^0_L$ is conditioned exclusively by the production of the pairs of non-identical neutral kaons $K^0\overline{K}^0$.

For comparison, the theoretical analysis of analogous correlations for the pairs of neutral heavy mesons D^0, B^0 and B^0_s, generated in multiple inclusive processes with charm (beauty) conservation, is performed as well (neglecting, just as for the case of K^0 mesons, the weak effects of CP violation). These correlations are described by quite similar expressions: in particular, just as for K^0 mesons, the correlation functions for the pairs of states with the same CP parity ($R_{SS} = R_{LL}$) and with different CP parity (R_{SL}) do not coincide, and the difference between them is conditioned exclusively by the production of pairs $D^0\overline{D}^0$, $B^0\overline{B}^0$ and $B^0_s\overline{B}^0_s$. However, contrary to the case of K^0 mesons, here the distinction of CP-even and CP-odd states encounters difficulties – due to the insignificant differences of their lifetimes and the relatively small probability of purely CP-even and CP-odd decay channels. Nevertheless, one may hope that it will become possible at future colliders.

On-shell helicity methods for soft-collinear effective field theories

Angelo Raffaele Fazio (Universidad Nacional de Colombia)

On-shell helicity methods provide powerful tools for determining scattering amplitudes, which have a one-to-one correspondence with leading power helicity operators in the Soft-Collinear Effective Theory (SCET) away from singular regions of phase space. Helicity based operators are also useful for enumerating power suppressed SCET operators, which encode subleading amplitude information about singular limits. In particular, we present a complete set of scalar helicity building blocks that are valid for constructing operators at any order in the SCET power expansion. The analysis is performed in D=4 dimensions and in $D = 4-2\epsilon$ by exploiting the four dimensional formulation of quantum chromodynamics, allowing one-loop computations from unitarity cuts by only four dimensional degrees of freedom.

Higgs Pair Production in gluon fusion at NLO with full top mass dependence

Sophia Borowka (University of Zurich)

The calculation of Higgs boson pair production in gluon fusion at next-to-leading order in the strong coupling constant with full top-quark mass dependence is presented. The usage of the programs GoSam, Reduze and SecDec for the computation and numerical evaluation of the most complicated piece, the virtual two-loop amplitude, is explained. The cross section and invariant mass distribution are shown, in addition to a comparison with various approximations proposed in the literature.

Transverse-momentum resummation of colorless final states at the NNLL+NNLO

Marius Wiesemann (University of Zurich)

The resummation of logarithmically enhanced terms at small transverse momenta is discussed for the production of a system of colorless particles. We present an automated computation of transverse-momentum spectra up to NNLL+NNLO, implemented in the MATRIX framework. Its application to diboson production allows for state-of-the art predictions for the transverse-momentum distribution of the diboson pair, that are shown to improve the comparison to data in the case of ZZ production.

Neutrinos

Tuesday Session

Recent Results From the T2K Experiment
Andrew Missert (University of Colorado Boulder)

The Tokai-to-Kamioka experiment (T2K) is an accelerator-based long-baseline neutrino oscillation experiment. An off-axis neutrino beam with a peak energy of 0.6 GeV is produced at the J-PARC accelerator facility, with the flavor content dominated by either muon neutrinos or muon antineutrinos, depending on the choice of the polarity of the magnetic focusing horns. The oscillated flux is detected at Super-Kamiokande, a ring-imaging water Cherenkov detector located 295 km away from the source, where the oscillation effect is maximal. This talk will briefly review T2K's previous oscillation results from running in neutrino mode, as well as present the most recent disappearance results from running in antineutrino mode with 4.01×10^{20} protons on target.

New Results of the Double Chooz Experiment
Thiago Sogo-Bezerra (SUBATECH, Nantes)

Double Chooz (DC) is a reactor neutrino experiment running at Chooz nuclear power plant in France. In 2011, DC first reported indication of non-zero θ_{13} in reactor neutrino oscillation by a single detector at around oscillation maximum (far detector, FD). Until then only the upper limit was given by the CHOOZ experiment. A robust observation of θ_{13} was followed in 2012 by the Daya Bay and RENO experiments with multiple detectors. θ_{13} is most precisely measured by the reactor experiments with the systematic uncertainties at per mille level and the value is used as reference in current and future projects which aim to search for CP violation and mass hierarchy in neutrino sector. Therefore, precision and accuracy of the reactor θ_{13} is a critical matter and validation by multi-experiments based on different systematic uncertainty compositions are essential. In the last analysis of DC with single detector, precision of θ_{13} was dominated by the reactor flux uncertainty after suppression of background and detector related systematic uncertainties, and hence significant improvement is expected with two detectors. DC finished construction of the second detector close to the reactor cores (near detector, ND) and has accumulated more than 1 year of data with two detectors as of May 2016. Thanks to nearly iso-flux experimental layout in DC, reactor flux uncertainties are strongly suppressed to the lowest level in the world. In this talk a first look on the ND data and its analysis will be shown.

Status and Prospects of the KM3NeT-ORCA experiment
Joao Coelho (Laboratoire APC, Paris)

The KM3NeT experiment is under construction in the Mediterranean Sea. The ORCA part of the experiment was designed to measure the Neutrino Mass Hierarchy (NMH) using atmospheric neutrinos. ORCA will consist of a 6 Mton water Cherenkov detector densely instrumented with over 64000 PMTs. This configuration will enable high statistics measurements of atmospheric neutrinos in the energy range where resonant neutrino flavour transitions are expected and which depend on the NMH. In this talk I will describe the latest developments on the KM3NeT-ORCA project, including the construction and deployment plans, design optimisations, and the expected sensitivity of the experiment to the NMH and other oscillation parameters.

Beyond standard neutrinos
Pedro Machado (IFT UAM Madrid)

In this talk I will consider some beyond standard physics aspects of neutrinos, specially regarding sterile neutrinos, mass mechanisms and non standard interactions. Emphasis will be given in the interplay between neutrino and Higgs physics. I will also present a non standard use of neutrinos in dark matter experiments which can help to understand solar physics, the running of theta weak at very low energies, and dark sectors in general.

Effective theories, dark matter and neutrinos
Richard Hill (TRIUMF & Perimeter Institute)

Many searches for physics beyond the standard model involve a quantitative understanding of nucleon and nuclear responses to weak probes. Heavy WIMP effective theory is introduced and used to highlight important applications of perturbative and nonperturbative QCD calculations in dark matter searches. Related applications to neutrino-nucleus cross sections for the accelerator neutrino oscillation program are discussed.

The GERDA neutrinoless double beta decay experiment: First data from Phase II
Tobias Bode (Technische Universität München)

The neutrinoless double beta ($0\nu\beta\beta$) decay is a lepton number violating process and if observed would prove the Majorana nature of the neutrino. The GERmanium Detector Array (GERDA) experiment, located in the Gran Sasso underground laboratory, Italy, was constructed to search for the $0\nu\beta\beta$ decay of ^{76}Ge. HPGe detectors, isotopically enriched in ^{76}Ge, are operated bare in liquid argon. Phase I was successfully completed with a new lower limit of $T_{1/2} > 2.1 \cdot 10^{25}$ yr (90 % C.L.) achieving the aspired background index (10^{-2} cts/keV·kg·yr) in the region of interest. For Phase II the active detector mass has been doubled and an argon scintillation light veto system has been deployed. The expected sensitivity (with a background index of 10^{-3} cts/keV·kg·yr) is $T_{1/2} > 1.4 \cdot 10^{26}$ yr with 100 kg·yr of exposure. After the extensive upgrade GERDA has started data taking in December 2015. The detector array performance and first Phase II data will be presented.

CUORE-0 background analysis and evaluation of ^{130}Te $\beta\beta(2\nu)$ decay half-life
Davide Chiesa (University & INFN of Milano-Bicocca)

CUORE is an experiment that will search for the neutrinoless double beta decay of ^{130}Te. The detector is composed by 988 TeO_2 bolometers, 750 g each, arranged in a structure of 19 towers and is now in its final commissioning phase at LNGS, Italy. CUORE-0 is a single CUORE-like tower that was run from March 2013 to July 2015 to test the performance of the CUORE experiment. In this talk we present the results of the model developed to analyze the CUORE-0 energy spectrum, disentangling the amount and the position of the background sources that combine to form the observed spectrum. A direct outcome of this analysis is the measurement of the ^{130}Te $\beta\beta(2\nu)$ decay half-life, of which we provide a preliminary evaluation.

The SNO+ Experiment: status and future prospects
Laura Segui (University of Oxford)

The SNO+ Experiment, successor of the Sudbury Neutrino Observatory (SNO) and located in the SNOLAB underground laboratory in Canada, is a multi-purpose loaded scintillator neutrino experiment which first aim is to detect the neutrinoless double beta decay process in Te-130. The detection of such a rare nuclear decay will imply physics beyond the standard model and can prove the nature, as well as the mass hierarchy, of the neutrino. Due to the expected low rate of the decay, the experiment needs to avoid any possible contamination entangling the expected signal. Placing it underground, reduce the possible radioactive contamination during its installation and applying background reduction techniques is mandatory.

The experiment is divided in three phases: filling the sensitive volume with water, scintillator and Te loaded scintillator phase. In each phase different physics can be studied, although its main focus will be during the Te loaded scintillator phase. In this talk the status of the experiment, which expects to start taking data with water in June 2016, will be presented. Special attention will be given to the recently new loading technique developed by the collaboration to dissolve the Te into the organic scintillator (LAB). Furthermore, the expected sensitivity and background model will be discussed, showing the competitiveness of the experiment in the field.

CUPID-0: a step forward exploring the inverted hierarchy region of the neutrino mass

Maria Martinez (Università di Roma La Sapienza)

CUORE experiment aims to observe neutrinoless double beta decay with a projected sensitivity reaching the inverted hierarchy scale, but to completely explore this region it is mandatory to increase the source mass and a major reduction in background. The CUPID project pursues this goal through several strategies, one of them being the rejection of alpha background by double readout (light and heat) on a scintillating crystal. After a great effort of the LUCIFER collaboration, the first array of $Zn^{82}Se$ bolometers (CUPID-0), is starting construction at the LNGS.
I will present results in terms of background and detector performances of three of the CUPID-0 bolometers and review the status of the experiment and its physics potential.

Astroparticle Physics and Cosmology

Wednesday Session I

Wednesday Session II

Thursday Session

The search for inflationary B-modes: latest results from BICEP/Keck

Clement Pryke (University of Minnesota, Minneapolis)

The BICEP/Keck experiments are CMB polarimeters located at the South Pole in Antarctica. They are specifically designed to search for the signature of primordial gravitational waves produced during the inflationary birth of our universe. I will describe the instruments and the analysis of multi-frequency data which allows to separate the galactic dust foreground from a potential cosmological signal, and which sets the world's best current limit of r¡0.09 (95% CL).

SPIDER: Exploring the Dawn of Time from Above the Clouds

Jeffrey Filippini (University of Illinois Urbana-Champaign)

SPIDER is an ambitious balloon-borne instrument to map the polarization of the cosmic microwave background at large angular scales. SPIDER targets the B-mode signature of primordial gravitational waves, with a focus on mapping a large sky area with high fidelity at multiple frequencies. SPIDER's six monochromatic refracting telescopes feed a total of more than 2000 antenna-coupled superconducting transition-edge sensors. A sapphire half-wave plate at the aperture of each telescope modulates sky polarization for control of systematics. I will report on SPIDER's first long-duration balloon flight in January 2015, which fielded three receivers each at 95 GHz and 150 GHz. I will give an update on the status of data analysis and development toward a second flight, which will add coverage at 285 GHz.

QUBIC

Mikhail Stolpovskiy (Laboratoire APC, Paris)

QUBIC is a ground-based experiment, currently under construction, that uses the novel bolometric interferometry technology. It is dedicated to measure the primordial B-modes of CMB. As a bolometric interferometer, QUBIC has high sensitivity and good systematics control. Dust contamination is controlled by operating with two bands ? 150 and 220 GHz. There are two possible sites for QUBIC: either Concordia station in Antarctic or in the Argentinian Puna desert. It is planned to see the first light in 2018-2019.

Results from the Nearby Supernova factory

Mickael Rigault (Humboldt University Berlin)

The Nearby Supernova factory has now obtained hundreds of high quality spectrophotometric times series of Type Ia Supernovae (SNe Ia). Unlike any other modern survey, the measurement of the spectral evolution of SN Ia events as a function of time enables us to compare our data with that of any other calibrated survey. This is key for the accurate measurement of the properties of the constituents of the Universe, notably those of the dark energy. I will present results on the enigmatic color of SNe Ia and on the correlation between SN Ia properties and these of their environments.

Marginal evidence for cosmic acceleration from Type Ia supernovae

Alberto Guffanti (Università degli Studi di Torino)

No abstract received

Measuring anisotropy in the local universe with type Ia supernovae

Ulrich Feindt (The Oskar Klein Centre, Stockholm)

Our Local Group of galaxies appears to be moving relative to the Cosmic Microwave Background with the source of the peculiar motion still not fully identified. While this has been studied mostly using galaxies in the past, the weight of SNe Ia has increased recently with the continuously improving statistics of available low-redshift supernovae. An analysis of the peculiar velocities of 117 supernovae out to z ¡ 0.1 from the Nearby Supernova Factory, as well as the world literature supernova data, found that the Shapley supercluster does not fully explain the observed velocities. This talk will give an overview of studies of peculiar velocities and local anisotropy based on type Ia supernovae and show first predictions for further analyses using future supernova surveys such as the Zwicky Transient Facility.

Baryonic Acoustic Oscillation Correlations at z=2.4 with SDSS-III Lyman-α Forests

Hélion du Mas des Bourboux (CEA, Saclay)

We measure the large-scale correlation using the Lyman-α forest absorption field and the quasar positions. We use over 170,000 forests from Data Release 12 (DR12) of the SDSS-III BOSS survey and over 240,000 quasars from DR12 and from DR7 of the SDSS-II survey. We compute two 3D correlations: the Lyman-α auto-correlation and the quasar - Lyman-α cross-correlation. This study allows us to measure the Baryonic Acoustic Oscillation (BAO) scale, along and across the line of sight, at a mean redshift of z = 2.40. These scales are linked to the Hubble parameter and the angular diameter distance, respectively. We use simulations to search for a possible bias in the measurement of the BAO scale.

QSO clustering with the SDSS-IV eBOSS survey

Pauline Zarrouk (CEA-SPP, Saclay)

The eBOSS multi-object spectrograph has undertaken a survey of Quasars (QSO) in the almost unexplored redshift range $0.9 < z < 2.2$. It will track both the Baryonic Acoustic Oscillations (BAO) and the Redshift Space Distortions (RSD) of the 2-point correlation function to extract cosmological information on the geometry of the universe and the nature of dark energy. In particular, it will measure the growth rate of structures and allow for a test of general relativity modifications and dark energy scenarios. Indeed, at the redshift range of the eBOSS QSO sample, any deviation from general relativity predictions on the growth rate of structures would start being a powerful discriminant between different modified gravity models such as the Galileon. The eBOSS survey started 2 years ago and preliminary results will be presented.

To perform this measurement, special care should be given to the RSD model. The most popular model is the Gaussian Streaming model which convolutes a pairwise velocity probability distribution function (PDF) assumed to be Gaussian with the real space correlation function. In this talk, I will present one of the most recent RSD model based on Convolution Lagrangian Perturbation Theory (CLPT) and its applicability for the QSO tracer. CLPT provides predictions on velocity and real-space clustering statistics that need to be tuned on N-body simulations. Moreover, the halo occupancy distribution of QSO in dark matter halos which links the properties of galaxies with the ones of their hosted dark matter halos can be investigated and we will examine at which scale this model is valid in the redshift range of eBOSS. In addition, we resort to mock catalogues as a benchmark of our analysis and more specifically to estimate the matrix describing the expected covariance of our measurement.

Finally, recent studies started involving small scales where non-linear evolution has to be taken into account. This will enlarge the range of scales and hence reduce the statistical error. This task is not easy since different scale-dependent effects have to be considered, so it complicates a lot the possibility to have an unique model which describes the distortions in the clustering pattern at all scales. One way of improving RSD models would be to use the N-body simulations to find the relevant quantities to be injected in the description of the full infall velocity PDF such as local environment parameters. Going in that direction, I will present an attempt to parametrize this PDF and then, using a specific streaming model, we plan to quantify the difference with the Gaussian Streaming Model.

Astrophysical Neutrinos in IceCube: Observations and Prospects

Mike Richman (Drexel University, Philadelphia)

The IceCube Neutrino Observatory is a cubic-kilometer scale detector located deep in the glacial ice at the geographic South Pole. Construction took place during the Austral summers of 2005–2010. By 2013, the existence of a high-energy astrophysical neutrino flux was established by an excess of neutrino detections above $\sim 10\,\mathrm{TeV}$ inconsistent with the expectation from atmospheric backgrounds at the 5.7σ level. In this talk I will review the ongoing efforts to characterize this flux and to identify its sources. I will also discuss the trajectory of IceCube neutrino astronomy in the coming years, including novel analysis methods, multi-messenger astronomy, and proposed detector extensions.

Latest results in data from the ANTARES experiment

Irene Di Palma (University of Rome La Sapienza)

The ANTARES experiment has been running in its final configuration since 2008. It is the largest neutrino telescope in the Northern hemisphere. After the discovery of a cosmic neutrino diffuse flux by the IceCube detector, the search for its origin has become a key mission in high-energy astrophysics. Particularly interesting is the indication (although not significant with the present IceCube statistics) of an excess of signal events from the Southern sky region. The search program also includes multi-messenger analyses based on time and/or space coincidences with other cosmic probes. The ANTARES observatory is sensitive to a wide-range of other phenomena, from atmospheric neutrino oscillations to dark matter annihilation or potential exotics such as nuclearites and magnetic monopoles. The most recent results are reported.

Neutrinos in neutron star mergers

Albino Perego (TU-Darmstadt)

Binary neutron star mergers are expected to copiously emit neutrinos of all flavor, with luminosities in excess of 10^{53} erg/s. In addition to efficiently releasing gravitational and internal energy, neutrinos are expected to influence the dynamics of the merger remnant, for example triggering the formation of a neutrino-driven wind from the disk accreting on the central object. Together with the dynamic and evaporation ejecta, this wind is expected to have a proper signature in terms of nucleosynthesis outcome and electromagnetic counterpart. Moreover, the annihilation of neutrino- antineutrino pairs above the remnant can deposit an amount of energy comparable to the one required to trigger a short gamma-ray burst.

KM3NeT/ARCA Status and perspectives.

Javier Barrios-Martí (IFIC, Valencia)

The main goal of KM3NeT/ARCA is the detection of high energy neutrinos of cosmic origin. The first phase of construction will be completed in 2017 and will consist of 31 strings (instrumented volume of about 0.1 km^3). The performance of the first string, deployed on the Italian site in December 2015, will be presented. A second phase with 2 blocks of 115 strings is scheduled to be completed in 2020. For neutrino energies above 10^5 GeV, the median angular resolution for track and cascade events will be of $<0.1^\circ$ and $<2^\circ$, respectively. The second phase detector is expected to observe the signal reported by IceCube in less than a year. Indications for galactic sources could be observed at a 3-sigma level within 3 years.

The Pierre Auger Observatory: challenge of ultra high energetic cosmic rays

Julian Rautenberg (Bergische Universität Wuppertal)

The high statistics precision data collected since 2004 with the world largest cosmic-ray observatory brought knowledge on many interesting astroparticle questions. For example, the suppression of cosmic rays with energies above 5×10^{19} eV has been confirmed with high significance. The question of direct detection of astrophysical sources is closely related to the nature of the primary cosmic rays. It cannot be expected for heavy primaries to point back to their source due to the larger deflection in (inter-) galactic magnetic fields. On the other hand the primary is best determined by the measurement using the uptime-limited fluorescence telescopes. The challenge is to extend the Surface Detectors of the Pierre Auger Observatory to allow a primary identification event-by-event to detect sources using the light primary component.

Recent Results from the HAWC Experiment

Andrew Smith (University of Maryland, College Park)

The High Altitude Water Cherenkov Observatory (HAWC) is a new and novel TeV gamma-ray detector that was recently completed and began full operation in March 2015. Located on the Sierra Negra volcano, Puebla, Mexico, at an elevation of 4,100m, HAWC is optimized for the detection of gamma rays in the 0.1 - 100 TeV range. It's 2sr field-of-view and ¿90% duty cycle make HAWC an ideal instrument for surveying the high-energy sky, searching for new sources, studying extended emission from diffuse sources and monitoring transient and variable sources such as GRBs and AGN. I will describe the HAWC detector and its performance characteristics and report initial results from the first year of operation.

The MAGIC Telescopes – Highlights and Perspectives

Martin Will (IFAE, Barcelona)

The MAGIC Telescopes in La Palma, Canary Islands, are a stereoscopic system of two 17m Imaging Air Cherenkov Telescopes. MAGIC measures high-energetic gamma rays for more than 10 years, has discovered many sources, and enlarged our fundamental understanding of gamma-ray astronomy in the energy regime between around 50 GeV and more than 50 TeV. The extensive physics program of MAGIC includes the study of pulsars and other galactic and extragalactic objects, as well as fundamental physics and dark matter searches. Highlights of the most recent findings from MAGIC observations are discussed, among them the two farthest Active Galactic Nuclei detected so far in very high-energy gamma rays. Also presented are perspectives to improve the performance of the telescopes and increase the efficiency of their observations, enabling MAGIC to reinforce its major role in gamma-ray astronomy.

Recent Highlights from VERITAS

Henrike Fleischhack (DESY, Zeuthen)

VERITAS is an array of four 12m imaging Cherenkov telescopes, sensitive to very-high energy (VHE; $> 100GeV$) gamma-ray photons. It has been observing the northern sky since 2007. VERITAS' science program includes the characterization of the VHE gamma-ray sky, the study of cosmic ray accelerators (both within and outside of the Galaxy), and other topics in astrophysics, cosmology and fundamental physics. Collaboration with multi-wavelength and multi-messenger partners is crucial for understanding the processes behind the emission of gamma rays.

In the following presentation, I will give an overview of the observatory's status, and present some of the recent results from observations of both galactic and extra-galactic targets.

Constraints on Neutrino Mass from the Lyman-alpha Forest

Julien Baur (CEA, Saclay)

I will present the constraint on massive neutrinos that was obtained recently using Lyman-alpha forest, BAO and CMB data. I will first describe the measurement of the power spectrum in the Lyman-alpha forest observed in quasars of the SDSS/BOSS survey. I will then present the extensive suite of N-body/hydro simulations that has been developed specifically for the purpose of this study, and show how it can be used to place constraints on the sum of the neutrino masses at the level of 0.12 eV (95% confidence level). I will also discuss the impact of Ly-alpha forest on the measurement of the primordial fluctuations by CMB experiments. Finally, I will illustrate how these data and simulations can also constrain the mass of neutrinos considered as Warm Dark Matter.

Search for Galactic Pevatrons with H.E.S.S.

Aion Viana (Max-Planck-Institut für Kernphysik, Heidelberg)

The energy spectrum of Cosmic Rays (CRs) extends without any major feature until particle energies of few PeVs, where it steepens originating a feature called the knee. This implies our galaxy hosts PeVatrons – extreme particle accelerators reaching such PeV energies. The identification of such objects is a key issue for the solution of the century-long puzzle of the origin of Galactic cosmic rays given that all proposed models of particle accelerators in our Galaxy encounter non-trivial difficulties at exactly these energies. The recent advances of ground-based gamma-ray astronomy, thanks to observations of Atmospheric Cherenkov Telescope Arrays, have resulted in the discovery of tens of TeVatrons – Galactic particle accelerators reaching TeV energies. However, until recently, none of the currently known accelerators, not even the handful of measured shell-type supernova remnants commonly believed to supply most Galactic cosmic rays, had shown PeV features: power-law spectra of gamma rays extending without a cutoff or a spectral break to tens of TeV, thereby implying the acceleration of parent cosmic rays to PeV energies. I will review the gamma-ray observations with the High Energy Stereoscopic System (H.E.S.S.) I array of ground-based Cherenkov telescopes of a few Pevatron candidates, and report on deep H.E.S.S. observations of the Galactic Centre region which recently revealed the existence of a PeVatron within the central 10 parsecs of our Galaxy. I will discuss possible implications of the observed emission, in particular, in the context of the origin of Galactic cosmic rays and large-scale emissions (Fermi bubbles, extraterrestrial neutrinos and others).

List of Participants

Akar	Simon	CPPM	Marseille	akar@cppm.in2p3.fr
Alanne	Tommi	CP3-Origins	Odense	alanne@cp3.sdu.dk
Aldaya Martin	Maria	DESY	Hamburg	maria.aldaya@desy.de
Allen	Bruce	Albert Einstein Institute	Hannover	bruce.allen@aei.mpg.de
Alunni Solestizi	Luisa	University of Perugia	Perugia	luisa.alunni@pg.infn.it
Andrea	Jeremy	IPHC	Strasbourg	jandrea@in2p3.fr
Armengaud	Eric	CEA Saclay	Gif-Sur-Yvette	eric.armengaud@cea.fr
Baratella	Pietro	SISSA	Trieste	pbaratel@sissa.it
Barberis	Dario	Università di Genova	Genova	dario.barberis@cern.ch
Barrios Marti	Javier	Instituto de Fisica Corpuscula	Paterna	javier.barrios@ific.uv.es
Baur	Julien	IRFU SPP CEA Saclay	Gif-Sur-Yvette	julien.baur@cea.fr
Bernardi	Gregorio	LPNHE	Paris	gregorio@lpnhe.in2p3.fr
Binétruy	Pierre	APC Université Paris Diderot	Paris	binetruy@apc.univ-paris7.fr
Bluj	Michal	National Centre for Nuclear Research	Warsaw	michal.bluj@cern.ch
Bode	Tobias	Technische Universität München	Munich	tobias.bode@ph.tum.de
Borowka	Sophia	University of Zurich	Zurich	sborowka@physik.uzh.ch
Brock	Ian	Physikalisches Institut	Bonn	brock@physik.uni-bonn.de
Cacciapaglia	Giacomo	IPN Lyon	Villeurbanne	g.cacciapaglia@ipnl.in2p3.fr
Celis	Alejandro	Ludwig Maximilian University	Munich	alejandro.celis@physik.uni-muenchen.
Chiesa	Davide	University and INFN Milano Bicocca	Milano	davide.chiesa@mib.infn.it
Coelho	Joao	Laboratoire APC	Paris	jcoelho@apc.in2p3.fr
Cooley	Jodi	Southern Methodist University	Dallas	cooley@physics.smu.edu
Cowan	Greig	The University of Edinburgh	Edinburgh	greig.cowan@cern.ch
Dalipi	Rea	University Pierre et Marie Curie	Paris	readalipi@gmail.com
Darme	Luc	LPTHE	Paris	darme@lpthe.jussieu.fr
De Blas	Jorge	INFN-Rome	Rome	jorge.deblasmateo@roma1.infn.it
De Florian	Daniel	ICAS-UNSAM	San Martin	deflo@unsam.edu.ar
Descotes-Genon	Sebastien	LPT Orsay	Orsay	descotes@th.u-psud.fr
di Chiara	Stefano	NICPB University of Tallinn	Tallinn	stefano.dichiara@kbfi.ee
di Palma	Irene	University of Rome La Sapienza	Rome	irene.dipalma@roma1.infn.it
Donega	Mauro	ETH	Zurich	mauro.donega@cern.ch
du Mas des Bourboux	Hélion	Irfu CEA Saclay	Gif Sur Yvette	helion.du-mas-des-bourboux@cea.fr
Dumarchez	Jacques	LPNHE	Paris	jacques.dumarchez@cern.ch
Ellis	Sebastian	University of Michigan	Ann Arbor	sarellis@umich.edu
Escalier	Marc	LAL	Orsay	escalier@lal.in2p3.fr
Fazio	Angelo R	Universidad nacional de Colombia	Bogota	arfazio@unal.edu.co
Feindt	Ulrich	The Oskar Klein Centre	Stockholm	ulrich.feindt@fysik.su.se
Ferrarotto	Fabio	INFN Roma 1	Roma	fabio.ferrarotto@roma1.infn.it
Filippini	Jeffrey	University of Illinois	Urbana	jpf@illinois.edu
Flacke	Thomas	Korea University	Seoul	flacke@korea.ac.kr
Fleischhack	Henrike	DESY	Zeuthen	henrike.fleischhack@desy.de
Franco	Davide	Laboratoire APC	Paris	dfranco@in2p3.fr
Furlan	Elisabetta	ETH Zurich	Zurich	efurlan@phys.ethz.ch
García Pepin	Mateo	IFAE UAB	Barcelona	mgarcia@ifae.es
Giulini	Maddalena	Heidelberg University	Heidelberg	maddalena.giulini@cern.ch
Gomez-Ambrosio	Raquel	Università degli studi di Torino	Torino	raquel.gomez@to.infn.it
Graverini	Elena	University of Zurich	Zurich	elena.graverini@cern.ch
Guffanti	Alberto	Università degli Studi di Torino	Torino	alberto.guffanti@unito.it
Guilbaud	Maxime	RICE University Bonner laboratory	Houston	m.guilbaud@cern.ch
Gustavino	Giuliano	Università di Roma La Sapienza	Rome	giuliano.gustavino@cern.ch
Hernandez Cuenca	Sergio	Imperial College	London	sergio.hernandez13@imperial.ac.uk

Hespel	Benoit	UCL IRMP CP3	Louvain-La-N	benoit.hespel@uclouvain.be
Hill	Richard	TRIUMF and Perimeter Institute	Vancouver	richardhill@uchicago.edu
Hsu	Lauren	Fermilab	Batavia	llhsu@fnal.gov
Huentemeyer	Petra	Michigan Tech	Houghton	petra@mtu.edu
Hulsbergen	Wouter	Nikhef	Amsterdam	wouter.hulsbergen@nikhef.nl
Huss	Alexander	ETH Zurich	Zurich	ahuss@phys.ethz.ch
Iacobellis	Giuseppe	Università di Ferrara	Ferrara	iacobellis@fe.infn.it
Jaeger	Barbara	University of Tuebingen	Tuebingen	jaeger@itp.uni-tuebingen.de
Jakobs	Karl	Albert Ludwigs Universität Freiburg	Freiburg	karl.jakobs@uni-freiburg.de
Kanemura	Shinya	University of Toyama	Toyama	kanemu@sci.u-toyama.ac.jp
Khukhunaishvili	Aleko	University of Rochester	Rochester	aleko.khukhunaishvili@cern.ch
King	Steve	University of Southampton	Southhampton	king@soton.ac.uk
Kluck	Holger	Vienna University of Technolog	Vienna	holger.kluck@oeaw.ac.at
Kobakhidze	Archil	The University of Sydney	Sydney	archil.kobakhidze@coepp.org.au
Komarov	Ilya	EPFL	Lausanne	ilya.komarov@epfl.ch
Kozhuharov	Venelin	LNF	Frascati	venelin.kozhuharov@cern.ch
Kucharczyk	Marcin	Institute of Nuclear Physics	Krakow	marcin.kucharczyk@cern.ch
Kumar	Ashok	Delhi University	Delhi	ashok.hep@gmail.com
Kusaka	Akito	Lawrence Berkeley National Lab	Berkeley	akusaka@lbl.gov
Laird	Edward	Brown University	Providence	edward.laird@cern.ch
Lee	Claire	Brookhaven National Laboratory	Upton	claire.lee@cern.ch
Lenz	Tatjana	Physics Institute Bonn	Bonn	tlenz@cern.ch
Lewicki	Marek	IFT University of Warsaw	Warsaw	marek.lewicki@fuw.edu.pl
Liu	Peilian	Institute of High Energy Physics	Beijing	liupl@ihep.ac.cn
Lohse	Thomas	Humboldt University Berlin	Berlin	lohse@physik.hu-berlin.de
Luisoni	Gionata	CERN	Geneva	gionata.luisoni@cern.ch
Lyuboshitz	Valery	Joint Institute for Nuclear Research	Dubna	valery.lyuboshitz@jinr.ru
Machado	Pedro	CSIC-IFT-UAM	Cantoblanco	pedro.machado@uam.es
Maricic	Jelena	University of Hawaii	Honolulu	jelena@phys.hawaii.edu
Martin dit	Bertrand	University of Bergen	Bergen	martindl@cern.ch
bfseries Latour				
Martinez	Maria	Università di Roma La Sapienza	Roma	maria.martinez@roma1.infn.it
Mattelaer	Olivier	Durham University	Durham	o.p.c.mattelaer@durham.ac.uk
Mazza	Simone M	INFN Milano	Milano	simone.mazza@mi.infn.it
Melzer-Pellmann	Isabell	DESY	Hamburg	isabell.melzer@desy.de
Meyer	Jochen	Nikhef	Amsterdam	jomeyer@mail.cern.ch
Micheneau	Kevin	Subatech	Nantes	kevin.micheneau@subatech.in2p3.fr
Milincic	Radovan	University of Hawaii	Honolulu	milincic@hawaii.edu
Miquel	Ramon	IFAE	Barcelona	rmiquel@ifae.es
Missert	Andrew	University of Colorado Boulder	Boulder	andrew.missert@colorado.edu
Nakada	Tatsuya	EPFL Institute of Physics	Lausanne	tatsuya.nakada@cern.ch
Neumeister	Norbert	Purdue University	West Lafayette	neumeist@purdue.edu
Noutsos	Aristeidis	MPI for Radio Astronomy	Bonn	anoutsos@mpifr-bonn.mpg.de
Novotny	Vladimir	Charles University	Prague	novotnyv@ipnp.troja.mff.cuni.cz
Perego	Albino	Technische Universität Darmstadt	Darmstadt	albino.perego@physik.tu-darmstadt.d
Pezzullo	Gianantonio	INFN of Pisa	Pisa	pezzullo@pi.infn.it
Piedra	Jonatan	Instituto de Fisica de Cantabria	Santander	jonatan.piedra@gmail.com
Pietrzyk	Bolek	LAPP	Annecy	pietrzyk@lapp.in2p3.fr
Pryke	Clem	University of Minnesota	Minneapolis	pryke@physics.umn.edu
Qamesh	Ahmed	British university in Egypt	Cairo	ahmed.qamesh@cern.ch
Rautenberg	Julian	Bergische Universität Wuppertal	Wuppertal	julian.rautenberg@uni-wuppertal.de

Richman	Michael	Drexel University	Philadelphia	mike.d.richman@gmail.com
Rigault	Mickael	Humboldt University Berlin	Berlin	mrigault@physik.hu-berlin.de
Ritz	Adam	University of Victoria	Victoria	aritz@uvic.ca
Rolandi	Luigi	CERN	Geneva	gigi.rolandi@cern.ch
Saikawa	Ken Ichi	DESY	Hamburg	kenichi.saikawa@desy.de
Samtleben	Dorothea	Leiden University	Leiden	dosamt@nikhef.nl
Saoulidou	Niki	Universtity of Athens	Athens	niki.saoulidou@cern.ch
Scholberg	Kate	Duke University	Durham	schol@phy.duke.edu
Segui	Laura	University of Oxford	Oxford	laura.segui@physics.ox.ac.uk
Sekula	Stephen	Southern Methodist University	Dallas	ssekula@smu.edu
Servant	Geraldine	DESY	Hamburg	geraldine.servant@desy.de
Shimizu	Shima	Kobe University	Kobe	shima.shimizu@cern.ch
Sidoti	Antonio	INFN Sezione di Bologna	Bologna	antonio.sidoti@bo.infn.it
Silvestri	Alessandra	Instituut Lorentz Leiden University	Leiden	silvestri@lorentz.leidenuniv.nl
Smith	Andrew	University of Maryland	College Park	asmith8@umd.edu
Smith	Eluned	Imperial College London	London	eluned.anne.smith@cern.ch
Soffi	Livia	Cornell University	Ithaka	livia.soffi@cern.ch
Sogo Bezerra	Thiago	Subatech Laboratory	Nantes	sogobeze@subatech.in2p3.fr
Stefanik	Stanislav	Charles University	Prague	stefanik@ipnp.troja.mff.cuni.cz
Stolpovskiy	Mikhail	Laboratoire APC	Paris	mikhail.stolpovskiy@apc.univ-paris7.fr
Stone	Sheldon	Syracuse University	Syracuse	slstone@syr.edu
Szydlowski	Marek	Astronomical Observatory	Krakow	marek.szydlowski@uj.edu.pl
Teixeira	Ana M	LPC Clermont	Clermont	ana.teixeira@clermont.in2p3.fr
Torrielli	Paolo	Università di Torino and INFN	Torino	paolo.torrielli@gmail.com
Trigger	Isabel	TRIUMF	Vancouver	isabel.trigger@cern.ch
Turra	Ruggero	Università di Milano and INFN	Milano	ruggero.turra@mi.infn.it
Van Kooten	Rick	Indiana University	Bloomington	rvankoot@indiana.edu
Vanlaer	Pascal	Universite Libre de Bruxelles	Bruxelles	pascal.vanlaer@ulb.ac.be
Viana	Aion	Max-Planck-Institut fuer Kernphysik	Heidelberg	aion.viana@mpi-hd.mpg.de
Vinokurova	Anna	BINP	Novosibirsk	vinokurovanna@gmail.com
Vryonidou	Eleni	CP3 Universite catholique de Louvain	Louvain La N	evryonidou@gmail.com
Walkowiak	Wolfgang	University of Siegen	Siegen	walkowiak@hep.physik.uni-siegen.de
Waxman	Eli	Weizmann Institute	Rehovot	eli.waxman@weizmann.ac.il
Wiesemann	Marius	University of Zurich	Zurich	mariusw@physik.uzh.ch
Will	Martin	Instituto de Astrofisica de Canarias	La Laguna	mwill@ifae.es
Wormser	Guy	LAL	Orsay	wormser@lal.in2p3.fr
Wulzer	Andrea	University of Padova	Padova	andrea.wulzer@pd.infn.it
Xu	Guofa	IHEP CAS	Beijing	xugf@ihep.ac.cn
Yacoob	Sahal	University of Cape Town	Cape Town	sahal.yacoob@cern.ch
Yoshimoto	Masahiro	Nagoya University	Nagoya	yoshimoto@flab.phys.nagoya-u.ac.jp
Zarrouk	Pauline	CEA Saclay	Gif Sur Yvette	pauline.zarrouk@cea.fr
Zivkovic	Lidija	Institute of Physics	Belgrade	lidija.zivkovic@cern.ch