

# **Blois 2016: 28th Rencontres de Blois on "Particle Physics and Cosmology"**

## **Report of Contributions**

Contribution ID: 1

Type: **not specified**

# Neutrino astronomy: Where are we now, what did we learn?

*Thursday 2 June 2016 14:00 (30 minutes)*

## Summary

**Author:** WAXMAN, Eli (Weizmann Institute)

**Presenter:** WAXMAN, Eli (Weizmann Institute)

**Session Classification:** The High Energy Universe

Contribution ID: 2

Type: **not specified**

# The origin of cosmic rays

*Thursday 2 June 2016 14:30 (30 minutes)*

**Presenter:** GABICI, Stefano (APC Paris)

**Session Classification:** The High Energy Universe

Contribution ID: 3

Type: **not specified**

## **Recent results and status of direct detection dark matter experiments**

*Friday 3 June 2016 08:15 (30 minutes)*

**Presenter:** HSU, Lauren

**Session Classification:** The Dark Universe

Contribution ID: 4

Type: **not specified**

# **The Cosmic Microwave Background Radiation - past and future**

*Friday 3 June 2016 10:00 (30 minutes)*

## **Summary**

**Presenter:** KUSAKA, Akito

**Session Classification:** Cosmology

Contribution ID: 5

Type: **not specified**

## Status of neutrino parameters and future prospects

*Thursday 2 June 2016 08:30 (30 minutes)*

**Presenter:** SCHOLBERG, Kate (Duke university)

**Session Classification:** Neutrino Physics

Contribution ID: 6

Type: **not specified**

# **Lepton Flavor Violation and neutrino physics Beyond the Standard Model**

*Thursday 2 June 2016 09:00 (30 minutes)*

**Presenter:** TEIXEIRA, Ana

**Session Classification:** Neutrino Physics

Contribution ID: 7

Type: **not specified**

# Theoretical models for the neutrino mass and mixing pattern

*Thursday 2 June 2016 09:30 (30 minutes)*

**Presenter:** KING, Stephen

**Session Classification:** Neutrino Physics



Contribution ID: 8

Type: **not specified**

## Indirect detection of WIMP dark matter

*Friday 3 June 2016 09:15 (30 minutes)*

### Summary

**Presenter:** ANDERSON, Brandon (Stockholm University)

**Session Classification:** The Dark Universe

Contribution ID: 9

Type: **not specified**

# Overview of liquid noble dark matter experiments

*Friday 3 June 2016 08:45 (30 minutes)*

## Summary

**Presenter:** FRANCO, Davide (Laboratoire APC Paris)

**Session Classification:** The Dark Universe

Contribution ID: **10**

Type: **not specified**

## **Gamma ray astronomy**

*Thursday 2 June 2016 15:00 (30 minutes)*

**Presenter:** HUENTEMEYER, Petra (Michigan Technological University)

**Session Classification:** The High Energy Universe

Contribution ID: **11**

Type: **not specified**

## Test of QCD at Colliders

*Tuesday 31 May 2016 09:00 (30 minutes)*

**Presenter:** SHIMIZU, Shima (Kobe University (JP))

**Session Classification:** QCD+EW+Top Physics+Heavy Ions

Contribution ID: 12

Type: **not specified**

## Status of electroweak physics

*Tuesday 31 May 2016 09:30 (30 minutes)*

**Presenter:** KHUKHUNAISHVILI, Aleko (University of Rochester (US))

**Session Classification:** QCD+EW+Top Physics+Heavy Ions

Contribution ID: 13

Type: **not specified**

## Top Quark production and properties

*Tuesday 31 May 2016 10:00 (30 minutes)*

**Presenter:** ALDAYA MARTIN, Maria (DESY)

**Session Classification:** QCD+EW+Top Physics+Heavy Ions

Contribution ID: 14

Type: **not specified**

## Progress in precision calculation

*Tuesday 31 May 2016 11:00 (30 minutes)*

**Presenter:** JAEGER, Barbara (University of Tuebingen)

**Session Classification:** QCD+EW+Top Physics+Heavy Ions

Contribution ID: 15

Type: **not specified**

## Far-from-equilibrium plasmas

*Tuesday 31 May 2016 11:30 (30 minutes)*

**Presenter:** KURKELA, Eero Aleksi (CERN)

**Session Classification:** QCD+EW+Top Physics+Heavy Ions



Contribution ID: **16**

Type: **not specified**

## **CP violation and rare decays**

*Thursday 2 June 2016 11:00 (30 minutes)*

**Presenter:** NAKADA, Tatsuya (Ecole Polytechnique Federale de Lausanne (CH))

**Session Classification:** Heavy Flavour Physics

Contribution ID: 17

Type: **not specified**

## Pentaquarks, Tetraquarks, Glueballs

*Thursday 2 June 2016 12:00 (30 minutes)*

**Presenter:** STONE, Sheldon (Syracuse University (US))

**Session Classification:** Heavy Flavour Physics

Contribution ID: **18**

Type: **not specified**

# Heavy Flavour tensions in the Standard Model

*Thursday 2 June 2016 11:30 (30 minutes)*

**Presenter:** DESCOTES-GENON, Sébastien (CNRS)

**Session Classification:** Heavy Flavour Physics

Contribution ID: **19**

Type: **not specified**

## **Higgs bosons: production and decays into bosons**

*Monday 30 May 2016 14:00 (30 minutes)*

**Presenter:** ESCALIER, Marc (LAL-Orsay (FR))

**Session Classification:** The Higgs Boson

Contribution ID: **20**

Type: **not specified**

## **Higgs boson parameters and fermionic decays**

*Monday 30 May 2016 14:30 (30 minutes)*

**Presenter:** BLUJ, Michal (National Centre for Nuclear Research (PL))

**Session Classification:** The Higgs Boson

Contribution ID: **21**

Type: **not specified**

## Status of Higgs precision studies

*Monday 30 May 2016 15:30 (30 minutes)*

**Presenter:** DE FLORIAN SABARIS, Daniel Enrique (Universidad de Buenos Aires (AR))

**Session Classification:** The Higgs Boson

Contribution ID: 22

Type: **not specified**

## Extended Higgs sector

*Monday 30 May 2016 16:00 (30 minutes)*

**Presenter:** KANEMURA, Shinya (University of Toyama)

**Session Classification:** The Higgs Boson

Contribution ID: 23

Type: **not specified**

## Status of the Search for SUSY

*Tuesday 31 May 2016 12:00 (30 minutes)*

**Presenter:** WHITBECK, Andrew James (Fermi National Accelerator Lab. (US))

**Session Classification:** Beyond the Standard Model Physics



Contribution ID: 24

Type: **not specified**

## Search for Exotics

*Tuesday 31 May 2016 14:00 (30 minutes)*

**Presenter:** LEE, Claire (Brookhaven National Laboratory (US))

**Session Classification:** Beyond the Standard Model Physics

Contribution ID: 25

Type: **not specified**

## Search for TOP partner

*Tuesday 31 May 2016 14:30 (30 minutes)*

**Presenter:** MARTIN DIT LATOUR, Bertrand (University of Bergen (NO))

**Session Classification:** Beyond the Standard Model Physics

Contribution ID: 26

Type: **not specified**

## Implications of LHC results for BSM physics

*Tuesday 31 May 2016 15:00 (30 minutes)*

**Presenter:** WULZER, Andrea (Universita e INFN, Padova (IT))

**Session Classification:** Beyond the Standard Model Physics

Contribution ID: 27

Type: **not specified**

# A cosmological solution to the hierarchy problem

*Tuesday 31 May 2016 15:30 (30 minutes)*

**Presenter:** SERVANT, Geraldine (Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE))

**Session Classification:** Beyond the Standard Model Physics

Contribution ID: **28**

Type: **not specified**

## **Light dark matter and neutrino experiments**

*Thursday 2 June 2016 10:00 (30 minutes)*

### **Summary**

**Presenter:** RITZ, Adam (University of Victoria, Canada)

**Session Classification:** Neutrino Physics

Contribution ID: 29

Type: **not specified**

## Large Scale Structure Surveys - results from DES

*Friday 3 June 2016 10:30 (30 minutes)*

### Summary

**Presenter:** MIQUEL, Ramon (IFAE)

**Session Classification:** Cosmology

Contribution ID: **30**

Type: **not specified**

## **Theoretical problems in cosmology**

**Presenter:** SILVESTRI, Alessandra (Leiden University)

**Session Classification:** Cosmology

Contribution ID: **31**

Type: **not specified**

## **Status / highlights of LHC Run 2**

*Monday 30 May 2016 10:15 (45 minutes)*

**Presenter:** ROLANDI, Gigi (CERN)

**Session Classification:** First Session



Contribution ID: **32**

Type: **not specified**

## Pulsars

*Monday 30 May 2016 11:00 (45 minutes)*

**Presenter:** NOUTSOS, Aristeidis (Max Planck Institute for Radio Astronomy Bonn)

**Session Classification:** First Session

Contribution ID: 33

Type: **not specified**

## Gravitational waves

*Monday 30 May 2016 11:45 (45 minutes)*

**Presenter:** ALLEN, Bruce (Max Planck Society/Albert Einstein Institute Hannover)

**Session Classification:** First Session

Contribution ID: 34

Type: **not specified**

## Conference Summary and Perspectives

*Friday 3 June 2016 11:00 (1 hour)*

**Presenter:** BINETRUY, Pierre (APC)

**Session Classification:** Summary and Conclusion

Contribution ID: 35

Type: **not specified**

## Closing remarks

*Friday 3 June 2016 12:00 (15 minutes)*

**Presenter:** TRAN THANH VAN, Jean (Rencontres du Vietnam)

**Session Classification:** Summary and Conclusion

Contribution ID: **36**

Type: **not specified**

# Welcome

*Monday 30 May 2016 09:00 (15 minutes)*

**Presenter:** TRAN THANH VAN, Jean (Rencontres du Vietnam)

**Session Classification:** Opening

Contribution ID: 37

Type: **not specified**

# Welcome

*Monday 30 May 2016 09:15 (15 minutes)*

**Presenter:** GRICOURT (MAYOR OF BLOIS), Marc (Mayor of Blois)

**Session Classification:** Opening

Contribution ID: **38**

Type: **not specified**

## Introduction

*Monday 30 May 2016 09:30 (15 minutes)*

**Presenter:** JAKOBS, Karl (Albert-Ludwigs-Universitaet Freiburg (DE))

**Session Classification:** Opening

Contribution ID: 39

Type: **not specified**

# Astrophysical Neutrinos in IceCube: Observations and Prospects

*Thursday 2 June 2016 17:30 (20 minutes)*

## Summary

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  $\sim 10$  TeV inconsistent with the expectation from atmospheric backgrounds at the  $5.7\sigma$  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.

**Presenter:** RICHMAN, Mike (Drexel Univ.)



Contribution ID: 40

Type: **not specified**

## Latest results in data from the ANTARES experiment

*Thursday 2 June 2016 17:50 (20 minutes)*

### Summary

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.

**Presenter:** DI PALMA, Irene (INFN Rome)

Contribution ID: 41

Type: **not specified**

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

*Wednesday 1 June 2016 17:50 (20 minutes)*

## Summary

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  $5 \cdot 10^{19}$  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.

**Presenter:** RAUTENBERG, Julian (Univ. Wuppertal)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 42

Type: **not specified**

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

*Wednesday 1 June 2016 14:00 (20 minutes)*

### **Summary**

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).

**Author:** PRYKE, Clement (University of Minnesota)

**Presenter:** PRYKE, Clement (University of Minnesota)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 43

Type: **not specified**

## Recent Results from the HAWC Experiment

*Wednesday 1 June 2016 18:10 (20 minutes)*

### Summary

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. Its 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.

**Presenter:** SMITH, Andrew (Univ. of Maryland)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 44

Type: **not specified**

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

*Thursday 2 June 2016 17:10 (20 minutes)*

### Summary

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).

**Presenter:** VIANA, Aion (MPI-K Heidelberg)

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 2"

Contribution ID: 45

Type: **not specified**

# The MAGIC Telescopes – Highlights and Perspectives

*Wednesday 1 June 2016 18:30 (20 minutes)*

## Summary

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.

**Presenter:** MARTIN, Will (IFAE Barcelona)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 46

Type: **not specified**

## Recent Highlights from VERITAS

*Wednesday 1 June 2016 18:50 (20 minutes)*

### Summary

VERITAS is an array of four 12m imaging Cherenkov telescopes, sensitive to very-high energy (VHE;  $>100$  GeV) 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.

**Presenter:** FLEISCHHACK, Henrike (DESY)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 47

Type: **not specified**

## Inclusive and differential W/Z at ATLAS and CMS

*Tuesday 31 May 2016 16:30 (20 minutes)*

### Summary

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.

**Author:** NEUMEISTER, Norbert (Purdue University (US))

**Presenter:** NEUMEISTER, Norbert (Purdue University (US))

**Session Classification:** EW + Top + Higgs



Contribution ID: 48

Type: **not specified**

## Diboson production at ATLAS and CMS

*Tuesday 31 May 2016 17:10 (20 minutes)*

### Summary

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.

**Author:** MEYER, Jochen (Nikhef National institute for subatomic physics (NL))

**Presenter:** MEYER, Jochen (Nikhef National institute for subatomic physics (NL))

**Session Classification:** EW + Top + Higgs

Contribution ID: 49

Type: **not specified**

## Electroweak corrections

*Tuesday 31 May 2016 17:30 (20 minutes)*

### Summary

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.

**Presenter:** Dr HUSS, Alexander (ETH Zurich)

**Session Classification:** EW + Top + Higgs

Contribution ID: 50

Type: **not specified**

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

*Tuesday 31 May 2016 17:50 (20 minutes)*

### Summary

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.

**Presenter:** PIEDRA GOMEZ, Jonatan (Universidad de Cantabria (ES))

**Session Classification:** EW + Top + Higgs

Contribution ID: 51

Type: **not specified**

## Precision Measurements of Electroweak Parameters with Z Bosons at the Tevatron

*Tuesday 31 May 2016 18:10 (20 minutes)*

### Summary

The extraction of  $\sin^2\theta_{\text{eff}}(MZ)$  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 9.4 fb $^{-1}$  run II sample, yielding an effective electroweak mixing angle  $\sin^2\theta_{\text{eff}}(MZ)=0.23146\pm0.00047$ . The CDF collaboration uses data samples of  $e^+e^-$  and  $\mu^+\mu^-$  events, corresponding to the full 9.4 fb $^{-1}$  run II sample to obtain an effective electroweak mixing angle  $\sin^2\theta_{\text{eff}}(MZ)=0.23222\pm0.00046$ . The CDF collaboration also extracts the on-shell electroweak mixing angle  $\sin^2\theta_W=0.22401\pm0.00044$  which corresponds to an indirect measurement of the W boson mass  $M_W(\text{indirect})=80.327\pm0.023\text{GeV}$ . The quoted uncertainties include both statistical and systematic contributions.

**Presenter:** BERNARDI, Gregorio (LPNHE-Paris CNRS/IN2P3)

**Session Classification:** EW + Top + Higgs

Contribution ID: 52

Type: **not specified**

# Electroweak precision constraints with HEPfit

*Tuesday 31 May 2016 18:30 (20 minutes)*

## Summary

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.

**Presenter:** Dr DE BLAS MATEO, Jorge (INFN - National Institute for Nuclear Physics)

**Session Classification:** EW + Top + Higgs

Contribution ID: 53

Type: **not specified**

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

*Tuesday 31 May 2016 18:50 (20 minutes)*

### Summary

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.

**Presenter:** Mr HESPEL, Benoît (Université catholique de Louvain)

**Session Classification:** EW + Top + Higgs

Contribution ID: 54

Type: **not specified**

## VBF and Vector Boson Scattering at 13 TeV, the EFT approach

*Tuesday 31 May 2016 19:10 (20 minutes)*

### Summary

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.

**Presenter:** GOMEZ AMBROSIO, Raquel (Universita e INFN Torino (IT))

**Session Classification:** EW + Top + Higgs

Contribution ID: 55

Type: **not specified**

## Higgs boson production (cross sections, inclusive and differential) of the h(125) from Run 1

*Wednesday 1 June 2016 16:30 (20 minutes)*

### Summary

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.?

**Author:** DONEGA, Mauro (Eidgenoessische Tech. Hochschule Zuerich (CH))

**Presenter:** DONEGA, Mauro (Eidgenoessische Tech. Hochschule Zuerich (CH))

**Session Classification:** EW + Top + Higgs



Contribution ID: 56

Type: **not specified**

## The profile of the h(125) from Run 1

*Wednesday 1 June 2016 16:50 (20 minutes)*

### Summary

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.

**Presenter:** LENZ, Tatjana (Universitaet Bonn (DE))

**Session Classification:** EW + Top + Higgs

Contribution ID: 57

Type: **not specified**

## Higgs + 3-jet-production in NLO QCD

*Wednesday 1 June 2016 17:10 (20 minutes)*

### Summary

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.

**Presenter:** LUISONI, Gionata (CERN)

**Session Classification:** EW + Top + Higgs

Contribution ID: 58

Type: **not specified**

## Interference in Higgs-mediated ZZ+jet production

*Wednesday 1 June 2016 17:30 (20 minutes)*

### Summary

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  $H \rightarrow ZZ$ , 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.

**Presenter:** FURLAN, Elisabetta (Brookhaven National Laboratory)

**Session Classification:** EW + Top + Higgs

Contribution ID: 59

Type: **not specified**

## Electroweak phase transition and baryogenesis with anomalous Higgs couplings

*Wednesday 1 June 2016 17:50 (20 minutes)*

### Summary

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.

**Presenter:** KOBAKHIDZE, Archil (The University of Sydney)

**Session Classification:** EW + Top + Higgs

Contribution ID: 60

Type: **not specified**

## Results on BSM Higgs boson searches at ATLAS

*Wednesday 1 June 2016 18:30 (20 minutes)*

### Summary

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.

**Presenter:** GIULINI, Maddalena (Ruprecht-Karls-Universitaet Heidelberg (DE))

**Session Classification:** EW + Top + Higgs

Contribution ID: 61

Type: **not specified**

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

*Wednesday 1 June 2016 18:10 (20 minutes)*

### Summary

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.

**Author:** VANLAER, Pascal (Universite Libre de Bruxelles (BE))

**Presenter:** VANLAER, Pascal (Universite Libre de Bruxelles (BE))

**Session Classification:** EW + Top + Higgs

Contribution ID: 62

Type: **not specified**

## Higgs production in association with bottom quarks at NLO+PS

*Wednesday 1 June 2016 18:50 (20 minutes)*

### Summary

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.

**Presenter:** TORRIELLI, Paolo (Universita e INFN Torino (IT))

**Session Classification:** EW + Top + Higgs

Contribution ID: 63

Type: **not specified**

## Top quark studies at the Tevatron

*Wednesday 1 June 2016 14:00 (20 minutes)*

### Summary

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  $t\bar{t}$  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.

**Presenter:** ZIVKOVIC, Lidija (Institute of physics Belgrade (RS))

**Session Classification:** EW + Top + Higgs



Contribution ID: 64

Type: **not specified**

## Top quark pair production cross-section measurements and measurements of $t\bar{t}$ +X with the ATLAS detector

*Wednesday 1 June 2016 14:20 (20 minutes)*

### Summary

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.

**Presenter:** SIDOTI, Antonio (Universita e INFN, Bologna (IT))

**Session Classification:** EW + Top + Higgs

Contribution ID: 65

Type: **not specified**

## Single top production at ATLAS and CMS

*Wednesday 1 June 2016 14:40 (20 minutes)*

### Summary

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.

**Author:** ANDREA, Jeremy (Institut Pluridisciplinaire Hubert Curien (FR))

**Presenter:** ANDREA, Jeremy (Institut Pluridisciplinaire Hubert Curien (FR))

**Session Classification:** EW + Top + Higgs

Contribution ID: 66

Type: **not specified**

## Top quark properties at ATLAS and CMS

*Wednesday 1 June 2016 15:00 (20 minutes)*

### Summary

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.

**Author:** BROCK, Ian (Universitaet Bonn (DE))

**Presenter:** BROCK, Ian (Universitaet Bonn (DE))

**Session Classification:** EW + Top + Higgs

Contribution ID: 67

Type: **not specified**

## Probing top-quark interactions at NLO in QCD

*Wednesday 1 June 2016 15:20 (20 minutes)*

### Summary

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.

**Presenter:** VRYONIDOU, Eleni (Universite catholique de Louvain)

**Session Classification:** EW + Top + Higgs

Contribution ID: 68

Type: **not specified**

## Top partners / vector-like fermions

*Wednesday 1 June 2016 15:40 (20 minutes)*

### Summary

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.

**Author:** CACCIAPAGLIA, Giacomo

**Presenter:** CACCIAPAGLIA, Giacomo

**Session Classification:** EW + Top + Higgs

Contribution ID: 69

Type: **not specified**

## SPIDER: Exploring the Dawn of Time from Above the Clouds

*Wednesday 1 June 2016 14:20 (20 minutes)*

### Summary

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.

**Presenter:** FILIPPINI, Jeffrey (Univ. of Illinois)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 70

Type: **not specified**

## Results from the Nearby Supernova factory

*Wednesday 1 June 2016 15:00 (20 minutes)*

### Summary

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.

**Presenter:** RIGAULT, Mickael (Humboldt Univ. Berlin)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 71

Type: **not specified**

# Measuring anisotropy in the local universe with type Ia supernovae

*Wednesday 1 June 2016 15:40 (20 minutes)*

## Summary

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.

**Presenter:** FEINDT, Ulrich (Stockholm Univ.)

**Session Classification:** Astro + Cosmo I-II



Contribution ID: 72

Type: **not specified**

## Baryonic Acoustic Oscillation Correlations at $z=2.4$ with SDSS-III Lyman- $\alpha$ Forests

*Wednesday 1 June 2016 16:30 (20 minutes)*

### Summary

We measure the large-scale correlation using the Lyman- $\alpha$  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- $\alpha$  auto-correlation and the quasar - Lyman- $\alpha$  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.

**Author:** DU MAS DE BOURBOUX, Helion (CEA)

**Presenter:** DU MAS DE BOURBOUX, Helion (CEA)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 73

Type: **not specified**

## KM3NeT/ARCA. Status and perspectives

*Wednesday 1 June 2016 17:30 (20 minutes)*

### Summary

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  $0.1 \text{ km}^3$ ). 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  $10^5 \text{ GeV}$ , 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.

**Presenter:** MARTI, Javier Barrios (Univ. of Valencia)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 74

Type: **not specified**

## QSO clustering with the SDSS-IV eBOSS survey

*Wednesday 1 June 2016 16:50 (20 minutes)*

### Summary

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 a 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.

**Author:** ZARROUK, Pauline (CEA)

**Presenter:** ZARROUK, Pauline (CEA)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 75

Type: **not specified**

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

*Tuesday 31 May 2016 16:30 (20 minutes)*

## Summary

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.

**Author:** SAIKAWA, Kenichi (DESY)**Presenter:** SAIKAWA, Kenichi (DESY)**Session Classification:** BSM + DM

Contribution ID: 76

Type: **not specified**

# Enabling Electroweak Baryogenesis trough Dark Matter

*Tuesday 31 May 2016 16:50 (20 minutes)*

## Summary

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 sensitivities.

**Author:** LEWICKI, Marek (University of Warsaw (PL))

**Presenter:** LEWICKI, Marek (University of Warsaw (PL))

**Session Classification:** BSM + DM

Contribution ID: 77

Type: **not specified**

## Dark matter searches at ATLAS

*Tuesday 31 May 2016 17:10 (20 minutes)*

### Summary

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.

**Author:** GUSTAVINO, Giuliano (Universita e INFN, Roma I (IT))

**Presenter:** GUSTAVINO, Giuliano (Universita e INFN, Roma I (IT))

**Session Classification:** BSM + DM

Contribution ID: 78

Type: **not specified**

## Dark matter searches at CMS

*Tuesday 31 May 2016 17:30 (20 minutes)*

### Summary

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.

**Author:** KUMAR, Ashok (University of Delhi (IN))

**Presenter:** KUMAR, Ashok (University of Delhi (IN))

**Session Classification:** BSM + DM

Contribution ID: 79

Type: **not specified**

## Current status of the CRESST experiment

*Thursday 2 June 2016 16:50 (20 minutes)*

### Summary

CRESST is a cryogenic experiment directly searching for dark matter interactions using scintillating  $\text{CaWO}_4$  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  $1 \text{ GeV}/c^2$ .

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.

**Author:** KLUCK, Holger (HEPHY and TU Wien, Wien)

**Presenter:** KLUCK, Holger (HEPHY and TU Wien, Wien)

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 2"



Contribution ID: 80

Type: **not specified**

## NEWS: Nuclear Emulsions for WIMP Search

*Tuesday 31 May 2016 17:50 (20 minutes)*

### Summary

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.

**Author:** YOSHIMOTO, Masahiro (Nagoya University)

**Presenter:** YOSHIMOTO, Masahiro (Nagoya University)

**Session Classification:** BSM + DM

Contribution ID: 81

Type: **not specified**

## Status of DM searches with EDELWEISS

*Tuesday 31 May 2016 18:10 (20 minutes)*

### Summary

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  $\text{GeV}/c^2$  mass range.

**Author:** ARMENGAUD, Eric (CEA Saclay)

**Presenter:** ARMENGAUD, Eric (CEA Saclay)

**Session Classification:** BSM + DM

Contribution ID: 82

Type: **not specified**

## Indirect Dark Matter searches and fundamental physics studies with MAGIC

### Summary

Since the beginning of operations, the MAGIC telescopes have been carrying out deep observations of several promising dark matter targets, such as galaxy clusters, the Galactic Center, and dwarf satellite galaxies, with the aim of detecting such signals or alternatively constraining dark-matter annihilation processes up to the TeV mass scale.

In this contribution we present the latest indirect dark matter search results achieved, for which MAGIC reached the strongest constraints on dark matter annihilation searches above few hundreds GeV.

The universality of dark matter properties allows the combination of data from different experiments and/or observational targets into a global and sensitive-optimized search. We have implemented this analysis framework and applied it to the MAGIC and Fermi-LAT observations of dwarf satellite galaxies, obtaining the most constraining bounds to dark matter properties for masses between 10 GeV and 100 TeV from dwarf galaxies observations.

Finally, we will review MAGIC searches for violations of Lorentz Invariance exploiting possible non-trivial dispersion relations of photons travelling cosmological distances.

**Author:** GAUG, Markus (Universitat Autònoma de Barcelona)

**Presenter:** GAUG, Markus (Universitat Autònoma de Barcelona)

**Session Classification:** BSM + DM

Contribution ID: 83

Type: **not specified**

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

*Tuesday 31 May 2016 18:30 (20 minutes)*

### Summary

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 ( $e^+e^- \rightarrow A'$ ) exploiting the 550 MeV positron beam from the DAFNE 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  $10^{13}$  positrons on target by the end of 2018, allowing to probe for dark photon with mass up to 24 MeV and a relative coupling down to  $\epsilon 10^{-3}$ . PADME was formally approved by the INFN at the end of 2015 and is in its construction phase.

**Author:** FERRAROTTO, Fabio (INFN, Roma 1)

**Presenter:** FERRAROTTO, Fabio (INFN, Roma 1)

**Session Classification:** BSM + DM

Contribution ID: 84

Type: **not specified**

## Di-photon excess in perturbative SUSY with Dirac gauginos

*Wednesday 1 June 2016 16:50 (20 minutes)*

### Summary

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 the scalar singlet presents in such models is a sound candidate for the 750 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.

**Author:** DARMÉ, Luc (LPTHE)

**Presenter:** DARMÉ, Luc (LPTHE)

**Session Classification:** BSM + DM

Contribution ID: 85

Type: **not specified**

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

*Wednesday 1 June 2016 17:30 (20 minutes)*

### Summary

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.

**Author:** FLACKE, Thomas Dieter (Korea University)

**Presenter:** FLACKE, Thomas Dieter (Korea University)

**Session Classification:** BSM + DM

Contribution ID: 86

Type: **not specified**

# Implications of Higgs data for the EW chiral Lagrangian

*Wednesday 1 June 2016 15:20 (20 minutes)*

## Summary

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

**Author:** CELIS, Alejandro (Munich)

**Presenter:** CELIS, Alejandro (Munich)

**Session Classification:** BSM + DM

Contribution ID: 87

Type: **not specified**

## Stationary configurations of the SM potential: EW stability and Higgs inflation

*Wednesday 1 June 2016 14:40 (20 minutes)*

### Summary

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.

**Author:** IACOBELLIS, Guiseppe (Ferrara)

**Presenter:** IACOBELLIS, Guiseppe (Ferrara)

**Session Classification:** BSM + DM



Contribution ID: 88

Type: **not specified**

## A closer look to the sgoldstino interpretation of the diphoton excess

*Wednesday 1 June 2016 17:50 (20 minutes)*

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  $\sim 4\pi$ .

### Summary

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  $\sim 4\pi$ .

**Author:** BARATELLA, Pietro (SISSA Trieste)**Presenter:** BARATELLA, Pietro (SISSA Trieste)**Session Classification:** BSM + DM

Contribution ID: 89

Type: **not specified**

## SUSY searches at 13 TeV at ATLAS

*Wednesday 1 June 2016 18:10 (20 minutes)*

### Summary

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<sup>-1</sup> 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.

**Author:** TRIGGER, Isabel (TRIUMF (CA))**Presenter:** TRIGGER, Isabel (TRIUMF (CA))**Session Classification:** BSM + DM

Contribution ID: 90

Type: **not specified**

## SUSY searches at 13 TeV with the CMS Experiment

*Wednesday 1 June 2016 18:30 (20 minutes)*

### Summary

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.

**Author:** MELZER-PELLMANN, Isabell (DESY)

**Presenter:** MELZER-PELLMANN, Isabell (DESY)

**Session Classification:** BSM + DM

Contribution ID: **91**

Type: **not specified**

## Searches for exotics at ATLAS

*Wednesday 1 June 2016 19:10 (20 minutes)*

### Summary

The ATLAS detector has collected  $3.2 \text{ fb}^{-1}$  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.

**Author:** TURRA, Ruggero (Università degli Studi e INFN Milano (IT))

**Presenter:** TURRA, Ruggero (Università degli Studi e INFN Milano (IT))

**Session Classification:** BSM + DM

Contribution ID: 92

Type: **not specified**

## Exotics searches at CMS

*Wednesday 1 June 2016 19:30 (20 minutes)*

### Summary

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 Standard 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 than 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.

**Author:** ALUNNI SOLESTIZI, Luisa (Universita e INFN, Perugia (IT))

**Presenter:** ALUNNI SOLESTIZI, Luisa (Universita e INFN, Perugia (IT))

**Session Classification:** BSM + DM

Contribution ID: 93

Type: **not specified**

# Radiatively Induced Fermi Scale and Unification

*Wednesday 1 June 2016 15:00 (20 minutes)*

## Summary

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.

**Author:** ALANNE, Tommi (CP3-Origins, Odense)

**Presenter:** ALANNE, Tommi (CP3-Origins, Odense)

**Session Classification:** BSM + DM

Contribution ID: 94

Type: **not specified**

## RED-Dark Matter search with directional sensitivity

### Summary

The feasibility of an innovative technique that would provide strong evidence in distinguishing true WIMP Dark Matter signal from backgrounds is investigated. If the recoil direction of the scattered nucleus after a WIMP interaction is measured, the signal rate acquires a large and peculiar angular dependence within a sidereal day. The sensitivity of a LAr TPC detector located at LNGS has been studied. The results show that directional detectors offer the most promising technique for future DM searches. The status of the RED experiment, under construction in Naples, will be also shown. The aim of this experiment is to prove that is possible to measure the direction of the nuclear recoil induced by a neutron beam.

**Author:** WALKER, Susan E. (University of Naples “Federico II” & INFN Naples)

**Presenter:** WALKER, Susan E. (University of Naples “Federico II” & INFN Naples)

**Session Classification:** BSM + DM

Contribution ID: 95

Type: **not specified**

## Mu2e: coherent $\mu \rightarrow e$ conversion experiment at Fermilab

*Wednesday 1 June 2016 14:00 (20 minutes)*

### Summary

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  $7 \cdot 10^{17}$  muons, provided by a dedicated muon beam line in construction at the Fermi National Accelerator Laboratory (Fermilab), will be stopped in 3 years in the Aluminum target. The corresponding single event sensitivity will be  $2.5 \cdot 10^{-17}$ .

The Standard Model of particle physics, even extended 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  $10^{-14}$  to  $10^{-18}$ . The current best experimental limit, set by the SINDRUM II experiment is  $7 \cdot 10^{-13}$  @ 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.

**Author:** PEZZULLO, Gianantonio

**Presenter:** PEZZULLO, Gianantonio

**Session Classification:** BSM + DM



Contribution ID: 96

Type: **not specified**

## Neutrinos in neutron star mergers

*Wednesday 1 June 2016 17:10 (20 minutes)*

### Summary

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.

**Author:** PEREGO, Albino (TU-Darmstadt)

**Presenter:** PEREGO, Albino (TU-Darmstadt)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 97

Type: **not specified**

## Recent results on B-meson decays at BaBar and Belle

*Tuesday 31 May 2016 16:50 (25 minutes)*

### Summary

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  $B \rightarrow sl+l^-$  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

**Presenter:** WORMSER, Guy (LAL)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **98**

Type: **not specified**

## Recent heavy flavor results from the Tevatron

*Tuesday 31 May 2016 18:55 (20 minutes)*

### Summary

Recent heavy flavor physics results in proton-antiproton collisions in Run 2 of the Tevatron 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.

**Presenter:** VAN KOOTEN, Rick (Indiana)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 99

Type: **not specified**

# Heavy flavour production and properties at ATLAS and CMS

*Tuesday 31 May 2016 17:35 (20 minutes)*

## Summary

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  $J/\psi$  and  $\psi'$  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.

**Author:** BARBERIS, Dario (Genova)

**Presenter:** BARBERIS, Dario (Genova)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **100**Type: **not specified**

## CP violation in B and charm decays at LHCb

*Tuesday 31 May 2016 17:55 (20 minutes)*

### Summary

The LHCb experiment has collected large samples of heavy flavoured hadrons during Run 1, corresponding to an integrated luminosity of  $3.0 \text{ fb}^{-1}$  at pp centre-of-mass energy of 7 and 8 TeV. This talk gives an overview of the CP techniques as well as the recent LHCb measurement of the CP asymmetry in  $B^0 \rightarrow \pi^0 \pi^0$  mixing, a \mathr

decays, corresponding to the most precise measurement of this quantity to date.

**Author:** AKAR, Simon (Marseille)

**Presenter:** AKAR, Simon (Marseille)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **101**Type: **not specified**

## Rare decays at LHCb

*Tuesday 31 May 2016 16:30 (20 minutes)*

### Summary

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.

**Author:** SMITH, Eluned (Imperial Col.)

**Presenter:** SMITH, Eluned (Imperial Col.)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **102**Type: **not specified**

## Charmed hadron physics at BESIII

*Tuesday 31 May 2016 18:15 (20 minutes)*

### Summary

The BESIII Experiment at the Beijing Electron Positron Collider (BEPCII) has accumulated the world's largest  $e^+e^-$  collision samples at  $\psi(3770)$  peak, around the  $\psi(4040)$  nominal mass, and at the  $\Lambda_c^+ \bar{\Lambda}_c^-$  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  $\Lambda_c^+$ .

**Author:** LIU, Peilian (Beijing)**Presenter:** LIU, Peilian (Beijing)**Session Classification:** QCD + Heavy Flavour

Contribution ID: 103

Type: **not specified**

## Recent results on bottomonium studies at Belle

*Tuesday 31 May 2016 18:35 (20 minutes)*

### Summary

We report new measurements of the total cross sections for  $e^+e^- \rightarrow \Upsilon(nS)\pi^+\pi^-$  ( $n = 1, 2, 3$ ) and  $e^+e^- \rightarrow b\bar{b}$  from a high-luminosity scan of the c.m. energy range 10.63–11.05 GeV and determine masses and widths of  $h_b(1P)$  and update the  $h_b(1P)$  mass. Also revised are the branching fractions of  $h_b(1P) \rightarrow \gamma \eta_b(1S)$  and  $\eta_b(1S) \rightarrow \gamma \eta_b(1S)$  ( $n = 1, 2$ ) cross sections, where we find clear  $\Upsilon(10860)$  and  $\Upsilon(11020)$  peaks. We find evidence that  $\Upsilon(11020) \rightarrow \pi^+\pi^-\pi^+\pi^-$  transitions proceed entirely via the  $Z_b(10610)$  and  $Z_b(10650)$  states. We report the analysis of the three-body  $e^+e^- \rightarrow B^0 \bar{B}^0 \pi^0$  processes, including the Born cross sections measurements and the first observations of  $B^0 \bar{B}^0$  and  $Z_b(10650) \rightarrow B^0 \bar{B}^0$  transitions.

**Author:** VINOKUROVA, Anna (Novosibirsk)

**Presenter:** VINOKUROVA, Anna (Novosibirsk)

**Session Classification:** QCD + Heavy Flavour



Contribution ID: **104**Type: **not specified**

## Heavy flavour spectroscopy, including exotic states at LHCb

*Tuesday 31 May 2016 19:15 (20 minutes)*

### Summary

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  $Z_c(4430)$  as a tetra quark state have increased the interest for exotic spectroscopy. An overview of the recent LHCb results in this area is presented.

**Presenter:** COWAN, Greig (University of Edinburgh (GB))

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 105

Type: **not specified**

## Perspective Study of Charmonium, Exotics and Baryons with Charm and Strangeness

### Summary

The spectroscopy of charmonium-like states together with the spectroscopy of charmed and strange baryons is discussed. It is a good testing tool for the theories of strong interactions, including: QCD in both the perturbative and non-perturbative regimes, LQCD, potential models and phenomenological models [1, 2, 3]. An understanding of the baryon spectrum is one of the primary goals of non-perturbative QCD. In the nucleon sector, where most of the experimental information is available, the agreement with quark model predictions is astonishingly small, and the situation is even worse in the strange and charmed baryon sector. The experiments with antiproton-proton annihilation and proton-proton collisions are well suited for a comprehensive spectroscopy program, in particular, the spectroscopy of exotic states and flavour baryons. Charmed and strange baryons can be produced abundantly in both processes, and their properties can be studied in detail [1, 2, 3].

For this purpose an elaborated analysis of charmonium, charmed hybrid and tetraquark spectrum together with spectrum of charmed and strange baryons is given. The recent experimental data from different collaborations are analyzed. A special attention was given to the recently discovered XYZ-particles. The attempts of their possible interpretation are considered [4 - 7]. The results of physics simulation are obtained. Some of these states can be interpreted as higher-lying charmonium and tetraquarks with a hidden charm. It has been shown that charge/neutral tetraquarks must have their neutral/charged partners with mass values which differ by few MeV. This hypothesis coincides with that proposed by Maiani and Polosa [8]. Many heavy baryons with charm and strangeness are expected to exist. But much more data on different decay modes are needed before firmer conclusions can be made. These data can be derived directly from the experiments using a high quality antiproton beam with momentum up to 15 GeV/c planned at FAIR and proton-proton collisions with momentum up to 26 GeV/c planned at the superconducting accelerator complex NICA.

### References

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- [8] L. Maiani, F. Piccinini, A.D. Polosa, V. Riquer, Phys. Rev. Lett. 99 (2007) 182003.

**Author:** BARABANOV, Mikhail (Dubna)

**Presenter:** BARABANOV, Mikhail (Dubna)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **106**Type: **not specified**

## Hadron spectroscopy at BESIII

*Wednesday 1 June 2016 14:00 (20 minutes)*

### Summary

The BESIII experiment in Beijing started data taking for physics since 2009. For the moment the world largest samples of  $J/\psi$ ,  $\psi(3686)$ ,  $\psi(3770)$  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.

**Author:** XU, Guofa (Beijing)

**Presenter:** XU, Guofa (Beijing)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **107**Type: **not specified**

## LHCb results on 13 TeV pp collisions

*Wednesday 1 June 2016 14:20 (20 minutes)*

### Summary

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.

**Presenter:** KOMAROV, Ilya (Lausanne, EPFL)**Session Classification:** QCD + Heavy Flavour

Contribution ID: **108**Type: **not specified**

# Probing new physics with rare kaon decays at CERN SPS

*Wednesday 1 June 2016 14:40 (20 minutes)*

## Summary

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  $K^\pm \rightarrow \pi^\mp \mu^p \mu^\pm$ , for new heavy or Majorana neutrinos in  $K^\pm \rightarrow \mu^\pm N$ ,  $N \rightarrow \pi^\pm \mu^\mp$ , and for new degrees of freedom in the channel  $K^\pm \rightarrow \pi^\pm X$  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  $K^+ \rightarrow \pi^+ \nu \bar{\nu}$  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.

**Author:** KOZHUHAROV, Venelin (Sofia)**Presenter:** KOZHUHAROV, Venelin (Sofia)**Session Classification:** QCD + Heavy Flavour

Contribution ID: **109**

Type: **not specified**

## **Electroweak physics and QCD in the forward direction at LHCb**

*Tuesday 31 May 2016 16:50 (20 minutes)*

### **Summary**

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.

**Author:** HULSBERGEN, Wouter (Nikhef)

**Presenter:** HULSBERGEN, Wouter (Nikhef)

**Session Classification:** EW + Top + Higgs

Contribution ID: 110

Type: **not specified**

## Results on heavy ion collisions at LHCb

*Wednesday 1 June 2016 15:00 (20 minutes)*

### Summary

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 D0 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/Psi, Psi(2S), Y(1S) and D0 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.

**Author:** KUCHARCZYK, Marcin (Cracow)

**Presenter:** KUCHARCZYK, Marcin (Cracow)

**Session Classification:** QCD + Heavy Flavour



Contribution ID: 111

Type: **not specified**

# Heavy Ion measurements at ATLAS and CMS

*Wednesday 1 June 2016 15:20 (20 minutes)*

## Summary

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.

**Presenter:** GUILBAUD, Maxime (Rice Uni.)**Session Classification:** QCD + Heavy Flavour

Contribution ID: 112

Type: **not specified**

## Recent results from VEPP-2000-collider in Novosibirsk

### Summary

Starting from 2010, experiments with the SND and CMD-3 detectors are carrying out at the VEPP-2000  $e^+e^-$ -collider in the energy range 0.3-2.0 GeV. The already collected data sample corresponds to 70  $\text{pb}^{-1}$  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.

**Author:** DIMOVA, Tatyana V. (Novosibirsk)

**Presenter:** DIMOVA, Tatyana V. (Novosibirsk)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 113

Type: **not specified**

## Soft QCD at 13 TeV at ATLAS and CMS

*Wednesday 1 June 2016 16:30 (20 minutes)*

### Summary

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.

**Author:** YACOOB, Sahal (Cape Town)

**Presenter:** YACOOB, Sahal (Cape Town)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 114

Type: **not specified**

## QCD with jets and photons at ATLAS and CMS

*Wednesday 1 June 2016 16:50 (20 minutes)*

### Summary

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 decorrelations 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.

**Presenter:** SAOULIDOU, Niki (Athens)**Session Classification:** QCD + Heavy Flavour

Contribution ID: 115

Type: **not specified**

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

Wednesday 1 June 2016 17:10 (20 minutes)

## Summary

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  $K_S^0 K_S^0$ ,  $K_L^0 K_L^0$  and the correlations of “mixed” pairs  $K_S^0 K_L^0$  at small relative momenta upon the space-time parameters of the generation region of  $K^0$  and  $\bar{K}^0$  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  $K_S^0 K_S^0$  and  $K_L^0 K_L^0$ , produced in the same inclusive process, coincide, and the difference between the correlation functions of the pairs  $K_S^0 K_S^0$  and  $K_S^0 K_L^0$  is conditioned exclusively by the production of the pairs of non-identical neutral kaons  $K^0 \bar{K}^0$ .

For comparison, the theoretical analysis of analogous correlations for the pairs of neutral heavy mesons  $D^0$ ,  $B^0$  and  $B_s^0$ , 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  $D^0 \bar{D}^0$ ,  $B^0 \bar{B}^0$  and  $B_s^0 \bar{B}_s^0$ .

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.

**Author:** LYUBOSHITZ, Valery V. (Dubna)

**Presenter:** LYUBOSHITZ, Valery V. (Dubna)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 116

Type: **not specified**

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

*Wednesday 1 June 2016 17:30 (20 minutes)*

## Summary

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.

**Author:** FAZIO, Angelo Raffaele (Colombia)

**Presenter:** FAZIO, Angelo Raffaele (Colombia)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 117

Type: **not specified**

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

*Wednesday 1 June 2016 17:50 (20 minutes)*

### Summary

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.

**Author:** BOROWKA, Sophia (Zurich Uni.)

**Presenter:** BOROWKA, Sophia (Zurich Uni.)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **118**Type: **not specified**

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

*Wednesday 1 June 2016 18:10 (20 minutes)*

### Summary

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.

**Author:** WIESEMANN, Marius (Zurich Uni.)

**Presenter:** WIESEMANN, Marius (Zurich Uni.)

**Session Classification:** QCD + Heavy Flavour



Contribution ID: 119

Type: **not specified**

## Rare Decays of B0(s) Mesons to Muon Pairs with the ATLAS Detector (Run 1)

*Tuesday 31 May 2016 17:15 (20 minutes)*

### Summary

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 B0s and B0 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.

**Presenter:** WALKOWIAK, Wolfgang (Siegen)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: 120

Type: **not specified**

## Recent Results From the T2K Experiment

*Tuesday 31 May 2016 16:30 (20 minutes)*

### Summary

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  $4.01 \times 10^{20}$  protons on target.

**Presenter:** MISSERT, Andrew**Session Classification:** Neutrinos

Contribution ID: 121

Type: **not specified**

## Results of Double Chooz

*Tuesday 31 May 2016 16:50 (20 minutes)*

### Summary

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  $\theta_{13}$  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  $\theta_{13}$  was followed in 2012 by the

Daya Bay and RENO experiments with multiple detectors.  $\theta_{13}$  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  $\theta_{13}$  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  $\theta_{13}$  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.

**Presenter:** SOGO BEZERRA, Thiago (Subatech Nantes)

**Session Classification:** Neutrinos

Contribution ID: 122

Type: **not specified**

## Status and Prospects of the KM3NeT-ORCA experiment

*Tuesday 31 May 2016 17:10 (20 minutes)*

### Summary

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.

**Presenter:** COELHO, Joao (APC Paris)

**Session Classification:** Neutrinos

Contribution ID: **123**

Type: **not specified**

## Beyond standard neutrinos

*Tuesday 31 May 2016 17:30 (20 minutes)*

### Summary

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.

**Presenter:** MACHADO, Pedro (Universidad Autónoma de Madrid)

**Session Classification:** Neutrinos

Contribution ID: 124

Type: **not specified**

# Constraints on Neutrino Mass from the Lyman-alpha Forest

*Thursday 2 June 2016 16:30 (20 minutes)*

## Summary

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.

**Presenter:** BAUR, Julien (Irfu-SPP CEA-Saclay)

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 2"

Contribution ID: 125

Type: **not specified**

## Effective theories, dark matter and neutrinos

*Tuesday 31 May 2016 17:50 (20 minutes)*

### Summary

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.

**Presenter:** HILL, Richard (Triumf & Perimeter institute & univ Chicago)

**Session Classification:** Neutrinos

Contribution ID: 126

Type: **not specified**

## The Gerda neutrinoless double beta decay experiment: First data from Phase II

*Tuesday 31 May 2016 18:10 (20 minutes)*

### Summary

The neutrinoless double 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 neutrinoless double-beta decay of  $^{76}\text{Ge}$ . HPGe detectors, isotopically enriched in  $^{76}\text{Ge}$ , are operated bare in liquid argon. Phase I was successfully completed with a new lower limit of  $T_{1/2} > 2.1 \cdot 10^{25} \text{ yr}$  (90% C.L.) achieving the aspired background index ( $10^{-2} \text{ cts/keV}\cdot\text{kg}\cdot\text{yr}$ ) 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  $10^{-3} \text{ cts/keV}\cdot\text{kg}\cdot\text{yr}$ ) is  $T_{1/2} > 1.4 \cdot 10^{26} \text{ yr}$  with  $100 \text{ kg}\cdot\text{yr}$  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.

**Presenter:** BODE, Tobias (Technische Universität München)

**Session Classification:** Neutrinos



Contribution ID: 127

Type: **not specified**

## The SNO+ Experiment: status and future prospects

*Tuesday 31 May 2016 18:50 (20 minutes)*

### Summary

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.

**Presenter:** SEGUI, Laura (University of Oxford)

**Session Classification:** Neutrinos

Contribution ID: 128

Type: **not specified**

## Search for di-photon resonances with the ATLAS experiment

*Thursday 2 June 2016 16:30 (20 minutes)*

### Summary

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<sup>-1</sup> 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.

**Author:** Mr MAZZA, Simone Michele (Università degli Studi e INFN Milano (IT))

**Presenter:** Mr MAZZA, Simone Michele (Università degli Studi e INFN Milano (IT))

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 1"

Contribution ID: **129**

Type: **not specified**

## Is there a X(750) signal?

*Thursday 2 June 2016 16:50 (20 minutes)*

### Summary

Searches for new physics in high-mass diphoton and  $Z\gamma$  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.

**Presenter:** SOFFI, Livia (Cornell University (US))

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 1"

Contribution ID: 130

Type: **not specified**

## Theoretical interpretations of the diphoton excess

*Thursday 2 June 2016 17:10 (20 minutes)*

### Summary

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  $X \rightarrow ZZ$ ,  $X \rightarrow Z\gamma$  and  $X \rightarrow W^+W^-$  are interesting prospective signatures that may help distinguish between different vector-like fermion models.

**Presenter:** ELLIS, Sebastian (Michigan)

**Session Classification:** Special session on "Hot Topics in Particle and Astroparticle Physics 1"

Contribution ID: **131**

Type: **not specified**

## Multi-Higgs production

*Wednesday 1 June 2016 19:10 (20 minutes)*

### Summary

In this talk, I will present two recent updates of the MadGraph5\_aMC@NLO framework. First I will present the possibility to compute cross-section/ 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.

**Presenter:** MATTELAER, Olivier Pierre C (IPPP Durham)

**Session Classification:** EW + Top + Higgs

Contribution ID: 132

Type: **not specified**

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

*Tuesday 31 May 2016 18:50 (20 minutes)*

### Summary

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  $^{39}\text{Ar}$  present in argon from underground sources among other advances.

**Author:** MARICIC, Jelena (University of Hawaii)

**Presenter:** MARICIC, Jelena (University of Hawaii)

**Session Classification:** BSM + DM

Contribution ID: 133

Type: **not specified**

## Latest results and status of the XENON program

### Summary

The XENON program aims for direct WIMP detection with a dual phase xenon time projection chambers (TPCs). The XENON100 detector is still taking 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  $1.6 \cdot 10^{-47} \text{ cm}^2$  at  $m_\chi = 50 \text{ GeV}/c^2$  after 2 years exposure and 1 ton of fiducial volume.

**Author:** MICHENEAU, Kevin (Subatech Nantes)

**Presenter:** MICHENEAU, Kevin (Subatech Nantes)

**Session Classification:** BSM + DM

Contribution ID: 134

Type: **not specified**

## **SHiP: a new facility with a dedicated detector to search for new long-lived neutral particles and study the tau neutrino properties**

*Wednesday 1 June 2016 14:20 (20 minutes)*

### **Summary**

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  $2 \times 10^{20}$  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<sup>2</sup>. 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.  $\nu_\tau$  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.

**Presenter:** GRAVERINI, Elena (Universitaet Zuerich (CH))

**Session Classification:** BSM + DM



Contribution ID: 135

Type: **not specified**

## New physics searches with taus

*Wednesday 1 June 2016 18:50 (20 minutes)*

### Summary

**Author:** LAIRD, Edward (Brown University (US))

**Presenter:** LAIRD, Edward (Brown University (US))

**Session Classification:** BSM + DM

Contribution ID: 136

Type: **not specified**

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

*Wednesday 1 June 2016 17:10 (20 minutes)*

### Summary

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 700 GeV, 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  $10^9 \text{ GeV}$ . Finally, I will show that the dark matter experimental bounds are satisfied in the same parameter space region viable at LHC.

**Author:** DI CHIARA, Stefano (NICPB, Tallinn)

**Presenter:** DI CHIARA, Stefano (NICPB, Tallinn)

**Session Classification:** BSM + DM

Contribution ID: 137

Type: **not specified**

## CUORE-0 background analysis and evaluation of the $^{130}\text{Te}$ DB2nu decay half-life

*Tuesday 31 May 2016 18:30 (20 minutes)*

### Summary

CUORE is an experiment that will search for the neutrinoless double beta decay of  $^{130}\text{Te}$ . The detector is composed by 988  $\text{TeO}_2$  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  $^{130}\text{Te}$  betabeta2nu decay half-life, of which we provide a preliminary evaluation.

**Presenter:** CHIESA, Davide (University and INFN Milano Bicocca)

**Session Classification:** Neutrinos

Contribution ID: 138

Type: **not specified**

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

*Tuesday 31 May 2016 19:10 (20 minutes)*

### Summary

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  $\text{Zn}^{82}\text{Se}$  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.

**Presenter:** MARTINEZ, Maria ( Universita di Roma - la sapienza )

**Session Classification:** Neutrinos

Contribution ID: **139**Type: **not specified**

## QUBIC

*Wednesday 1 June 2016 14:40 (20 minutes)*

### Summary

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.

**Author:** STOLPOVSKIY, Mikhail (Institute for High Energy Physics (RU))

**Presenter:** STOLPOVSKIY, Mikhail (Institute for High Energy Physics (RU))

**Session Classification:** Astro + Cosmo I-II

Contribution ID: 140

Type: **not specified**

## **Perspective Study of Charmonium, Exotics and Baryons with Charm and Strangeness**

**Presenter:** BARABANOV, Mikhail (Dubna)

**Session Classification:** QCD + Heavy Flavour

Contribution ID: **141**

Type: **not specified**

## **Marginal evidence for cosmic acceleration from Type Ia supernovae**

*Wednesday 1 June 2016 15:20 (20 minutes)*

**Author:** GUFFANTI, Alberto (University of Turin)

**Presenter:** GUFFANTI, Alberto (University of Turin)

**Session Classification:** Astro + Cosmo I-II

Contribution ID: **151**

Type: **not specified**

## **Light stops from extra dimensions**

*Wednesday 1 June 2016 15:40 (20 minutes)*

**Presenter:** GARCÍA PEPIN, Mateo (IFAE / UAB)

**Session Classification:** BSM + DM



Contribution ID: **152**

Type: **not specified**

## **Latest results and status of the XENON program**

*Wednesday 1 June 2016 16:30 (20 minutes)*

**Presenter:** MICHENEAU, Kevin (Subatech Nantes)

**Session Classification:** BSM + DM