

# LHC Ski 2016, Austria



**A first discussion of 13 TeV results**  
April 10-15, 2016, Obergurgl University Center, Tirol, Austria

## Report of Contributions

Contribution ID : 0

Type : **Invited Talk**

## **The scalar sector of the Standard Model. Moving from discovery to precision physics.**

*Monday, 11 April 2016 08:20 (40)*

### **Summary**

**Primary author(s)** : FLECHL, Martin (Austrian Academy of Sciences (AT))

**Presenter(s)** : FLECHL, Martin (Austrian Academy of Sciences (AT))

Contribution ID : 1

Type : **Invited Talk**

# **On the Nature of Dynamical Electroweak Symmetry Breaking**

*Monday, 11 April 2016 10:10 (40)*

## **Summary**

**Primary author(s)** : SANNINO, Francesco (CP3-Origins)

**Presenter(s)** : SANNINO, Francesco (CP3-Origins)

Contribution ID : 2

Type : **Invited Talk**

## **The stability of the electroweak scale**

*Monday, 11 April 2016 10:50 (40)*

### **Summary**

**Primary author(s)** : BATELL, Brian Thomas

**Presenter(s)** : BATELL, Brian Thomas

Contribution ID : 3

Type : **Invited Talk**

## **What's hiding at 750 GeV?**

*Monday, 11 April 2016 09:00 (40)*

### **Summary**

**Primary author(s)** : SANZ GONZALEZ, Veronica (University of Sussex)

**Presenter(s)** : SANZ GONZALEZ, Veronica (University of Sussex)

Contribution ID : 5

Type : **Invited Talk**

## **Low-scale SUSY: RIP or resurrection?**

*Tuesday, 12 April 2016 08:20 (40)*

### **Summary**

**Primary author(s)** : SEKMEN, Sezen (Kyungpook National University (KR))

**Presenter(s)** : SEKMEN, Sezen (Kyungpook National University (KR))

Contribution ID : 6

Type : **Invited Talk**

## **Fine-tuning sweet spots**

*Tuesday, 12 April 2016 09:00 (40)*

### **Summary**

**Presenter(s)** : PIERINI, Maurizio (CERN)

Contribution ID : 7

Type : **Invited Talk**

## **"Exotica"? Speaking up for minorities.**

*Tuesday, 12 April 2016 10:10 (40)*

### **Summary**

**Primary author(s)** : HRYN'OVA, Tetiana (Centre National de la Recherche Scientifique (FR))

**Presenter(s)** : HRYN'OVA, Tetiana (Centre National de la Recherche Scientifique (FR))



Contribution ID : 8

Type : **Invited Talk**

## **CP violation in the Standard Model**

*Thursday, 14 April 2016 09:00 (40)*

### **Summary**

**Primary author(s)** : F. KAMENIK, Jernej (Jozef Stefan Institute)

**Presenter(s)** : F. KAMENIK, Jernej (Jozef Stefan Institute)

Contribution ID : 9

Type : **Invited Talk**

## Precision Measurements

*Thursday, 14 April 2016 10:10 (40)*

### Summary

**Primary author(s)** : GERSHON, Timothy (University of Warwick (GB))

**Presenter(s)** : GERSHON, Timothy (University of Warwick (GB))

Contribution ID : **10**

Type : **Invited Talk**

## **New Physics in the flavor sector**

*Thursday, 14 April 2016 10:50 (40)*

### **Summary**

**Primary author(s)** : CRIVELLIN, Andreas (CERN)

**Presenter(s)** : CRIVELLIN, Andreas (CERN)

Contribution ID : 11

Type : **Invited Talk**

## **Physics program at Belle-II in light of LHCb**

*Thursday, 14 April 2016 11:30 (40)*

### **Summary**

**Primary author(s)** : BERNLOCHNER, Florian Urs (Universitaet Bonn (DE))

**Presenter(s)** : BERNLOCHNER, Florian Urs (Universitaet Bonn (DE))

Contribution ID : 15

Type : **not specified**

## **Opening Talk: the Physics of New Physics**

*Sunday, 10 April 2016 20:00 (60)*

### **Summary**

**Primary author(s)** : DVALI, Georgi (NYU and LMU)

**Presenter(s)** : DVALI, Georgi (NYU and LMU)

Contribution ID : 17

Type : **not specified**

## **Going Beyond WIMPs: Exploring Light Dark Matter**

*Wednesday, 13 April 2016 09:00 (40)*

### **Summary**

**Presenter(s)** : VOLANSKY, Tomer (Tel Aviv University (IL))

Contribution ID : **18**

Type : **Invited Talk**

## **Dark Matter Direct Detection in the next 5 years**

*Wednesday, 13 April 2016 08:20 (40)*

### **Summary**

**Presenter(s)** : SCHUMANN, Marc (University of Bern)

Contribution ID : **19**

Type : **Invited Talk**

## **New avenues to search for Dark Matter**

*Wednesday, 13 April 2016 10:10 (40)*

### **Summary**

**Primary author(s)** : POSPELOV, Maxim

**Presenter(s)** : POSPELOV, Maxim



Contribution ID : 20

Type : **Invited Talk**

# **Ultra-high multiplicity electroweak production at Future Colliders - Perturbation theory meltdown and Beyond**

*Friday, 15 April 2016 08:20 (40)*

## **Summary**

**Primary author(s)** : KHOZE, Valentin V (Durham University)

**Presenter(s)** : KHOZE, Valentin V (Durham University)

Contribution ID : 21

Type : **Invited Talk**

# **Towards the Next Standard Model: Experimental Challenges**

*Friday, 15 April 2016 09:00 (40)*

## **Summary**

**Primary author(s)** : KIESLING, Christian (Werner-Heisenberg-Institut)

**Presenter(s)** : KIESLING, Christian (Werner-Heisenberg-Institut)

Contribution ID : 22

Type : **Invited Talk**

## **Physics Prospects at Future Colliders**

*Thursday, 14 April 2016 08:20 (40)*

### **Summary**

**Primary author(s)** : LIST, Jenny (Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE))

**Presenter(s)** : LIST, Jenny (Deutsches Elektronen-Synchrotron Hamburg and Zeuthen (DE))

Contribution ID : 23

Type : **Invited Talk**

## Outlook

*Friday, 15 April 2016 10:10 (40)*

### Summary

**Presenter(s)** : PLEHN, Tilman (Heidelberg University)

Contribution ID : 24

Type : **Invited Talk**

## **Finding New Physics by understanding Standard Model Processes**

*Tuesday, 12 April 2016 10:50 (40)*

### **Summary**

**Primary author(s)** : SCHWANENBERGER, Christian (Deutsches Elektronen-Synchrotron (DE))

**Presenter(s)** : SCHWANENBERGER, Christian (Deutsches Elektronen-Synchrotron (DE))

Contribution ID : 25

Type : **not specified**

## **DM at 13 TeV and Data Interpretation**

*Wednesday, 13 April 2016 10:50 (40)*

### **Summary**

**Primary author(s)** : SALEK, David (Nikhef National institute for subatomic physics (NL))

**Presenter(s)** : SALEK, David (Nikhef National institute for subatomic physics (NL))

Contribution ID : 26

Type : **Talk**

## A new class of family non-universal $Z'$ models

*Thursday, 14 April 2016 17:00 (20)*

Recent anomalies in B meson decays observed by the LHCb collaboration have motivated the construction of extensions of the Standard Model with a gauged family non-universal  $U(1)$  factor. I will present a large class of family non-universal  $U(1)$  gauge models for which flavor changing neutral currents are completely controlled by CKM matrix elements. I will discuss then phenomenological implications of these models, including the possibility to explain the LHCb anomalies.

### Summary

**Primary author(s)** : CELIS, Alejandro (Ludwig Maximilian University of Munich)

**Presenter(s)** : CELIS, Alejandro (Ludwig Maximilian University of Munich)

**Session Classification** : THU1

Contribution ID : 27

Type : **Talk**

## **h(125) boson measurements in ATLAS: run-1 legacy and early run-2 results**

*Monday, 11 April 2016 17:00 (20)*

This talk will summarize the most important properties of the h(125) boson measured at the LHC run-1 by the ATLAS collaboration. It will also present early measurements made with the first data taken at 13 TeV in 2015.

### **Summary**

**Primary author(s)** : VENTURI, Nicola (University of Toronto (CA))

**Presenter(s)** : VENTURI, Nicola (University of Toronto (CA))

**Session Classification** : MON1

**Track Classification** : Scalar Sector



Contribution ID : 28

Type : **Talk**

## **Searches for Beyond-Standard-Model Higgs bosons in ATLAS**

*Tuesday, 12 April 2016 17:00 (20)*

This talk will briefly summarize the searches for BSM Higgs Bosons performed at the LHC run-1 by the ATLAS collaboration. Then it will present the searches for high mass Higgses in several channels, made at 13 TeV with the 2015 data.

### **Summary**

**Primary author(s)** : ZINONOS, Zinonas (Georg-August-Universitaet Goettingen (DE))

**Presenter(s)** : ZINONOS, Zinonas (Georg-August-Universitaet Goettingen (DE))

**Session Classification** : TUE1

**Track Classification** : Scalar Sector

Contribution ID : 29

Type : Talk

## Searches for new physics with fermions or jets at the ATLAS detector in LHC Run 2

*Tuesday, 12 April 2016 18:20 (20)*

Many extensions of the Standard Model of particle physics predict heavy new particles and new phenomena, leading to characteristic signatures such as a narrow peak or excess in the tail of distributions. This talk highlights results on searches with fermionic signatures, mainly with high- $p_T$  jets and leptons, using 2015 data collected at 13 TeV.

### Summary

**Primary author(s)** : DANDOY, Jeff (University of Chicago (US))

**Presenter(s)** : DANDOY, Jeff (University of Chicago (US))

**Session Classification** : TUE2

**Track Classification** : TeV-scale new physics

Contribution ID : 30

Type : **Talk**

## Searches for new physics with bosons at the ATLAS detector in LHC Run 2

*Tuesday, 12 April 2016 18:40 (20)*

Searches for new physics beyond the Standard Model with bosonic signatures in LHC Run 2 are presented. These include searches for resonant production of two massive bosons (VV, VH and HH) and (non)resonant production of photons in high-mass region.

### Summary

**Primary author(s)** : IORDANIDOU, Kalliopi (Columbia University (US))

**Presenter(s)** : IORDANIDOU, Kalliopi (Columbia University (US))

**Session Classification** : TUE2

**Track Classification** : TeV-scale new physics

Contribution ID : 31

Type : **Talk**

## **Dark matter searches from the ATLAS experiment at LHC Run 2**

*Wednesday, 13 April 2016 18:40 (20)*

Signatures of large missing transverse momentum recoiling against jets at the LHC provide powerful probe to strongly produced dark matter (DM), complementary to direct and indirect DM detection experiments. This talk presents recent results on dark matter searches with the ATLAS detector in LHC Run 2, focusing on signatures with jets, photons or hadronically decaying bosons.

### **Summary**

**Primary author(s)** : LEVIN, Dan (University of Michigan (US))

**Presenter(s)** : LEVIN, Dan (University of Michigan (US))

**Session Classification** : WED2

**Track Classification** : Dark Matter

Contribution ID : 32

Type : **Talk**

## Muon $g-2$ in Two-Higgs-Doublet Models

*Thursday, 14 April 2016 17:20 (20)*

Updating various theoretical and experimental constraints on the four different types of two-Higgs-doublet models (2HDMs), we find that only the lepton-specific” (ortype X”) 2HDM can explain the present muon  $g-2$  anomaly in the parameter region of large  $\tan\beta$ , a light CP-odd boson, and heavier CP-even and charged bosons which are almost degenerate. The severe constraints on the models come mainly from the consideration of vacuum stability and perturbativity, the electroweak precision data, the b-quark observables like  $B_s \rightarrow \mu\mu$ , the precision measurements of the lepton universality as well as the 125 GeV boson property observed at the LHC. We also discuss the tau-rich signatures at the LHC to probe the allowed parameter space of Type X 2HDM.

### Summary

**Primary author(s)** : CHUN, Eung Jin (Korea Institute for Advanced Study)

**Presenter(s)** : CHUN, Eung Jin (Korea Institute for Advanced Study)

**Session Classification** : THU1

**Track Classification** : Scalar Sector

Contribution ID : 33

Type : Talk

## **LHCb measurements at 13 TeV with online data analysis exploiting new trigger and real time alignment and calibration**

*Thursday, 14 April 2016 18:40 (20)*

By using the very first proton-proton collision data of the LHC Run II, LHCb performed a series of measurements, notably including the cross-sections for quarkonia, beauty and charm productions. The results have been carried out by exploiting a new scheme for the LHCb software trigger, where the algorithm has been split in two stages to allowing for a delayed trigger decision. This enables the alignment and calibration to be performed in real time, hence achieving an optimal reconstruction performance already at the trigger level. In turn this gives the possibility to finalise physics analyses directly from data objects produced by the online reconstruction. Physics results will be discussed with some emphasis on the performance and technical implementation of this novel trigger approach.

### **Summary**

**Primary author(s)** : STORACI, Barbara (Universitaet Zuerich (CH))

**Presenter(s)** : STORACI, Barbara (Universitaet Zuerich (CH))

**Session Classification** : THU2

**Track Classification** : Flavor Physics

Contribution ID : 34

Type : **Talk**

## Status and perspectives with exotic states at LHCb

*Thursday, 14 April 2016 17:40 (20)*

The analysis of the full LHC Run I data set of proton-proton collision events collected with the LHCb detector, corresponding to an integrated luminosity of 3.0 fb<sup>-1</sup>, is yielding several improved results on exotic hadron candidates, such as  $X(3872)$  and  $Z(4430)^+$ , as well as the first observation of two new states compatible with the pentaquark hypothesis. Run II data allow LHCb to further sharpen the experimental picture, opening up the possibility to observe new states. The measurements of the properties of these exotic states and the Run II prospects will be presented, including the determination of their quantum numbers, with model dependent and independent methods.

### Summary

**Primary author(s)** : Mr ALVES JUNIOR, Antonio Augusto (University of Cincinnati (US))

**Presenter(s)** : Mr ALVES JUNIOR, Antonio Augusto (University of Cincinnati (US))

**Session Classification** : THU1

**Track Classification** : Flavor Physics

Contribution ID : 35

Type : **Young Scientists Forum**

## Low Scale Unification @ LHC

*Thursday, 14 April 2016 19:00 (10)*

The Talk is based on

- P. Fileviez Perez, S. Ohmer and H. H. Patel,  
“Minimal Theory for Lepto-Baryons”,  
Phys.Lett. B735 (2014) 283-287,  
[arXiv: 1403.8029]
- P. Fileviez Perez and S. Ohmer,  
“Low Scale Unification of Gauge Interactions”,  
Phys.Rev. D90 (2014) 3, 037701,  
[arXiv: 1405.1199]
- S. Ohmer and H. H. Patel,  
“Leptobaryons as Majorana Dark Matter”,  
Phys.Rev. D92 (2015) 5, 055020,  
[arXiv: 1506.00954]

### Summary

I will discuss a new class of models where the global baryonic and leptonic symmetries of the Standard Model are promoted to gauge symmetries. Anomaly cancellation requires new fermions called “leptobaryons”. I demonstrate how these new degrees of freedom can allow for the possibility of low scale unification, and I will show how the LHC can search for this class of models and draw connections to dark matter searches.

**Primary author(s)** : OHMER, Sebastian (Max-Planck-Institut fuer Kernphysik (MPIK), Heidelberg)

**Co-author(s)** : PATEL, Hiren (Max Planck Institute); FILEVIEZ PEREZ, Pavel (MPIK)

**Presenter(s)** : OHMER, Sebastian (Max-Planck-Institut fuer Kernphysik (MPIK), Heidelberg)

**Session Classification** : Young Scientists Forum 4



Contribution ID : 37

Type : **Talk**

## **Studies of Higgs bosons decaying to fermions with CMS**

*Monday, 11 April 2016 17:40 (20)*

This talk will review the status of what we know about the observed Higgs boson decaying to fermions, together with the search for Physics beyond the standard model in cases with fermions in the final state. The presentation will cover the couplings from the analyses of final states and initial states like production in association with top quark pairs or single top quarks.

### **Summary**

**Primary author(s)** : SALERNO, Daniel (Universitaet Zuerich (CH))

**Presenter(s)** : SALERNO, Daniel (Universitaet Zuerich (CH))

**Session Classification** : MON1

**Track Classification** : Scalar Sector

Contribution ID : 38

Type : **Talk**

## **Studies of Higgs bosons decaying to bosons with CMS**

*Monday, 11 April 2016 17:20 (20)*

This talk will review the status of what we know about the observed Higgs boson decaying to bosons, together with the search for Physics beyond the standard model in cases with bosons in the final state.

### **Summary**

**Primary author(s)** : SAFONOV, Alexei (Texas A & M University (US))

**Presenter(s)** : SAFONOV, Alexei (Texas A & M University (US))

**Session Classification** : MON1

**Track Classification** : Scalar Sector

Contribution ID : 39

Type : **Young Scientists Forum**

## Search for New Physics in Z+MET channel at CMS

*Tuesday, 12 April 2016 19:00 (10)*

Despite the great understanding of particle interactions in terms of the Standard Model and the recent discovery of the Higgs boson at the LHC, the Standard Model of particle physics can not yet explain various phenomena, such as neutrino masses or the Dark Matter halo in the galaxies. This talk presents new LHC Run II results of a search for New Physics in Z+MET channel, discussing the main experimental features along the uncertainties and finally giving an outlook for the future data in Run II.

### Summary

**Primary author(s)** : BRODSKI, Michael (Rheinisch-Westfaelische Tech. Hoch. (DE))

**Presenter(s)** : BRODSKI, Michael (Rheinisch-Westfaelische Tech. Hoch. (DE))

**Session Classification** : Young Scientists Forum 2

Contribution ID : 40

Type : **Talk**

## Dark matter searches with CMS

*Wednesday, 13 April 2016 19:00 (20)*

The existence of dark matter, indicated by astronomical observations, is one of the main proofs of physics beyond the standard model. Despite its abundance, dark matter has not been directly observed yet. This talk presents several searches for dark matter production in proton-proton collisions at 7, 8, and 13 TeV at the LHC, performed by the CMS collaboration. They are interpreted in terms of simplified models with different structures and mediators, as well as generic effective theory terms.

### Summary

**Primary author(s)** : JEITLER, Manfred (Austrian Academy of Sciences (AT))

**Presenter(s)** : JEITLER, Manfred (Austrian Academy of Sciences (AT))

**Session Classification** : WED2

**Track Classification** : Dark Matter

Contribution ID : 41

Type : **Talk**

## Highlights of searches for new physics (non-SUSY) with CMS

*Tuesday, 12 April 2016 17:20 (20)*

The Large Hadron Collider has restarted pp collisions at 13 TeV center of mass energy in June 2015. The CMS experiments have taken data at this new energy which allows greater reach in probing for physics beyond the Standard Model. Several results on searches for physics not associated with supersymmetric extensions of the Standard Model are presented. To give few examples, these extensions predict the existence of new massive resonances, contact interactions with non-resonant phenomena, and long-lived particles.

### Summary

**Primary author(s)** : SKHIRTLDZE, Nikoloz (Kansas State University (US))

**Presenter(s)** : SKHIRTLDZE, Nikoloz (Kansas State University (US))

**Session Classification** : TUE1

**Track Classification** : TeV-scale new physics

Contribution ID : 42

Type : **Young Scientists Forum**

## **New CMS results for H->4l at 13 TeV**

*Tuesday, 12 April 2016 19:20 (10)*

This talk will present the H->4l analysis with 13 TeV data, and the corresponding results.

### **Summary**

**Primary author(s)** : KIANI, Muhammad Bilal (Universita e INFN Torino (IT))

**Presenter(s)** : KIANI, Muhammad Bilal (Universita e INFN Torino (IT))

**Session Classification** : Young Scientists Forum 2

Contribution ID : 43

Type : **Young Scientists Forum**

## **N-jettiness at NNLO accuracy in electron-positron annihilation**

*Thursday, 14 April 2016 19:20 (10)*

Vetoing undesired jets is essential in many analyses aiming at searches for new particles. A new jet function, called N-jettiness has been introduced with the purpose of using an inclusive event shape variable for vetoing jets. The logarithms from the phase space restriction, are simple enough to allow their systematic summation to all orders, which allows for providing high precision predictions that combine the fixed-order and resummed results. In this talk we present predictions for two- and three-jettiness in electron-positron annihilation at the next-to-next-to-leading order accuracy. We use the CoLoRFulNNLO subtraction scheme, which is implemented in a computer program that can be used for computing arbitrary jet cross sections at NNLO provided the necessary matrix elements are supplemented.

### **Summary**

**Primary author(s) :** TULPIÁNT, Zoltán (University of Debrecen)

**Presenter(s) :** TULPIÁNT, Zoltán (University of Debrecen)

**Session Classification :** Young Scientists Forum 4

Contribution ID : 44

Type : **Talk**

## Searches for supersymmetry at CMS in leptonic final states with 13 TeV Data

*Tuesday, 12 April 2016 17:40 (20)*

The CMS SUSY program is very active in performing searches with the 13 TeV data including multiple analyses done in regions with leptonic final states. The results of these analyses are used to expand the reach of the searches done by CMS at 8 TeV and additionally to investigate two excesses seen in run I, namely a 2.6 sigma excess seen by CMS and a 3.0 sigma excess seen by ATLAS. These excesses were observed in two separate signal regions both having final states of at least 2 opposite sign same flavor leptons, jets, and MET.

### Summary

**Primary author(s)** : WELKE, Charles Vincent (Univ. of California San Diego (US))

**Presenter(s)** : WELKE, Charles Vincent (Univ. of California San Diego (US))

**Session Classification** : TUE1

**Track Classification** : TeV-scale new physics



Contribution ID : 45

Type : **Talk**

## **Belle II early physics program of bottomonia spectroscopy**

The Belle II experiment at the SuperKEKB collider is a major upgrade of KEK B factory facility in Tsukuba, Japan. First beams are planned for early 2016 and first physics data will be recorded in the middle of 2017 during phase 2 commissioning, while the Belle II detector is still missing its vertex detector system. In this talk, we will describe the physics program for this early data, which will focus on bottomonium spectroscopy at different center-of-mass energies, namely at the  $\Upsilon(3S)$  and  $\Upsilon(6S)$  resonances, amongst other energy points.

### **Summary**

**Primary author(s)** : SCHWANDA, Christoph (Austrian Academy of Sciences (AT))

**Presenter(s)** : BELLE II SPEAKER

**Track Classification** : Flavor Physics

Contribution ID : 46

Type : Talk

## Belle II studies of missing energy decays and searches for dark photon production

*Thursday, 14 April 2016 18:20 (20)*

The Belle II experiment at the SuperKEKB collider is a major upgrade of the KEK B factory in Tsukuba, Japan. The machine is designed for an instantaneous luminosity of  $8 \times 10^{35} \text{ cm}^{-2} \text{ s}^{-1}$  and the experiment is expected to accumulate a data sample of about  $50 \text{ ab}^{-1}$  in 5 years running. With this amount of data, decays sensitive to physics beyond the Standard Model can be studied with unprecedented precision. One promising set of modes are physics processes with missing energy such as  $B \rightarrow \tau\nu$ ,  $B \rightarrow D^{(*)}\tau\nu$  and  $B \rightarrow K^{(*)}\nu\bar{\nu}$ . The Belle II data also allows searches for the dark photon, the gauge mediator of a hypothetical dark sector, which recently received much attention in the context of dark matter models.

### Summary

**Primary author(s)** : LI GIOI, Luigi (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

**Presenter(s)** : LI GIOI, Luigi (Max-Planck-Institut fuer Physik (Werner-Heisenberg-Institut) (D))

**Session Classification** : THU2

**Track Classification** : Flavor Physics

Contribution ID : 47

Type : **Talk**

## How (not) to use simplified models to search for dark matter at the LHC

*Wednesday, 13 April 2016 17:40 (20)*

I will discuss the motivation, the advantages and the problems of using simplified models as a tool to interpret LHC searches for dark matter. I will present a few examples for how this approach can be used to understand the complementarity of different dark matter search strategies. Finally, I will focus on various consistency conditions that should be imposed even on the most simplified models. These conditions can imply the presence of additional new particles and interactions that may change the phenomenology of the model in important ways.

### Summary

**Primary author(s)** : Dr KAHLHOEFER, Felix (DESY)

**Presenter(s)** : Dr KAHLHOEFER, Felix (DESY)

**Session Classification** : WED1

**Track Classification** : Dark Matter

Contribution ID : 48

Type : **Young Scientists Forum**

## Searches for new physics in jet final states in ATLAS at LHC Run II

*Tuesday, 12 April 2016 19:10 (10)*

Significant increase of the center-of-mass energy from 8 to 13 TeV at LHC Run II offers a great discovery potential for new physics at high mass, especially for strongly produced high-mass resources, contact interactions and TeV-gravity phenomena with high-pT jets. This talk presents most recent Run II results from ATLAS on new physics searches in the jet final states.

### Summary

**Primary author(s)** : AMADIO, Brian Thomas (Lawrence Berkeley National Lab. (US))

**Presenter(s)** : AMADIO, Brian Thomas (Lawrence Berkeley National Lab. (US))

**Session Classification** : Young Scientists Forum 2

**Track Classification** : TeV-scale new physics

Contribution ID : 49

Type : **Young Scientists Forum**

## **Constraining composite Higgs models with direct and indirect searches**

*Tuesday, 12 April 2016 19:30 (10)*

Direct searches for fermion and vector boson resonances, as well as indirect constraints from precision measurements are both important tools to test the predictions of composite Higgs models. A novel numerical technique allows us to take into account many direct and indirect constraints in a single framework. This talk present results from applying our method to a class of four-dimensional pseudo-Nambu-Goldstone boson Higgs models.

### **Summary**

**Primary author(s)** : NIEHOFF, Christoph (Excellence Cluster Universe, Munich); STRAUB, David (Excellence Cluster Universe, Munich); STANGL, Peter (Excellence Cluster Universe, Munich)

**Presenter(s)** : STANGL, Peter (Excellence Cluster Universe, Munich)

**Session Classification** : Young Scientists Forum 2

**Track Classification** : Scalar Sector

Contribution ID : 50

Type : **Talk**

## Baryonic Dark Matter at the LHC

*Wednesday, 13 April 2016 18:20 (20)*

I present an extension of the Standard Model where baryon number is a local gauge symmetry that is spontaneously broken. In such a setup, anomaly cancellation requires the introduction of new fermion fields, the lightest of which is an attractive dark matter candidate. Dark matter stability is an automatic consequence of the gauge symmetry, and proton decay never occurs even if baryon number is broken at the low scale. I discuss collider signatures of this model as well as implications for direct and indirect dark matter searches.

### Summary

**Primary author(s)** : DUERR, Michael (DESY)**Presenter(s)** : DUERR, Michael (DESY)**Session Classification** : WED2**Track Classification** : Dark Matter

Contribution ID : 51

Type : **not specified**

## **Seeking Evidence for Dark Matter in Indirect Detection**

*Wednesday, 13 April 2016 11:30 (40)*

### **Summary**

**Presenter(s)** : REIMER, Olaf

Contribution ID : 52

Type : **Talk**

## **Minimal Composite Dynamics versus Axion Origin of the Diphoton excess**

*Monday, 11 April 2016 18:40 (20)*

ATLAS and CMS observe deviations from the expected background in the diphoton invariant mass searches of new resonances around 750 GeV. We show that a simple realization in terms of a new pseudoscalar state can accommodate the observations. The model leads to further footprints that can be soon observed. The new state can be interpreted both as an axion or as a highly natural composite state stemming from minimal models of dynamical electroweak symmetry breaking. We further show how to disentangle the two scenarios.

### **Summary**

**Primary author(s)** : Dr MOLINARO, Emiliano (CP3-Origins, University of Southern Denmark)

**Co-author(s)** : Prof. SANNINO, Francesco (CP3-Origins); Dr VIGNAROLI, Natascia (CP3-Origins)

**Presenter(s)** : Dr MOLINARO, Emiliano (CP3-Origins, University of Southern Denmark)

**Session Classification** : MON2

**Track Classification** : Scalar Sector



Contribution ID : 53

Type : **not specified**

## Making sense of the LHC diboson and diphoton excesses

*Monday, 11 April 2016 19:00 (20)*

Towards the end of Run-1 data taking, an excess in the diboson as well as eejj channel was announced. During the first round of Run-2 data taking, an excess in diphoton channel has been announced. I consider possible explanations of these excesses in two different BSM scenarios. I demonstrate the feasibility of accommodating the diboson and eejj excess in a Left-Right Symmetric Standard Model. For the diphoton excess, I scrutinise a simplified model with scalar resonance coupling to gluons, photons and fermionic dark matter. I illustrate the monojet constraints on such a simplified model scenario and inspect the possibility of reconciling the diphoton excess with dark matter constraints.

### Summary

**Primary author(s)** : KULKARNI, Suchita (Austrian Academy of Sciences (AT))

**Presenter(s)** : KULKARNI, Suchita (Austrian Academy of Sciences (AT))

**Session Classification** : MON2

Contribution ID : 54

Type : **Talk**

## Convexity, gauge-dependence, and tunneling rates

The experimental data point towards the fact that the Standard Model, when assumed to be valid up to very high energies, might be metastable. The stability properties of the theory strongly depend on the Higgs and top masses, so that it becomes important to perform precise, unambiguous computations. Traditionally, these rely on calculating the effective potential and checking for an instability. Once this is known, the lifetime of the Higgs vacuum can be estimated from semi-classical computations of tunneling rates. This approach suffers from two conceptual problems. First, the true effective potential of the theory is known to be concave and real, and thus cannot have false vacua. Second, it is also gauge-dependent, which opens up the question of how to get unambiguous results for decay rates. We will show how these issues can be overcome.

### Summary

**Primary author(s)** : TAMARIT, Carlos (IPPP Durham)

**Co-author(s)** : Mr PASCENCIA-CONTRERAS, Alexis (Durham IPPP)

**Presenter(s)** : TAMARIT, Carlos (IPPP Durham)

**Track Classification** : Scalar Sector

Contribution ID : 58

Type : Talk

## Induced Electroweak Symmetry Breaking and the Composite Twin Higgs

*Monday, 11 April 2016 18:20 (20)*

Induced electroweak symmetry breaking is an alternative to the Standard Model mechanism for triggering the Higgs vev which can preserve a Standard-Model-like Higgs decoupled from additional states. In composite Higgs models, this provides a natural mechanism to explain a hierarchy  $v \ll f$  between the EWSB scale and the global symmetry breaking scale. In particular, we describe how composite twin Higgs models with minimal tuning can be realized with this mechanism. A unique feature of this model is the presence of both lower and *upper* bounds on the composite global symmetry breaking scales  $\sim 700 \text{ GeV}$   $f \sim 2 \text{ TeV}$ .

### Summary

**Primary author(s)** : Dr HOWE, Kiel (Fermi National Accelerator Laboratory)

**Presenter(s)** : Dr HOWE, Kiel (Fermi National Accelerator Laboratory)

**Session Classification** : MON2

Contribution ID : 59

Type : Young Scientists Forum

## Angular analysis of $B \rightarrow K(*)l+l-$ at the Belle experiment

*Thursday, 14 April 2016 19:10 (10)*

We present the measurement of angular observables in the decay  $B^0 \rightarrow K^{*0}(892)l^+l^-$ , where  $l^+l^-$  is either  $e^+e^-$  or  $\mu^+\mu^-$ . The analysis is performed on a data sample corresponding to  $711 \text{ fb}^{-1}$  containing  $772 \times 10^6$   $B\bar{B}$  pairs, collected at the  $\Upsilon(4S)$  resonance with the Belle detector at the asymmetric-energy  $e^+e^-$  collider KEKB. Four form-factor independent angular observables and the longitudinal polarization of the  $K^{*0}(892)$ ,  $F_L$  and the transverse polarization asymmetry  $A(2)$  are extracted in five bins of the invariant mass squared of the lepton system  $q^2$ .

We compare our results in the region  $q^2 < 8 \text{ GeV}^2/c^4$  with Standard Model predictions and analyze the  $q^2$  region in which the LHCb collaboration reported the so called  $P_5$  anomaly [1, 2].

### References

[1] Aaij, R and others Measurement of Form-Factor-Independent Observables in the Decay  $B^0 \rightarrow K^{*0}\mu^+\mu^-$  10.1103/PhysRevLett.111.191801

[2] Aaij, Roel and others Angular analysis of the  $B^0 \rightarrow K^{*0}\mu^+\mu^-$  decay arXiv/1512.04442

### Summary

**Primary author(s)** : WEHLE, Simon (DESY Hamburg)

**Presenter(s)** : WEHLE, Simon (DESY Hamburg)

**Session Classification** : Young Scientists Forum 4

**Track Classification** : Flavor Physics

Contribution ID : **60**

Type : **not specified**

## **New signatures of DM at the LHC**

### **Summary**

**Presenter(s)** : KOPP, Joachim (Johannes-Gutenberg-Universitaet Mainz (DE))

Contribution ID : 61

Type : **Talk**

## GeV-ish Dark Matter in the Sun

The Sun may act as a gravitational well and capture Dark Matter at a constant rate: DM would therefore accrete inside the Sun. In absence of Annihilation (for example, for Asymmetric Dark Matter) the total number of captured DM particles at  $t = t_{sun}$  may have stabilised to a constant number only if capture goes in equilibrium with evaporation, for DM masses below 5-10 GeV, while for higher masses it cannot have reached equilibrium yet. Evaporation thus plays a very important role in determining the total quantity of DM particles trapped in the sun for  $m_{DM} < 10 GeV$ . The presence of GeV-ish Dark Matter would modify energy transport in the Sun, thus is a potential solution of the Solar Abundance problem. However, DM with a constant SI or SD interaction cross section does not modify the energy transport in the right way to solve the Abundance problem, therefore here we consider DM with momentum and velocity-dependent interactions.

### Summary

**Primary author(s)** : BUSONI, Giorgio

**Presenter(s)** : BUSONI, Giorgio

**Session Classification** : WED2

Contribution ID : 62

Type : **Young Scientists Forum**

## Searches for LFV $H/Z \rightarrow \tau e / \tau \mu$ decays with the ATLAS detector at 8 TeV

*Thursday, 14 April 2016 19:30 (10)*

Direct searches for lepton-flavour-violation (LFV) in decays of the Z and recently discovered Higgs boson with the ATLAS detector at the LHC are presented. Three LFV decays are considered:  $H \rightarrow e\tau$ ,  $H \rightarrow \mu\tau$ , and  $Z \rightarrow \mu\tau$ . The searches are based on the data sample of proton-proton collisions collected by the ATLAS detector corresponding to an integrated luminosity of 20.3 fb<sup>-1</sup> at a center-of-mass energy of  $\sqrt{s} = 8$  TeV.

### Summary

**Primary author(s)** : WEITS, Hartger (NIKHEF (NL))

**Presenter(s)** : WEITS, Hartger (NIKHEF (NL))

**Session Classification** : Young Scientists Forum 4

**Track Classification** : Scalar Sector

Contribution ID : **63**

Type : **not specified**

## **New signatures of DM at the LHC**

*Wednesday, 13 April 2016 17:00 (40)*

### **Summary**

**Presenter(s)** : KOPP, Joachim (Johannes-Gutenberg-Universitaet Mainz (DE))