26th International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY2018)

Report of Contributions

https://indico.cern.ch/e/689399

Contribution ID: **2** Type: **Talk (closed)**

The quest for $\mu \to e\gamma$ and its experimental limiting factors at future high intensity muon beams

Tuesday, 24 July 2018 17:00 (20 minutes)

In the next decade, accelerator upgrades are expected in various facilities, making it feasible to have continuous muons beams with an intensity of 10^9 or even 10^{10} muons per second. These progresses would open new prospects in the search for the Lepton Flavor Violating decay $\mu \to e\gamma$. We discuss the potential sensitivity to this decay for experiments exploiting continuous beams at these extremely high rates, by investigating the experimental limiting factors that will define their ultimate performances.

Parallel Session

Primary authors: RENGA, Francesco; CAVOTO, Gianluca (Sapienza Universita e INFN, Roma I (IT)); PAPA, Angela; RIPICCINI, Emanuele (UNIGE); VOENA, Cecilia (Sapienza Universita e INFN, Roma I (IT))

Presenter: VOENA, Cecilia (Sapienza Universita e INFN, Roma I (IT))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **4** Type: **Talk (closed)**

Interesting Models unifying Neutrino Mass, Dark Matter, Origin of PMNS and CKM, and GUT

Tuesday, 24 July 2018 15:30 (20 minutes)

The Standard Model of particle physics have been extremely successful so far, but there are still many unanswered questions like the origin of neutrino mass, nature of dark matter, the source of quark and lepton flavor mixing and their possible correlation, the theory of grand unification of all SM interactions. In this talk I will focus on some interesting models that attempt to answer these questions and possible correlation between them. Embedding a Pati-Salam quark-lepton unification symmetry, SU(4)$_c$⊗SU(2)$_L$⊗U(1)$_R$, into SU(7) GUT with a Scotogenic radiate neutrino mass and LHC phenomenology will be discussed. I will also touch on G_{SM}⊗U(1)$_{B-L}$ with residual Z_4 symmetry leading to Scotogenic radiative Dirac neutrino masses with dark matter, $0\nu4\beta$ and absence of $0\nu2\beta$ signal and phenomenology of related rare processes. Possible common origin of CKM and PMNS mixings in a complete model. Other possible topics will include chiral dark sector with composite dark matter leading to Scotogenic two loop neutrino mass and neutrino portal to SM.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: NATALE, Alexander (Korea Institute for Advanced Study); DASGUPTA, Arnab (Jamia Millia Islamia); Dr POPOV, Oleg (Seoul National University of Science and Technology); KANG, Sin Kyu (Seoul-Tech)

Presenter: Dr POPOV, Oleg (Seoul National University of Science and Technology)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **5** Type: **not specified**

Welcome/ Introduction to IFAE

Monday, 23 July 2018 08:50 (10 minutes)

Parallel Session

Presenters: MARTINEZ, Mario (IFAE, SUSY2018 Chair); MIQUEL, Ramon (Director of IFAE)

Session Classification: Inauguration

Contribution ID: **6** Type: **not specified**

Welcome remarks (Direcció General de Recerca , Catalunya)

Monday, 23 July 2018 09:00 (15 minutes)

Presenter: Mr SUBIRADA, Francesc

Session Classification: Inauguration

Contribution ID: **7** Type: **not specified**

Welcome remarks (Barcelona Institute of Technology, BIST)

Monday, 23 July 2018 09:15 (15 minutes)

Parallel Session

Primary author: Mr SILBERMAN, Gabriel (BIST)

Presenter: Mr SILBERMAN, Gabriel (BIST)

Session Classification: Inauguration

Contribution ID: **8** Type: **Talk (closed)**

On the Nature of Gravity

Monday, 23 July 2018 09:30 (30 minutes)

Parallel Session

Primary author: DVALI, Gia (ASC/MPI Munich, Germany and CCPP/New York Univ., USA)

Presenter: DVALI, Gia (ASC/MPI Munich, Germany and CCPP/New York Univ., USA)

Session Classification: Plenary I

Contribution ID: **9** Type: **not specified**

SM Higgs properties measurements

Monday, 23 July 2018 10:00 (30 minutes)

Parallel Session

Primary author: ZENZ, Seth (Imperial College (GB))

Presenter: ZENZ, Seth (Imperial College (GB))

Session Classification: Plenary I

Contribution ID: **10** Type: **not specified**

SM Higgs rare processes

Monday, 23 July 2018 10:30 (30 minutes)

Parallel Session

Primary author: LENZ, Tatjana (University of Bonn (DE))

Presenter: LENZ, Tatjana (University of Bonn (DE))

Session Classification: Plenary I

Contribution ID: **11** Type: **not specified**

Status of precision computations

Monday, 23 July 2018 11:30 (30 minutes)

Parallel Session

Primary author: FRIXIONE, Stefano (INFN)

Presenter: FRIXIONE, Stefano (INFN)

Session Classification: Plenary II

Contribution ID: **12** Type: **not specified**

Precision top and electroweak measurements

Monday, 23 July 2018 12:00 (30 minutes)

Parallel Session

Primary author: BOUDREAU, Joseph (University of Pittsburgh (US))

Presenter: BOUDREAU, Joseph (University of Pittsburgh (US))

Session Classification: Plenary II

Contribution ID: **13** Type: **not specified**

Precision physics at the high-energy frontier

Monday, 23 July 2018 12:30 (30 minutes)

Parallel Session

Primary author: WULZER, Andrea (CERN)

Presenter: WULZER, Andrea (CERN)

Session Classification: Plenary II

Contribution ID: **14** Type: **not specified**

New improvements in Jet Physics

Monday, 23 July 2018 13:00 (30 minutes)

Parallel Session

Primary author: THALER, Jesse (MIT)

Presenter: THALER, Jesse (MIT)

Session Classification: Plenary II

Contribution ID: **15** Type: **Talk (closed)**

Amplitudes for Gravitino LSP and Stop NLSP

Monday, 23 July 2018 18:10 (20 minutes)

In scenarios of the Minimal Supersymmetric Standard Model where the gravitino is the LSP and the Stop is the NLSP, the Stop could have a long life-time, which makes it a quasi-stable particle that requires special strategies for its search at hadron colliders. We calculate the lifetime for the stop decay in different regions of parameter space where the different N-body modes are open, namely: stop⟶ top+gravitino (2-body), stop ⟶ b+W +gravitino (3-body) and stop ⟶ b+l+nu+gravitino (4-body). The calculation presented here are simplified thanks to the implementation of appropriate helicity methods, suited to deal with the massive case. We work within the conext of the Phenomenological version of the MSSM. Implications for collider physics and cosmology are also discussed at the end of this talk.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Prof. DIAZ-CRUZ, Lorenzo (FCFM and CIFFU, BUAP)

Presenter: Prof. DIAZ-CRUZ, Lorenzo (FCFM and CIFFU, BUAP)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **18** Type: **Talk (closed)**

A possible alternative mechanism to SUSY: conservative extensions of the Poincaré group

Thursday, 26 July 2018 18:00 (20 minutes)

Apart from the nonvanishing neutrino masses, state of the art experimental results in particle physics do not show direct evidence for Beyond Standard Model scenarios. This leaves us puzzled concerning the relation of the electromagnetic, weak, strong, and eventually of the gravitational interactions. On a theoretical basis, the local (extended) SUSY is considered to be a rather well-founded candidate for such unification mechanism, but it is still not seen experimentally. Therefore, a search for alternative mechanisms to SUSY is well motivated. In this contribution it is pointed out that even without the QFT context of the Coleman-Mandula theorem, already the group theoretical possibilities for nontrivial extensions of the Poincaré group are rather limited. These limited possibilities, however, do exist: these allow, in turn, for (extended) super-Poincaré group to exist. It shall be pointed out that also a less exotic alternative to (extended) super-Poincaré group is possible to construct. Namely, it is shown that there exists a unified group containing the usual Poincaré symmetries, the usual compact internal (gauge) symmetries, at the price of allowing in addition a normal subgroup of nilpotent internal (gauge) symmetries. The proposed mechanism uses a similar group theoretical backdoor to the Coleman-Mandula theorem as the (extended) super-Poincaré group does. It is, however, less exotic in the sense that it preserves also the vector bundle structure of fundamental fields over a four dimensional Lorentz signature spacetime manifold – i.e. it conserves a behavior so characteristic to gauge theories. Hence, we named these the conservative extensions of the Poincaré group. A theory having such symmetries can basically be considered as an ordinary gauge theory with some nilpotent internal symmetries besides the usual compact ones. However, the nilpotent symmetries make it possible to have a unified, i.e. non direct product structure for the group. Due to the normalness of the subgroup of nilpotent internal symmetries, introduction of new elementary particle species can eventually be avoided, while keeping the most important features of (extended) SUSY, and a maximal resemblance to an ordinary gauge theory can be maintained at the same time. These results were published in: JPhysA50(2017)115401.

Parallel Session

Alternatives to Supersymmetry

Primary author: LASZLO, Andras (Hungarian Academy of Sciences (HU))

Presenter: LASZLO, Andras (Hungarian Academy of Sciences (HU))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **19** Type: **not specified**

SUSY searches - strong production

Tuesday, 24 July 2018 09:00 (30 minutes)

Parallel Session

Primary author: WEBER, Hannsjorg (Fermi National Accelerator Lab. (US))

Presenter: WEBER, Hannsjorg (Fermi National Accelerator Lab. (US))

Session Classification: Plenary III

Contribution ID: **20** Type: **not specified**

SUSY searches - electroweak production

Tuesday, 24 July 2018 09:30 (30 minutes)

Parallel Session

Primary author: CAMACHO TORO, Reina Coromoto (Centre National de la Recherche Scientifique (FR))

Presenter: CAMACHO TORO, Reina Coromoto (Centre National de la Recherche Scientifique (FR))

Session Classification: Plenary III

Contribution ID: **21** Type: **not specified**

BSM Higgs searches

Tuesday, 24 July 2018 10:00 (30 minutes)

Parallel Session

Primary author: WOLF, Roger (KIT - Karlsruhe Institute of Technology (DE))

Presenter: WOLF, Roger (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Plenary III

Contribution ID: **22** Type: **not specified**

Status of low-scale supersymmetry

Tuesday, 24 July 2018 11:00 (30 minutes)

Parallel Session

Primary author: REECE, Matthew (Harvard University)

Presenter: REECE, Matthew (Harvard University)

Session Classification: Plenary IV

Contribution ID: **23** Type: **not specified**

New ideas in model building

Tuesday, 24 July 2018 11:30 (30 minutes)

Parallel Session

Primary author: DELGADO, Antonio (University of Notre Dame (US))

Presenter: DELGADO, Antonio (University of Notre Dame (US))

Session Classification: Plenary IV

Contribution ID: **24** Type: **not specified**

Weak Gravity Conjecture from Black Hole Entropy

Tuesday, 24 July 2018 12:00 (30 minutes)

Parallel Session

Primary author: CHEUNG, Clifford (California Institute of Technology (US))

Presenter: CHEUNG, Clifford (California Institute of Technology (US))

Session Classification: Plenary IV

Contribution ID: **25** Type: **not specified**

The ADS_4D/BPS_3D correspondence

Tuesday, 24 July 2018 12:30 (30 minutes)

Parallel Session

Primary author: TERNING, John (UC Davis)

Presenter: TERNING, John (UC Davis)

Session Classification: Plenary IV

Contribution ID: **26** Type: **not specified**

Exotic searches - prompt signatures

Wednesday, 25 July 2018 09:00 (30 minutes)

Parallel Session

Primary author: CID VIDAL, Xabier (Universidade de Santiago de Compostela)

Presenter: CID VIDAL, Xabier (Universidade de Santiago de Compostela)

Session Classification: Plenary V

Contribution ID: **27** Type: **not specified**

Exotic searches - long-lived signatures

Wednesday, 25 July 2018 09:30 (30 minutes)

Parallel Session

Primary author: JEANTY, Laura (University of California Berkeley (US))

Presenter: JEANTY, Laura (University of California Berkeley (US))

Session Classification: Plenary V

Contribution ID: **28** Type: **not specified**

New ideas in LHC phenomenology

Wednesday, 25 July 2018 10:00 (30 minutes)

Parallel Session

Primary author: SPANNOWSKY, Michael (University of Durham (GB))

Presenter: SPANNOWSKY, Michael (University of Durham (GB))

Session Classification: Plenary V

Contribution ID: **29** Type: **not specified**

BSM on flavor physics

Wednesday, 25 July 2018 11:00 (30 minutes)

Parallel Session

Primary author: NEUBERT, Matthias (Johannes Gutenberg Universitat Mainz)

Presenter: NEUBERT, Matthias (Johannes Gutenberg Universitat Mainz)

Session Classification: Plenary VI

Contribution ID: **30** Type: **not specified**

Quark flavour physics

Wednesday, 25 July 2018 11:30 (30 minutes)

Parallel Session

Primary author: REICHERT, Stefanie (Technische Universität Dortmund)

Presenter: REICHERT, Stefanie (Technische Universität Dortmund)

Session Classification: Plenary VI

Contribution ID: **31** Type: **not specified**

Neutrino physics results

Wednesday, 25 July 2018 12:30 (30 minutes)

Parallel Session

Primary author: MEZZETTO, Mauro (Universita e INFN, Padova (IT))

Presenter: MEZZETTO, Mauro (Universita e INFN, Padova (IT))

Session Classification: Plenary VI

Contribution ID: **32** Type: **not specified**

Lepton flavor experiment

Wednesday, 25 July 2018 12:00 (30 minutes)

Parallel Session

Primary author: RAY, Ron (Fermilab)

Presenter: RAY, Ron (Fermilab)

Session Classification: Plenary VI

Contribution ID: **33** Type: **Talk (closed)**

Loopholes in Z' searches: exploring supersymmetry and leptophobia

Thursday, 26 July 2018 15:30 (20 minutes)

Searches for GUT-inspired heavy gauge bosons Z' have been so far carried out by assuming that they can decay according to Standard Model modes, namely dilepton and dijet final states. I will discuss Z' phenomenology in a U(1) extension of the MSSM, where it can decay into sleptons, squarks and gauginos, leading to final states
with charged leptons and missing energy. In particular, I will explore scenatios where the Z' is leptophobic and therefore leptonic final states can arise only through supersymmetric cascades. Th exclusion limits on the Z' mass will be recast once accounting for supersymmetry and leptophobia.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: CORCELLA, Gennaro (INFN - LNF)

Presenter: CORCELLA, Gennaro (INFN - LNF)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **34** Type: **Talk (closed)**

The top-quark mass: uncertainties due to bottom fragmentation

Wednesday, 25 July 2018 15:10 (20 minutes)

The top quark mass is a fundamental parameter of the Standard Model, entering in the precision tests even before the Higgs discovery and playing a crucial role in any assumption on the stability of the electroweak vacuum. Therefore, determining it with the highest precision and having under control all sources of errors will be of paramount importance. I will investigate the uncertainties in the top mass extraction due to bottom-quark fragmentation in top decays, in the context of both Monte Carlo generators and resummed calculations. In particular, I will discuss the interpretation of the measured mass as a pole mass and the sources of both perturbative and non-perturbative uncertainties.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: CORCELLA, Gennaro (INFN - LNF)

Presenter: CORCELLA, Gennaro (INFN - LNF)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **37** Type: **Talk (closed)**

Next-to-minimal dark matter at colliders

Thursday, 26 July 2018 17:00 (20 minutes)

We present an economical model of WIMP dark matter in which the dark sector consists of the dark matter candidate, a fermionic singlet, and its coannhihilation partner, a fermionic SU(2) n-plet with n>=3. The dark sector is coupled to the SM Higgs boson via non-renormalizable interactions. We map the viable parameter space of this model, taking into accounts constraints from direct detection and collider experiments. In particular, the near-degeneracy between the n-plet-like states naturally leads to long-lived particles and hence to interesting signatures at the LHC.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: BRUEMMER, Felix (Université de Montpellier)

Co-authors: BHARUCHA, Aoife (CNRS); DESAI, Nishita (LUPM, Montpellier)

Presenter: BRUEMMER, Felix (Université de Montpellier)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **38** Type: **Talk (closed)**

Higgs binoculars for dark matter searches

Thursday, 26 July 2018 17:40 (20 minutes)

We study novel collider signatures including the Higgs boson and dark matter. These signatures arise naturally in well-motivated models, where dark matter interacts with the Standard Model primarily via the Higgs boson.
We explore concrete examples with fermion or scalar dark matter vis-a-vis our proposed search and the existing dark sector studies at the LHC. We also comment on the implications for future colliders.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: WESTHOFF, Susanne (Heidelberg University); ZURITA, José Francisco (KIT); BLANKE, Monika; THOMPSON, Jennifer (ITP Heidelberg); KAST, Simon (Karlsruhe Institute for Technology)

Presenter: KAST, Simon (Karlsruhe Institute for Technology)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **39** Type: **Talk (closed)**

Collinear Superspace

Thursday, 26 July 2018 15:10 (20 minutes)

I will introduce a new set of effective field theory rules for constructing Lagrangians with $\mathcal{N} = 1$ supersymmetry in collinear superspace. In the standard superspace treatment, supersymmetry preservation is manifest at the Lagrangian level in part by the inclusion of auxiliary term components. By contrast, collinear superspace depends on a smaller set of coordinates and directly yields a formulation of supersymmetry on the light-cone that depends exclusively on propagating degrees of freedom, at the expense of obscuring Lorentz invariance and introducing apparent nonlocality. While there exist superspace formulations of theories involving only on-shell physical degrees of freedom, these constructions are typically discovered starting with an on-shell component Lagrangian, and guessing the superspace formulation that reproduces the component level result. In contrast the new formalism I will introduce represents a way to derive on-shell superspace Lagrangians directly from the symmetries of the theory. After establishing the general framework, I will construct collinear superspace Lagrangians for chiral matter, non-Abelian gauge fields, and their interactions. An important ingredient is a superfield representation that is simultaneously chiral, anti-chiral, and real; this novel object encodes residual gauge transformations on the light cone. This work paves the way for constructing theories with $\mathcal{N} > 1$ supersymmetry directly from low-energy considerations.

Parallel Session

Formal Field Theory and Strings

Primary authors: ELOR, Gilly (Massachusetts Institute of Technology (US)); THALER, Jesse (MIT); COHEN, Timothy (University of Michigan); LARKOSKI, Andrew (Reed Collge)

Presenter: ELOR, Gilly (Massachusetts Institute of Technology (US))

Session Classification: Formal Field Theory and Strings

Contribution ID: **40** Type: **not specified**

Observational cosmology

Thursday, 26 July 2018 09:00 (30 minutes)

Parallel Session

Primary author: FRIEMAN, Josh (Fermilab)

Presenter: FRIEMAN, Josh (Fermilab)

Session Classification: Plenary VII

Contribution ID: **41** Type: **not specified**

Cosmological results from Planck

Thursday, 26 July 2018 09:30 (30 minutes)

Parallel Session

Primary author: NATOLI, Paolo (University of Ferrara and INFN)

Presenter: NATOLI, Paolo (University of Ferrara and INFN)

Session Classification: Plenary VII

Contribution ID: **42** Type: **not specified**

Primordial black holes

Thursday, 26 July 2018 10:00 (30 minutes)

Parallel Session

Primary author: CARR, Bernard (Queen Mary Univ. London, UK)

Presenter: CARR, Bernard (Queen Mary Univ. London, UK)

Session Classification: Plenary VII

Contribution ID: **43** Type: **not specified**

Direct dark matter searches

Thursday, 26 July 2018 11:00 (30 minutes)

Parallel Session

Primary author: BAUDIS, Laura (University of Zurich)

Presenter: BAUDIS, Laura (University of Zurich)

Session Classification: Plenary VIII

Contribution ID: **44** Type: **not specified**

Indirect dark matter searches

Thursday, 26 July 2018 11:30 (30 minutes)

Parallel Session

Primary author: FORNENGO, Nicolao (University of Torino and INFN)

Presenter: FORNENGO, Nicolao (University of Torino and INFN)

Session Classification: Plenary VIII

Contribution ID: **45** Type: **not specified**

Ultralight scalars as dark matter

Thursday, 26 July 2018 12:00 (30 minutes)

Parallel Session

Primary author: HUI, Lam (Columbia University, USA)

Presenter: HUI, Lam (Columbia University, USA)

Session Classification: Plenary VIII

Contribution ID: **46** Type: **not specified**

Axion searches

Thursday, 26 July 2018 12:30 (30 minutes)

Parallel Session

Primary author: MAJOROVITS, Bela (MPI for Physics)

Presenter: MAJOROVITS, Bela (MPI for Physics)

Session Classification: Plenary VIII

Contribution ID: **47** Type: **not specified**

Gravitational waves results

Friday, 27 July 2018 09:30 (30 minutes)

Parallel Session

Primary author: SORAZU, Borja (University of Glasgow, UK)

Presenter: SORAZU, Borja (University of Glasgow, UK)

Session Classification: Plenary IX

Contribution ID: **48** Type: **not specified**

Gravitational waves & cosmological phase transitions

Parallel Session

Primary author: HINDMARSH, Mark (University of Sussex (UK))

Presenter: HINDMARSH, Mark (University of Sussex (UK))

Session Classification: Plenary IX

Contribution ID: **49** Type: **not specified**

New ideas in inflation

Friday, 27 July 2018 10:00 (30 minutes)

Parallel Session

Primary author: BAUMANN, Daniel (University of Amsterdam (NL))

Presenter: BAUMANN, Daniel (University of Amsterdam (NL))

Session Classification: Plenary IX

Contribution ID: **50** Type: **not specified**

The first stars, high-redshift 21-cm absorption, and dark matter

Friday, 27 July 2018 11:00 (30 minutes)

Parallel Session

Primary author: MIRALDA, Jordi (ICCUB, Spain)

Presenter: MIRALDA, Jordi (ICCUB, Spain)

Session Classification: Plenary X

Contribution ID: **51** Type: **not specified**

The S-matrix bootstrap revisited

Friday, 27 July 2018 11:30 (30 minutes)

Parallel Session

Primary author: PENEDONES, Joao (EPFL, Switzerland)

Presenter: PENEDONES, Joao (EPFL, Switzerland)

Session Classification: Plenary X

Contribution ID: **52** Type: **not specified**

New results in amplitudology

Friday, 27 July 2018 12:00 (30 minutes)

Parallel Session

Primary author: KOSOWER, David (Institut de Physique Theorique at Saclay (FR))

Presenter: KOSOWER, David (Institut de Physique Theorique at Saclay (FR))

Session Classification: Plenary X

Contribution ID: **54** Type: **not specified**

Prospects at future colliders

Friday, 27 July 2018 12:30 (30 minutes)

Parallel Session

Primary author: ELLIS, Jonathan R. (University of London (GB))

Presenter: ELLIS, Jonathan R. (University of London (GB))

Session Classification: Plenary X

Contribution ID: **55** Type: **not specified**

Outlook: Is SUSY enough?

Friday, 27 July 2018 14:30 (30 minutes)

Parallel Session

Primary author: IBAÑEZ, Luis (Universidad Autonoma de Madrid (ES))

Presenter: IBAÑEZ, Luis (Universidad Autonoma de Madrid (ES))

Session Classification: Closing

Contribution ID: **56** Type: **not specified**

SUSY2019

Friday, 27 July 2018 15:00 (15 minutes)

Parallel Session

Primary author: SZCZERBINSKA, Barbara (Texas A&M University Corpus Christi (US))

Presenter: SZCZERBINSKA, Barbara (Texas A&M University Corpus Christi (US))

Session Classification: Closing

Contribution ID: **57** Type: **Talk (closed)**

Same-sign trilepton signal for a stop in presence of sneutrino LSP

Wednesday, 25 July 2018 14:50 (20 minutes)

We have explored a minimal supersymmetric Standard Model scenario extended by one pair of gauge singlets per generation, where light neutrino masses and mixing are generated via inverse seesaw mechanism. In such a scenario, a right-handed sneutrino can be the lightest supersymmetric particle and a cold Dark Matter (DM) candidate. We have studied the constraints on such a scenario arising from non-observation lepton flavor violating (LFV) decays and DM data. We have observed that if the Dirac neutrino Yukawa coupling matrix is used to fit the neutrino oscillation data by Casas-Ibarra parametrisation, the resulting off-diagonal matrix is highly constrained from the LFV data. The resultant Yukawa parameter(s), also responsible for the sneutrino DM couplings, produces a very small direct detection cross-section lying orders of magnitude below the present XENON limit. However, the smallness of the Yukawa parameters also requires the sneutrino DM to co-annihilate with other sparticle(s) in order to satisfy DM relic density constraints. We have studied sneutrino co-annihilation with wino and observed that this sneutrino-wino compressed parameter space gives rise to a novel same-sign trilepton signal for the stop quark in this scenario.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Dr MONDAL, Subhadeep (University of Helsinki)

Co-authors: Prof. GHOSH, DILIP KUMAR (INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE); Dr MITRA, Manimala (Institute of Physics (IOP)); Prof. HUITU, Katri (University of Helsinki)

Presenter: Dr MONDAL, Subhadeep (University of Helsinki)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **58** Type: **Talk (closed)**

J-factors for Velocity-Dependent Dark Matter Annihilation

Tuesday, 24 July 2018 17:20 (20 minutes)

If dark matter annihilation is velocity dependent, then the J-factors associated with any astrophysical target depend on the full dark matter phase space distribution. We calculate these velocity-dependent J-factors for a variety of targets and a variety of choices for the velocity-dependence of DM annihilation. Significantly, we find that the choice of velocity-dependence affects the relative importance of different dwarf spheroidal galaxies for dark matter searches, relative to each other and to the Galactic Center, and can affect the morphology of any signal from the Galactic Center.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Prof. KUMAR, Jason (University of Hawaii)

Presenter: Prof. KUMAR, Jason (University of Hawaii)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **59** Type: **Talk (closed)**

Bileptons at LHC

Wednesday, 25 July 2018 17:00 (20 minutes)

I discuss the production of bileptons at LHC, as predicted in the
so-called 3-3-1 model, yielding final states with two same-sign lepton pairs.
I will show that this signal can be easily separated from the SM backgrounds
and investigate the comparison between scalar (Higgs-like) and vector bileptons, as they are both present in the 3-3-1 scenario.

Parallel Session

Alternatives to Supersymmetry

Primary author: CORCELLA, Gennaro (INFN - LNF)

Presenter: CORCELLA, Gennaro (INFN - LNF)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **60** Type: **Talk (closed)**

Results of vector boson scattering from ATLAS and CMS

Tuesday, 24 July 2018 16:10 (20 minutes)

The production of massive vector boson pairs is a key process for the understanding of the non-abelian gauge structure of the standard model and for the comprehension of the electroweak symmetry breaking mechanism. The study of the production of vector boson pairs with the presence of two jets in the event allows to measure the electroweak production of vector bosons in association with jets, in particular made up through vector boson scattering (VBS) processes. In this presentation, we will report the recent results of the production of diboson in association with two jets at \sqrt{s} = 8 and 13 TeV. The constraints on anomalous quartic couplings will be presented as well.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: JANSSEN, Xavier (University of Antwerp (BE))

Presenter: JANSSEN, Xavier (University of Antwerp (BE))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **61** Type: **Talk (closed)**

Multiboson production and searches for anomalous gauge boson couplings in ATLAS and CMS

Tuesday, 24 July 2018 15:50 (20 minutes)

Precision measurements of multi-boson production is a validation of the Standard Model. These multi-boson processes are a background to Higgs measurements and searches for Beyond the Standard Model physics. In this talk, we present the recent measurements of multiboson final states performed in CMS, involving W, Z and photon combinations. Inclusive and differential cross sections are compared to different theoretical predictions. Phase space regions that provide sensitivity to anomalous triple or quartic gauge couplings are also investigated. These coupling strengths are directly related to the broken electroweak symmetry and deviations from the SM are a clear signal of new physics.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: ERICE CID, Carlos Francisco (Universidad de Oviedo (ES))

Presenter: ERICE CID, Carlos Francisco (Universidad de Oviedo (ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **62** Type: **Talk (closed)**

Searches for supersymmetry in final states with τ leptons with CMS

Tuesday, 24 July 2018 16:10 (20 minutes)

Searches for the supersymmetric particles in events with one or more hadronically decaying tau leptons are presented. The results focus on the stau pair production, and in addition address scenarios with electroweakly produced SUSY particles leading to final states with multiple tau leptons. The results are based on proton-proton collisions recorded at sqrt(s) = 13 TeV with the CMS detector.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: KALOGEROPOULOS, Alexis (Princeton University)

Presenter: KALOGEROPOULOS, Alexis (Princeton University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **63** Type: **Talk (closed)**

Searches for dark matter in non-hadronic final states at CMS

Thursday, 26 July 2018 14:50 (20 minutes)

Searches in CMS for dark matter in final states with invisible particles recoiling against leptons and photons are presented. Various topologies are explored, covering several specific dark-matter production modes. The talk focuses on the recent results obtained using data collected at Run-II of the LHC.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: GHOSH, Shamik (Saha Institute of Nuclear Physics (IN))

Presenter: GHOSH, Shamik (Saha Institute of Nuclear Physics (IN))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **64** Type: **Talk (closed)**

Searches for 3rd generation squarks with CMS

Monday, 23 July 2018 16:40 (20 minutes)

The accumulation of 36fb-1 of data at 13 TeV has been a unique window for supersymmetry searches at the LHC, allowing the CMS collaboration to search for specific supersymmetric particles. This talk covers searches of supersymmetric particles of 3rd generation squarks, which might be the only sparticles produced at the LHC, other sparticles being too heavy. It will highlight "compressed scenarios", which are preferred by cosmological observations, and where the small mass difference between the searched sparticle and the lightest supersymmetric particle limits the available phase-space, rendering these promising searches challenging. State-of-the-art approaches such as multivariate tools will be presented, not only for the selection of the signal but also for the prediction of the background.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: BARGASSA, Pedrame (LIP Laboratorio de Instrumentacao e Fisica Experimental de Part)

Presenter: BARGASSA, Pedrame (LIP Laboratorio de Instrumentacao e Fisica Experimental de Part)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **65** Type: **Talk (closed)**

Searches for strong production of SUSY in fully-hadronic final states with CMS

Monday, 23 July 2018 15:20 (20 minutes)

Searches for the pair-production of colored supersymmetric particles in events without isolated leptons are presented. The results cover different scenarios of gluino and squark production. The interpretation includes models of split supersymmetry that predict long-lived gluinos. The results are based on proton-proton collisions recorded at sqrt(s) = 13 TeV with the CMS detector.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SCHOENENBERGER, Myriam (ETH Zurich (CH))

Presenter: SCHOENENBERGER, Myriam (ETH Zurich (CH))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **66** Type: **Talk (closed)**

Search for strong production of supersymmetry in final states with one or more leptons with CMS

Monday, 23 July 2018 16:00 (20 minutes)

Searches for the pair-production of colored supersymmetric particles in events with one or more isolated leptons are presented. The results cover different scenarios of gluino and squark production. The leptons can originate from the decays of vector bosons or supersymmetric lepton partners produced in the decay chain. The results are based on proton-proton collisions recorded at sqrt(s) = 13 TeV with the CMS detector.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: MELZER-PELLMANN, Isabell (Deutsches Elektronen-Synchrotron (DE))

Presenter: MELZER-PELLMANN, Isabell (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **67** Type: **Talk (closed)**

Searches for chargino, neutralino and slepton production with CMS

Tuesday, 24 July 2018 15:30 (20 minutes)

Searches for the production of supersymmetric partners of electroweak gauge and Higgs bosons are presented. The focus of the talk will be on SUSY models with compressed mass spectra, as they are expected if the lightest of these states are dominantly partners of the Higgs bosons. The talk will also cover searches for the direct production of supersymmetric partners of electrons and muons. The results are based on data taken in proton-proton collisions at a centre-of-mass energy of 13 TeV with the CMS detector.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SCHNEIDER, Basil (Fermi National Accelerator Lab. (US))

Presenter: SCHNEIDER, Basil (Fermi National Accelerator Lab. (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **68** Type: **Talk (closed)**

Searches for supersymmetry in final states with photons with CMS

Tuesday, 24 July 2018 17:40 (20 minutes)

Events with isolated photons in the final state can be used in multiple ways to search for supersymmetry. Depending on the composition of the lightest neutralino state, decays to a photon and the gravitino can be a dominant signature for models with gauge-mediated supersymmetry breaking. Photons are also a tool for the identification of Higgs bosons in the decay chains of supersymmetric particles. Results are reported based on proton-proton collisions recorded at sqrt(s) = 13 TeV with the CMS experiment.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SCHULZ, Johannes (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: SCHULZ, Johannes (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **69** Type: **Talk (closed)**

Searches for R-parity violating supersymmetry with CMS

Wednesday, 25 July 2018 15:50 (20 minutes)

Searches for R-parity conserving supersymmetry have set stringent limits on sparticle masses. In R-parity violating (RPV) models the characteristic missing transverse momentum signature is absent and these constraints do not apply. Specific searches are designed to detect production and decay of supersymmetric particles via RPV couplings. Results are presented based on data recorded by the CMS experiment in proton-proton collisions at sqrt(s) = 13 TeV.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: GOMEZ ESPINOSA, Alejandro (ETH Zurich (CH))

Presenter: GOMEZ ESPINOSA, Alejandro (ETH Zurich (CH))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **70** Type: **Talk (closed)**

Searches for supersymmetry in events with heavy boosted objects with CMS

Monday, 23 July 2018 17:50 (20 minutes)

Searches for supersymmetry at the LHC have pushed the mass limits for strongly-produced sparticles to the TeV level. At this scale, even heavy decay products such as vector or Higgs bosons can be produced at high transverse momenta and make the reconstruction and identification of boosted objects to an essential tool for current and future searches for supersymmetry. The talk summaries the use of large-radius jets and substructure techniques in CMS searches such as the ones for the pair production of gluinos or third generation squarks in proton-proton collisions at 13 TeV.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: PASTIKA, Nathaniel Joseph (Baylor University (US))

Presenter: PASTIKA, Nathaniel Joseph (Baylor University (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **71** Type: **Talk (closed)**

Searches with non-standard signatures with CMS

Thursday, 26 July 2018 15:10 (20 minutes)

The CMS detector explores a wide range of non-standard signatures including displaced and delayed particles, which allow to explore various beyond standard models and set limits of different exotic particles. Results based on data recorded in proton-proton collisions at sqrt(s) = 13 TeV will be reviewed.

Parallel Session

Alternatives to Supersymmetry

Primary author: SOFFI, Livia (Cornell University (US))

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

Session Classification: Alternatives to Supersymmetry

Contribution ID: **73** Type: **Talk (closed)**

Dark matter from electroweak top-quark production

Tuesday, 24 July 2018 15:10 (20 minutes)

Assume that dark matter couples mostly to the top-quark. This hypothesis is well motivated in models with scalar mediators, where flavor-hierarchical couplings to quarks prevent large flavor-changing neutral currents. In this talk, we discuss searches for dark matter produced in association with top-quarks at the LHC. We propose single-top-associated production as a new search channel for dark matter. Being complementary to exisiting searches with top pairs, the new single-top channel enhances the discovery potential for dark matter in future LHC analyses.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: BISHARA, Fady (University of Oxford); HAISCH, Ulrich Andreas; WESTHOFF, Susanne (Heidelberg University)

Presenter: WESTHOFF, Susanne (Heidelberg University)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **75** Type: **Talk (closed)**

ttH production measurements at CMS

Wednesday, 25 July 2018 15:30 (20 minutes)

We present the measurements of production of the standard model Higgs boson in association with a pair of top quarks. Several Higgs decays are considered and combined together. This search is performed on the full 13-TeV dataset of proton-proton collisions collected by the CMS experiment at the LHC in 2016.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: Dr VISCHIA, Pietro (Universidad de Oviedo (ES))

Presenter: Dr VISCHIA, Pietro (Universidad de Oviedo (ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **76** Type: **Talk (closed)**

Axions from Strings

Wednesday, 25 July 2018 14:30 (20 minutes)

The axion solution to the strong CP problem also provides a natural dark matter candidate. If the PQ symmetry has ever been restored after inflation, topological defects of the axion field would have formed and produced relic axions, whose abundance is in principle calculable. Using numerical simulations I will present a detailed study of the evolution of axion strings and the resulting spectrum of axion produced. The features found are important for a correct estimate of the total DM abundance.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: GORGHETTO, Marco (SISSA); HARDY, Edward (Liverpool U.); VILLADORO, Giovanni (Abdus Salam Int. Cent. Theor. Phys. (IT))

Presenter: GORGHETTO, Marco (SISSA)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **77** Type: **Talk (closed)**

Searches for Vector-like Leptons in CMS

Wednesday, 25 July 2018 18:00 (20 minutes)

We present the result of the search for vector-like leptons in multilepton final states using proton-proton collision data collected with the CMS detector at 13 TeV. Events are primarily categorized into either two light leptons (electron or muon) plus a hadronic tau or three and more light leptons. The scalar sum of transverse momenta of leptons and the missing transverse energy are used to discriminate the signal model against standard model backgrounds.

Parallel Session

Alternatives to Supersymmetry

Primary author: HEINDL, Maximilian Dieter (Rutgers State Univ. of New Jersey (US))

Presenter: HEINDL, Maximilian Dieter (Rutgers State Univ. of New Jersey (US))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **78** Type: **Talk (closed)**

Higgs Cascade Decays and the LHC

Tuesday, 24 July 2018 17:20 (20 minutes)

In models with Higgs sectors larger than 2 Higgs doublets, as for example found in the Next-to-Minimal Supersymmetric Standard Model (NMSSM), decays of heavy Higgs bosons into pairs of lighter Higgs bosons or a Z boson and a light Higgs (so-called Higgs cascade decays) can have large branching ratios. The presence of the 125 GeV SM-like mode suppresses the couplings of additional heavy Higgs bosons to pairs of SM-like Higgs bosons or a Z boson and a SM-like Higgs. Thus, Higgs cascade decays will typically produce a Z boson or a SM-like Higgs and an additional non-SM like Higgs.
I will discuss the reach of the LHC for different final states arising from the Higgs cascades and demonstrate that they can be used to effectively probe models with a corresponding Higgs sector, e.g. the NMSSM, at the LHC. In particular, such searches remain effective even in the low $\tan\beta$, large m_A regime typically not accessible at the LHC because of the dominance of Higgs decays into pairs of top quarks and the interference with the QCD background.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: BAUM, Sebastian (Stockholm University and Oskar Klein Centre)

Co-authors: Dr SHAH, Nausheen (Wayne State University); SHAKYA, Bibhushan (MCTP); FREESE, Katherine (University of Michigan)

Presenter: BAUM, Sebastian (Stockholm University and Oskar Klein Centre)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **79** Type: **Talk (closed)**

Bottom-quark Fusion Processes at the LHC for Probing Z′ Models and B-meson Decay Anomalies

Thursday, 26 July 2018 15:50 (20 minutes)

Anomalies in B-meson decays reported by the LHCb experiment could be explained by introducing a heavy neutral gauge boson Z' that dominantly couples to third generation quarks and second generation leptons. While the sensitivities of inclusive searches for such models are strong in heavy Z' regions (>500 GeV), the low-mass region sensitivity is degraded by large SM background (mostly Drell-Yan process).
A Z' boson production, decaying to two muons, through bottom-quark fusion processes is studied. We assume an associated production with jets, at least one of them bottom-tagged. This complementary search is shown to improve sensitivities for low Z' mass regions beyond the inclusive analyses.

Reference: https://arxiv.org/abs/1707.07016, to appear in PRD

Parallel Session

Alternatives to Supersymmetry

Primary author: KAMON, Teruki (Texas A & M University (US))

Co-author: DUTTA, Bhaskar (Texas A&M University)

Presenter: KAMON, Teruki (Texas A & M University (US))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **80** Type: **Talk (closed)**

Measurements of $R(D^{(*)}$ and other missing energy decays modes at Belle II.

Monday, 23 July 2018 15:40 (20 minutes)

The Belle II experiment is a substantial upgrade of the Belle detector and will operate at the SuperKEKB energy-asymmetric e^+e^- collider. The accelerator has already successfully completed the first phase of commissioning in 2016 and first electron positron collisions in Belle II are expected for April 2018. The design luminosity of SuperKEKB is 8×10^{35} cm^{-2}s^{-1} and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than the Belle experiment. With this amount of data, decays sensitive to physics beyond the Standard Model can be studied with unprecedented precision. In this talk we will present our prospects for studying lepton flavor non-universality with the modes $B \to D^{(*)}\tau\nu$. Prospects for other missing energy modes sensitive to physics beyond the Standard Model such as $B^+ \to \tau^+\nu$ and $B \to K^{(*)}\nu\bar{\nu}$ will also be covered

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: PERUZZI, Ida (Laboratori Nazionali di Frascati dell'INFN); DE NARDO, Guglielmo (Universita e sezione INFN di Napoli (IT))

Presenter: DE NARDO, Guglielmo (Universita e sezione INFN di Napoli (IT))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **81** Type: **Talk (closed)**

Dark Sector searches with Belle II

Tuesday, 24 July 2018 15:30 (20 minutes)

The Belle II experiment is a substantial upgrade of the Belle detector and will operate at the SuperKEKB energy-asymmetric e^+e^- collider. The accelerator has already successfully completed the first phase of commissioning in 2016 and first electron positron collisions in Belle II are expected for April 2018. The design luminosity of SuperKEKB is 8×10^{35} cm^{-2}s^{-1} and the Belle II experiment aims to record 50 ab^{-1} of data, a factor of 50 more than the Belle experiment. This data set offers the possibility to search for a large variety of dark sector particles in the GeV mass range complementary to LHC and dedicated low energy experiments. These searches will profit both from the size of the Belle II data, and from specifically designed triggers for the early running of Belle II. This talk will review planned dark sector searches with a focus on the discovery potential of the first data

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: PERUZZI, Ida (Laboratori Nazionali di Frascati dell'INFN); GRAZIANI, Enrico (INFN - Sezione Roma III)

Presenter: GRAZIANI, Enrico (INFN - Sezione Roma III)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **82** Type: **Talk (closed)**

Quasifixed points from scalar sequestering and the little hierarchy problem in supersymmetry

Monday, 23 July 2018 16:40 (20 minutes)

In supersymmetric models with scalar sequestering, superconformal strong dynamics in the hidden sector suppresses the low-energy couplings of mass dimension two, compared to the squares of the dimension one parameters. Taking into account restrictions on the anomalous dimensions in superconformal theories, I point out that the interplay between the hidden and visible sector renormalizations gives rise to quasi-fixed point running for the supersymmetric Standard Model squared mass parameters, rather than driving them to 0. The extent to which this dynamics can ameliorate the little hierarchy problem in supersymmetry is studied. Models of this type in which the gaugino masses do not unify are arguably more natural, and are certainly more likely to be accessible, eventually, to the Large Hadron Collider.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: MARTIN, Stephen (Northern Illinois University)

Presenter: MARTIN, Stephen (Northern Illinois University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **83** Type: **Talk (closed)**

A supersymmetric model with uncolored scalar top partners

Monday, 23 July 2018 17:30 (20 minutes)

We present a four-dimensional model where the Higgs mass is protected from the quadratic one-loop top quark corrections by scalar particles that do not carry standard model (SM) color charges. They can even be complete SM singlets. The cancellation of the quadratic divergence is ensured by a Z_3 symmetry that relates the SM top sector and two hidden top sectors, each charged under its own hidden color group. In addition to the scalar top partners, there are additional supermultiplets in the hidden color sectors below the TeV scale, which can carry SM electroweak quantum numbers. There a variety of possible collider signals of this model, which are governed by the hidden color bound states.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Prof. CHENG, Hsin-Chia (University of California, Davis)

Presenter: Prof. CHENG, Hsin-Chia (University of California, Davis)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **84** Type: **Talk (closed)**

Superconformal Subcritical Hybrid Inflation

Thursday, 26 July 2018 17:40 (20 minutes)

We consider D-term hybrid inflation in the framework of superconformal supergravity. In part of the parameter space, inflation continues for subcritical inflaton field value. Consequently, a new type of inflation emerges, which gives predictions for the scalar spectral index and the tensor-to-scalar ratio that are consistent with the Planck 2015 results. The potential in the subcritical regime is found to have a similar structure to one in the simplest class of superconformal α attractors.

Parallel Session

Cosmology and Gravitational Waves

Primary author: Dr ISHIWATA, Koji (Kanazawa University)

Presenter: Dr ISHIWATA, Koji (Kanazawa University)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **85** Type: **Talk (closed)**

Future DUNE constraints on EFT

Tuesday, 24 July 2018 14:30 (20 minutes)

In the near future, fundamental interactions at high-energy scales may be most efficiently studied via precision measurements at low energies. In this talk I will discuss the possible impact of the DUNE neutrino experiment on constraining the Standard Model Effective Field Theory. The unprecedented neutrino flux offers an opportunity to greatly improve the current limits via precision measurements of the trident production and neutrino scattering off electrons and nuclei in the DUNE near detector. I will quantify the DUNE sensitivity to dimension-6 operators in the SMEFT Lagrangian and I will compare the DUNE reach to that of future experiments involving atomic parity violation and polarization asymmetry in electron scattering, which are sensitive to an overlapping set of SMEFT parameters.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: Dr GRILLI DI CORTONA, Giovanni (University of Sao Paulo)

Co-authors: FALKOWSKY, Adam; TABRIZI, Zahra

Presenter: Dr GRILLI DI CORTONA, Giovanni (University of Sao Paulo)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **86** Type: **Talk (closed)**

Collider phenomenology of Hidden Valley mediators of spin 0 or 1/2 with semivisible jets

Thursday, 26 July 2018 16:10 (20 minutes)

I will provide a general overview of the collider phenomenology of spin 0 or 1/2 mediators with non-trivial gauge numbers under both the Standard Model and a single new confining group. Due to the possibility of many unconventional signatures, the focus is on direct production with semivisible jets. For the mediators to be able to decay, a global U(1) symmetry must be broken. This is best done by introducing a set of operators explicitly violating this symmetry. We find that there is only a finite number of such renormalizable operators and that the phenomenology can be classified into five distinct categories. We show that large regions of the parameter space are already excluded, while others are unconstrained by current search strategies. We also discuss how searches could be modified to better probe these unconstrained regions by exploiting special properties of semivisible jets.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: GRILLI DI CORTONA, Giovanni (Sao Paulo University)

Co-authors: BEAUCHESNE, Hugues (Sao Paulo University); BERTUZZO, Enrico (Sao Paulo University); TABRIZI, Zahra (Sao Paulo University)

Presenter: GRILLI DI CORTONA, Giovanni (Sao Paulo University)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **87** Type: **Talk (closed)**

Quark jet rates and quark gluon discrimination in multi-jet final states

Monday, 23 July 2018 17:55 (25 minutes)

We calculate quark and gluon jet fraction in multi-jet final states at the LHC, which is based on perturbative QCD at next-to-double logarithmic accuracy. We find a measurable scaling pattern of the fraction. This is related to a performance of new physics searches using quark-gluon jet discrimination in multi-jet final states, and would be useful for more understanding of QCD and tuning of Monte-Carlo generators. We also introduce a variable related to jet flavors in multi-jet final states, and propose a data-driven method using the variable to improve the performance of BSM searches and to reduce systematic uncertainties of the analysis. We show how the background rejection increase for signals which produce many quark jets.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SAKAKI, Yasuhito (KAIST)

Presenter: SAKAKI, Yasuhito (KAIST)

Session Classification: Precision Calculations and MC tools

Contribution ID: **88** Type: **Talk (closed)**

A universally enhanced light-quarks Yukawa couplings paradigm

Wednesday, 25 July 2018 17:40 (20 minutes)

We propose that natural TeV-scale new physics (NP) with $O(1)$ couplings to the standard model (SM) quarks may lead to a universal enhancement of the Yukawa couplings of all the light quarks, perhaps to a size comparable to that of the SM b-quark Yukawa coupling, i.e., $y_q\ O(y_b^{SM})$ for $q = u, d, c, s$. I will discuss this scenario in an effective field theory (EFT) extension of the SM, and show that the potential EFT contribution to the light quarks Yukawa couplings is $y_q\ O\left(f\frac{v^2}{\Lambda^2}\right)$, where Λ is the typical scale of the underlying heavy NP and f depends on its properties and details. For example, with Λ 1.5 TeV and natural NP couplings $f\ O(1)$, one obtains $y_q\ 0.025\ y_b^{SM}$. I will also discuss this enhanced light quarks Yukawa paradigm in extensions of the SM which contain TeV-scale vector-like quarks (VLQ) and match them to the EFT description. The flavor structure and the constraints on this scenario will also be explored as well as the resulting "smoking gun" signals that should be searched for at the LHC, e.g., multi-Higgs production $pp \to hh,\ hhh$ and single Higgs production in association with a high p_T jet or photon and with a single top-quark, i.e., $pp \to hj,\ h$ and $pp \to ht$.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: Dr BAR-SHALOM, Shaouly (Technion, Israel); Dr SONI, Amarjit (BNL, USA)

Presenter: Dr BAR-SHALOM, Shaouly (Technion, Israel)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **89** Type: **Talk (closed)**

Dissecting Multi-Photon Resonances at the Large Hadron Collider

Wednesday, 25 July 2018 18:20 (20 minutes)

We examine the phenomenology of the production, at the 13 TeV Large Hadron Collider (LHC), of a heavy resonance X, which decays via other new on-shell particles n into multi- (i.e.\ three or more) photon final states. In the limit that n has a much smaller mass than X, the multi-photon final state may dominantly appear as a two-photon final state because the γs from the n decay are highly collinear and remain unresolved. We discuss how to discriminate this scenario from $X \to \gamma\gamma$: rather than discarding non-isolated photons, it is better instead to relax the isolation criterion and instead form photon jet substructure variables. The spins of X and n leave their imprint upon the distribution of pseudorapidity gap $\Delta\eta$ between the apparent two-photon states. Depending on the total integrated luminosity, this can be used in many cases to claim discrimination between the possible spin choices of X and n, although the case where X and n are both scalar particles cannot be discriminated from the direct $X \to \gamma\gamma$ decay in this manner. Information on the mass of n can be gained by considering the mass of each photon jet.

Parallel Session

Alternatives to Supersymmetry

Primary author: Dr IYER, Abhishek (INFN)

Co-authors: Prof. ALLANACH, Benjamin (University of Cambridge (GB)); BHATIA, Disha (TIFR)

Presenter: Dr IYER, Abhishek (INFN)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **90** Type: **Talk (closed)**

Stop annihilation into heavy quarks in DM@NLO

Tuesday, 24 July 2018 18:20 (20 minutes)

In the MSSM, light scalar top quarks are well motivated and often contribute significantly to the neutralino dark matter relic density. We present a new precision calculation of stop annihilation into heavy quarks at next-to-leading order of SUSY-QCD and with Coulomb resummation effects and discuss the size and uncertainty of these corrections with respect to the experimental measurement of the relic density.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: SCHMIEMANN, Saskia (Westfaelische Wilhelms-Universitaet Muenster (D))

Co-authors: KLASEN, Michael; Dr HARZ, Julia (ILP / LPTHE Paris); KOVARIK, Karol; Dr HERRMANN, Bjorn (Unite Reseaux du CNRS (FR))

Presenter: SCHMIEMANN, Saskia (Westfaelische Wilhelms-Universitaet Muenster (D))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **91** Type: **Talk (closed)**

Resonance enhancement of dark matter interactions: the case for early kinetic decoupling and velocity dependent resonance width

Wednesday, 25 July 2018 17:20 (20 minutes)

Motivated by the possibility of enhancing dark matter (DM) self-scattering cross-section σ self , we have revisited the issue of DM annihilation through a Breit-Wigner resonance. In this case thermally averaged annihilation cross-section has strong temperature dependence, whereas elastic scattering of DM on the thermal bath particles is suppressed. This leads to the early kinetic decoupling of DM and an interesting interplay in the evolution of DM density and temperature that can be described by a set of coupled Boltzmann equations. The standard Breit-Wigner parametrization of a resonance propagator is also corrected by including momentum dependence of the resonance width. It has been shown that this effects may change predictions of DM relic density by more than order of magnitude in some regions of the parameter space. Model independent discussion is illustrated within a theory of Abelian vector dark matter. The model assumes extra U(1) symmetry group factor and an additional complex Higgs field needed to generate a mass for the dark vector boson. We discuss gauge dependence of the Breit-Wigner propagator with energy-dependent width. The pinch technique is advocated in order to cure the gauge dependence while preserving unitarity.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: PILAFTSIS, Apostolos; GRZADKOWSKI, Bohdan (University of Warsaw); DUCH, Mateusz (University of Warsaw)

Presenter: GRZADKOWSKI, Bohdan (University of Warsaw)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **92** Type: **Talk (closed)**

Fast computation of electroweakino cross-sections: the EWKFast tool

Tuesday, 24 July 2018 15:18 (24 minutes)

Phenomenological studies of SUSY models typically imply the sampling of multidimensional parameter spaces. Each parameter point needs to be checked against the available theoretical and experimental limits from indirect and direct SUSY searches. The constraints from electroweakino searches are particularly challenging due to the computational resources needed to calculate their production cross section using the currently available tools. We address this issue and present a novel computer program (EWKFast) to compute electroweakino cross-sections at hadron colliders, at NLO-QCD, which has been optimized for speed. Our approach is based on the observation that the cross-section can be written as a sum of terms, each of which can be factorized in a coefficient, which depends on the electroweakino mixing-angles times a kinematical function which solely depends on their masses. The latter needs to be evaluate numerically, which is time consuming. In our approach the values of the kinematical functions are interpolated from pre-calculated grids. As an example of application, we will present the recasting of a few LHC electroweakinos searches.

Parallel Session

Precision Calculations and MC tools

Primary author: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Co-authors: ZEUNE, Lisa; PAPUCCI, Michele (Lawrence Berkeley National Laboratory); Dr SAKURAI, Kazuki (University of Warsaw)

Presenter: Dr SAKURAI, Kazuki (University of Warsaw)

Session Classification: Precision Calculations and MC tools

Contribution ID: **93** Type: **Talk (closed)**

Towards high-precision for high-scale SUSY: status and perspectives on the EFT Higgs-mass computation in FlexibleSUSY

Tuesday, 24 July 2018 17:50 (25 minutes)

The non-observation of superpartners at the LHC coupled with a measured mass of the Higgs boson of $\sim$ 125 GeV, which points to relatively heavy spectra, has renewed the interest in the study of SUSY scenarios where most/all superpartners lie significantly above the EW scale. In this context an Effective Field Theory (EFT) approach to the Higgs mass computation is needed, in order to properly resumm the large logarithms of $\mathcal{O}(M_S/M_{EW})$,where M_S is the mass scale of the superpartners and M_{EW} is the electroweak scale.
In this talk we present the latest developments of the EFT computation in FlexibleSUSY, considering both possibilities of having one or two Higgs doublets in the low-energy EW-scale EFT. FlexibleSUSY includes the state-of-the-art of our current knowledge in this field. Such an advanced computation is required because of the high-precision of the experimental measurements for a quantity which might be our only handle to probe high-scale SUSY spectra.
Besides showing a few example scenarios, where we also compare with the other available predictions, we also present our own prescription for the estimation of the theoretical uncertainty of the Higgs mass prediction.

Parallel Session

Precision Calculations and MC tools

Primary author: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Co-authors: VOIGT, Alexander (RWTH Aachen); WEIGLEIN, Georg Ralf (Deutsches Elektronen-Synchrotron (DE))

Presenter: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Session Classification: Precision Calculations and MC tools

Contribution ID: **94** Type: **Talk (closed)**

Prospects for SUSY discovery in light of LHC Run 2 results

Thursday, 26 July 2018 17:00 (20 minutes)

We present the current perspectives for SUSY at the LHC in Run 2 and beyond, and at future colliders, in a phenomenological Minimal Supersymmetric Standard Model with eleven parameters (pMSSM11) and in the subGUT-CMSSM, where the input scale, M_{in}, at which the soft SUSY breaking terms are universal is treated as an additional free parameter in the sampling instead of being assumed to be the GUT scale.
Our study includes the most important present limits on SUSY coming from searches at Runs 1 and 2 of the LHC, as well as compatibility with the observed Higgs signal and the constraints coming from precision data and flavor physics. Cosmological data and direct searches for dark matter are also taken into account. Particular attention has been given to the impact of the constraint muon anomalous magnetic moment constraint in determining the allowed mass range for the neutralino, which impacts the typical signatures of sparticle production at the LHC. We have found that the prospects for a discovery of strongly interacting sparticles at the LHC remain good, with a rich phenomenology
of possible signatures, especially in the pMSSM11. Electroweakino production will, on the other hand, be more efficiently probed at future lepton colliders.

This contribution is based on Eur.Phys.J. C78 (2018) no.2, 158 and Eur.Phys.J. C78 (2018) no.3, 256. It will be presented by one of the members of the collaboration.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Co-author: MASTERCODE COLLABORATION

Presenter: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **95** Type: **Talk (closed)**

Prospects for SUSY dark matter in light of LHC Run 2 results

Thursday, 26 July 2018 18:00 (20 minutes)

We present the current perspectives for supersymmetric Dark Matter, in light of current and future collider and direct detection experiments, in a phenomenological Minimal Supersymmetric Standard Model scenarios with eleven parameters (pMSSM11) and in the subGUT-CMSSM, in which the input scale, M_{in}, at which the soft SUSY-breaking terms are universal, is treated as an additional free parameter in the sampling instead of being assumed to be the GUT scale.
Our study includes the most important limits on SUSY coming from searches at runs 1 and 2 of the LHC, as well as the compatibility with the observed Higgs signal and the constraints coming from precision data and flavor physics. Cosmological data and direct searches for dark matter are also taken into account. Particular attention has been given to the impact of the the muon anomalous magnetic moment constraint in determining the allowed mass range and nature of the neutralino and, in turn, how this impacts the phenomenology of DM in current and future
direct detection experiments. We have found that the preferred nature of the neutralino in the pMSSM11 can vary from being a bino-like LSP, with a mass of O(100 GeV) to a Higgsino-like LSP with a mass of O(1 TeV). In the subGUT-CMSSM the neutralino is preferred to be either bino- or Higgsino-like, in both cases with a mass of O(1 TeV). Future DM direct-detection experiments will be able to probe significantly the parameter spaces of both scenarios, in a complementary way to collider searches.

This contribution is based on Eur.Phys.J. C78 (2018) no.2, 158 and Eur.Phys.J. C78 (2018) no.3, 256. It will be presented by one of the members of the collaboration.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Co-author: MASTERCODE COLLABORATION

Presenter: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **96** Type: **Talk (closed)**

Global perspectives on dark matter simplified models

Thursday, 26 July 2018 15:50 (20 minutes)

We present the results of the first global likelihood study of Dark Matter Simplified Models (DMSMs) performed by the MasterCode collaboration, considering the case of spin-1 and spin-0 mediators. Our study includes the most important collider limits coming from searches at runs 1 and 2 of the LHC, as well as constraints coming from cosmological data and direct searches for dark matter.

This contribution is based on an upcoming article. It will presented by one of the members of the collaboration.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Co-author: MASTERCODE COLLABORATION

Presenter: BAGNASCHI, Emanuele Angelo (DESY Hamburg)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **97** Type: **Talk (closed)**

Searches for squarks and gluinos in final states involving dark matter candidates with ATLAS

Monday, 23 July 2018 15:00 (20 minutes)

Despite the absence of experimental evidence, weak-scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarises recent ATLAS results on inclusive searches for supersymmetric squarks of the first two generations, and gluinos in R-parity conserving models that predict dark matter candidates. The searches target final states including jets, leptons, photons, and missing transverse momentum.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: GAGNON, Louis-Guillaume (Universite de Montreal (CA))

Presenter: GAGNON, Louis-Guillaume (Universite de Montreal (CA))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **98** Type: **Talk (closed)**

Searches for squarks and gluinos in less conventional scenarios with ATLAS

Wednesday, 25 July 2018 15:30 (20 minutes)

Despite the absence of experimental evidence, weak scale supersymmetry remains one of the best motivated and studied Standard Model extensions. This talk summarises recent ATLAS results on inclusive searches for supersymmetric squarks of the first two generations, and gluinos in less conventional scenarios including R-parity violating models that typically lead to high-multiplicity final states without large missing transverse momentum. The searches target final states including jets, and leptons.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: NELSON, Michael Edward (University of Oxford (GB))

Presenter: NELSON, Michael Edward (University of Oxford (GB))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **99** Type: **Talk (closed)**

Searches for squarks and gluinos in signatures with long-lived particles with ATLAS

Wednesday, 25 July 2018 16:10 (20 minutes)

From strongly produced initial states, SUSY phenomenology offers a rich array of observable signatures. Several supersymmetric models predict massive long-lived supersymmetric particles that may be detected through abnormal specific energy loss, appearing or disappearing tracks, displaced vertices, long time-of-flight or late calorimetric energy deposits. This talk summarises recent ATLAS results on the production of squarks and gluinos in scenarios with non-prompt particle decays.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: KRAUSS, Dominik (Max-Planck-Institut fur Physik (DE))

Presenter: KRAUSS, Dominik (Max-Planck-Institut fur Physik (DE))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **100** Type: **Talk (closed)**

Searches for direct pair production of stops and sbottoms with the ATLAS detector

Monday, 23 July 2018 16:20 (20 minutes)

Naturalness arguments for weak-scale supersymmetry favour supersymmetric partners of the third generation quarks with masses not too far from those of their Standard Model counterparts. The phenomenology ranges from final states of top or bottom quark pairs and two dark matter candidates, to more complex scenarios involving non-prompt sparticle decays or R-parity violating signatures. This talk presents recent ATLAS results from searches for direct sbottom and stop pair production focusing on the less conventional scenarios.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: LUEDTKE, Christian (Freiburg)

Presenter: LUEDTKE, Christian (Freiburg)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **101** Type: **Talk (closed)**

Cosmic Archaeology with Gravitational Waves from Cosmic Strings

Wednesday, 25 July 2018 15:30 (20 minutes)

Cosmic strings are generic cosmological predictions of many extensions of the Standard Model of particle physics, such as a U(1)′ symmetry breaking phase transition in the early universe. Unlike other topological defects, cosmic strings can reach a scaling
regime that maintains a small fixed fraction of the total energy density of the universe from a very early epoch until today. If present, they will oscillate and generate gravitational waves with a
frequency spectrum that imprints the dominant sources of total cosmic energy density throughout the history of the universe. We demonstrate that current and future gravitational wave detectors, such as LIGO and LISA, could be capable of measuring the frequency spectrum of gravitational waves from cosmic strings and discerning the energy composition of the universe at times well before primordial nucleosynthesis and the cosmic microwave background where standard cosmology
has yet to be tested.

Parallel Session

Cosmology and Gravitational Waves

Primary author: LEWICKI, Marek (Kings College London)

Presenter: LEWICKI, Marek (Kings College London)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **102** Type: **Talk (closed)**

Searches for electroweak production of supersymmetric particles involving the Higgs boson and the higgsino with ATLAS

Tuesday, 24 July 2018 17:00 (20 minutes)

Fine-tuning arguments suggest the mass of the supersymmetric partner of the Higgs boson, the higgsino, is not too far from the weak scale. The search for higgsinos represents an experimental challenge due to the near mass-degeneracy resulting in soft decay products, and the low production cross section. This talk presents recent ATLAS results of analyses explicitly targeting the higgsino with a variety of experimental techniques, as well as searches for electroweak production of supersymmetric particles in final states involving the Higgs boson.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: RESSEGUIE, Elodie Deborah (University of Pennsylvania (US))

Presenter: RESSEGUIE, Elodie Deborah (University of Pennsylvania (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **103** Type: **Talk (closed)**

Searches for charginos and neutralinos with the ATLAS detector

Tuesday, 24 July 2018 15:50 (20 minutes)

Charginos and neutralinos are typically the lightest new particles predicted by a wide range of supersymmetry models, and the lightest neutralino is a well motivated and studied candidate for dark matter in models with R-parity conservation. The talk presents recent results from searches for pair produced charginos and neutralinos in final states with leptons and missing transverse momentum.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: KLEIN, Matthew Henry (University of Michigan (US))

Presenter: KLEIN, Matthew Henry (University of Michigan (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **104** Type: **Talk (closed)**

Searches for sleptons with the ATLAS detector

Tuesday, 24 July 2018 15:10 (20 minutes)

Many supersymmetry models feature gauginos and sleptons with masses less than a few hundred GeV. These can give rise to direct pair production rates at the LHC that can be observed in the data sample recorded by the ATLAS detector. The talk presents recent ATLAS results from searches for slepton pair production.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: ANTRIM, Daniel Joseph (University of California Irvine (US))

Presenter: ANTRIM, Daniel Joseph (University of California Irvine (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **105** Type: **Talk (closed)**

Reconstruction techniques in supersymmetry searches in the ATLAS experiment

Monday, 23 July 2018 15:40 (20 minutes)

Many supersymmetric scenarios feature final states with non-standard final state objects. The production of massive sparticles can lead to the production of boosted top quarks or vector bosons, high-pt b-jets. At the same time, transitions between nearly mass-degenerate sparticles can challenge the standard reconstruction because of the presence of very soft leptons or jets. The talk will review the application of innovative reconstruction techniques to supersymmetry searches in ATLAS.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: LIU, Jesse (University of Oxford)

Presenter: LIU, Jesse (University of Oxford)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **106** Type: **Talk (closed)**

Dark Matter searches with the ATLAS Detector

Thursday, 26 July 2018 14:30 (20 minutes)

Dark matter could be produced at the LHC if it interacts weakly with the Standard Model. The search for dark matter can be performed directly, by looking for a signature of large missing transverse momentum coming from the dark matter candidates escaping the detector, measured against an accompanying visible object (jet, photon, boson). A broad and systematic search program covering these various possibilities with the ATLAS detector is in place: the talk will review the latest results of these searches.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: QUEITSCH-MAITLAND, Michaela (Deutsches Elektronen-Synchrotron (DE))

Presenter: QUEITSCH-MAITLAND, Michaela (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **107** Type: **Talk (closed)**

Searches for Dark Matter mediators with the ATLAS Detector

Thursday, 26 July 2018 15:10 (20 minutes)

The search for dark matter can be performed indirectly at the LHC by looking for the intermediate mediators which would couple the dark matter particles to the Standard Model. The mediator could indeed decay to jets or leptons, leading to a resonant signature which can be probed. The talk will present the results of these searches with the ATLAS detector and show their complementarity with the other ATLAS searches looking directly for Dark Matter.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: CREPE-RENAUDIN, Sabine (LPSC-Grenoble, CNRS/UGA (FR))

Presenter: CREPE-RENAUDIN, Sabine (LPSC-Grenoble, CNRS/UGA (FR))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **108** Type: **Talk (closed)**

Search for vector-like quarks with the ATLAS Detector

Wednesday, 25 July 2018 15:30 (20 minutes)

Vector like quarks appear in many theories beyond the Standard Model as a way to cancel the mass divergence for the Higgs boson. The current status of the ATLAS searches for the production of vector like quarks will be reviewed for proton-proton collisions at 13 TeV. This presentation will address the analysis techniques, in particular the selection criteria, the background modeling and the related experimental uncertainties. The results and the complementarity of the various searches will be discussed.

Parallel Session

Alternatives to Supersymmetry

Primary author: MADAR, Romain (Université Clermont Auvergne (FR))

Presenter: MADAR, Romain (Université Clermont Auvergne (FR))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **109** Type: **Talk (closed)**

ATLAS Searches for Diboson Resonances

Thursday, 26 July 2018 14:50 (20 minutes)

Many extensions to the Standard Model, such as an extended Higgs sector, predict new particles decaying into two bosons (W, Z, gamma, H) making these important signatures in the search for new physics. Searches for such diboson resonances have been performed in final states with different numbers of leptons, photons and jets and b-jets where new jet substructure techniques to disentangle the hadronic decay products in highly boosted configuration are being used. The most recent results in the search for such resonances by the ATLAS experiment at the LHC will be presented focusing on semi-leptonic and fully hadronic decay channels, using proton-proton collision data collected at a centre-of-mass energy of 13 TeV.

Parallel Session

Alternatives to Supersymmetry

Primary authors: Dr CHIODINI, Gabriele (INFN Lecce & Università del Salento (IT)); CHIODINI, Gabriele (INFN Lecce)

Presenters: Dr CHIODINI, Gabriele (INFN Lecce & Università del Salento (IT)); CHIODINI, Gabriele (INFN Lecce)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **110** Type: **Talk (closed)**

Searches for new phenomena in final states involving leptons and jets using the ATLAS detector

Wednesday, 25 July 2018 17:40 (20 minutes)

Many theories beyond the standard model predict new phenomena which decay to leptons and/or jets. Searches for new physics models with these signatures are performed using the ATLAS experiment at the LHC. The results reported here use the pp collision data sample collected by the ATLAS detector at the LHC with a centre-of-mass energy of 13 TeV.

Parallel Session

Alternatives to Supersymmetry

Primary author: PASCUZZI, Vincent (University of Toronto (CA))

Presenter: PASCUZZI, Vincent (University of Toronto (CA))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **111** Type: **Talk (closed)**

Search for New Physics through the Reconstruction of Challenging Signatures with the ATLAS detector

Thursday, 26 July 2018 15:30 (20 minutes)

Many theories of beyond the Standard Model (BSM) physics predict unique signatures which are difficult to reconstruct and the background rates are also a challenge. Signatures from displaced vertices anywhere from the inner detector to the muon spectrometer as well as those of new particles with fractional or multiple value of the charge of the electron or high mass stable charged particles are experimentally demanding signatures. The results of searches using data collected by the ATLAS detector of $\sqrt{s}$ = 13 TeV pp collision is presented.

Parallel Session

Alternatives to Supersymmetry

Primary author: SHIRABE, Shohei (Kyushu University (JP))

Presenter: SHIRABE, Shohei (Kyushu University (JP))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **113** Type: **Talk (closed)**

Highlights of top-quark production measurements at ATLAS and CMS (production: top pairs, single top as well as tt+X, t+X)

Wednesday, 25 July 2018 14:30 (20 minutes)

Measurements of the inclusive and differential cross-sections of top-quark production in proton-proton collisions at centre-of-mass energy of 13 TeV with the ATLAS detector at the Large Hadron Collider are presented. Single top-quark and top-quark pair final states as well as top-quark production in association with vector bosons are considered. The measurements reach high precision and are compared to the most precise available theoretical calculations.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: BESSIDSKAIA BYLUND, Olga (Bergische Universitaet Wuppertal (DE))

Presenter: BESSIDSKAIA BYLUND, Olga (Bergische Universitaet Wuppertal (DE))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **114** Type: **Talk (closed)**

Searches for additional charged Higgs bosons in the MSSM in ATLAS and CMS

Monday, 23 July 2018 15:40 (20 minutes)

The MSSM predicts the existence of additional neutral and charged Higgs bosons. This presentation will discuss results from recent searches for charged Higgs bosons in several decay channels based on collision data collected at 13 TeV, and their interpretation within the MSSM.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: AUTERMANN, Christian (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: AUTERMANN, Christian (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **115** Type: **Talk (closed)**

Searches for additional neutral Higgs bosons in the MSSM in ATLAS and CMS

Monday, 23 July 2018 15:20 (20 minutes)

The MSSM predicts the existence of additional neutral and charged Higgs bosons. This presentation will discuss results from recent searches for neutral Higgs bosons in several leptonic decay channels based on collision data collected at 13 TeV, and their interpretation within the MSSM.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: WINTERBOTTOM, Daniel (Imperial College (GB))

Presenter: WINTERBOTTOM, Daniel (Imperial College (GB))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **116** Type: **Talk (closed)**

Clockwork theory and phenomenology

Thursday, 26 July 2018 17:00 (20 minutes)

The clockwork mechanism is an elegant framework to generate exponential hierarchies in a theory with only $O(1)$ numbers to start with. I will present some of the recent theoretical and phenomenological developments, first introducing the mechanism by using dark matter as an example of clockwork model building, then discussing the robustness of the clockwork solution to the hierachy problem and the possible origins of the clockwork in the UV from extra-dimensional constructions.

Parallel Session

Alternatives to Supersymmetry

Primary author: Dr TERESI, Daniele (Université Libre de Bruxelles)

Co-authors: HAMBYE, Thomas; TYTGAT, Michel (Université Libre de Bruxelles)

Presenter: Dr TERESI, Daniele (Université Libre de Bruxelles)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **117** Type: **Talk (closed)**

Search for di-Higgs production

Wednesday, 25 July 2018 17:00 (20 minutes)

Di-Higgs final states can arise through non-resonant production of two Higgs bosons and through potential heavy states decaying to two Higgs boson. This talk presents searches in several Higgs boson decay channels using 36 fb-1 of pp collision data recorded at 13 TeV.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: PETIT, Elisabeth (LPSC-Grenoble, CNRS/UGA (FR))

Presenter: PETIT, Elisabeth (LPSC-Grenoble, CNRS/UGA (FR))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **118** Type: **Talk (closed)**

Searches for non Standard Model decays of the Higgs to two light bosons in ATLAS and CMS

Tuesday, 24 July 2018 14:30 (20 minutes)

Theories beyond the Standard Model predict Higgs boson decays that do not exist in the Standard Model, such as decays into two light bosons (a). This talk presents recent results based on pp collision data collected at 13 TeV.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: KARAPOSTOLI, Georgia (University of California Riverside (US))

Presenter: KARAPOSTOLI, Georgia (University of California Riverside (US))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **119** Type: **Talk (closed)**

Searches for non-Standard Model decays to a light meson and a photon of the Higgs boson

Tuesday, 24 July 2018 14:50 (20 minutes)

Theories beyond the Standard Model predict Higgs boson decays at a much enhanced rate compared to the Standard Model, e.g. for decays to Z+photon or a meson and a photon. This talk presents recent results based pp collision data collected at 13 TeV.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: OWEN, Rhys Edward (University of Birmingham (GB))

Presenter: OWEN, Rhys Edward (University of Birmingham (GB))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **120** Type: **Talk (closed)**

Studies of Higgs boson production in association with a ttbar pair

Wednesday, 25 July 2018 15:50 (20 minutes)

The search for the production of the Higgs Boson with a pair of top-anti-top quarks is both very important and very challenging. This talks presents the analyses using Higgs boson decays to bbbar pairs, to two Z bosons, to other multi-lepton final states, and to a pair of photons, using pp collision data collected at 13 TeV, as well as their combined results.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: HELD, Alexander (CERN)

Presenter: HELD, Alexander (CERN)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **121** Type: **Talk (closed)**

Measurements and searches of Higgs boson decays to two fermions at ATLAS and CMS

Tuesday, 24 July 2018 17:20 (20 minutes)

Measurements and searches of Higgs boson decays to two third- or two second-generation quarks or leptons are presented using pp collision data collected at 13 TeV.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: FIORINI, Luca (Univ. of Valencia and CSIC (ES))

Presenter: FIORINI, Luca (Univ. of Valencia and CSIC (ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **122** Type: **Talk (closed)**

Measurement of cross sections and properties of the Higgs boson in decays to bosons with ATLAS and CMS

Tuesday, 24 July 2018 17:00 (20 minutes)

Measurements of Higgs boson properties and cross sections measured in Higgs boson decays to two photons, two Z bosons, and two W bosons based on pp collision data collected at 13 TeV are presented. In addition, results from the combination of different decay channels are shown.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: ANGELIDAKIS, Stylianos (Université Clermont Auvergne (FR))

Presenter: ANGELIDAKIS, Stylianos (Université Clermont Auvergne (FR))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **123** Type: **Talk (closed)**

The status of SUSY by GAMBIT

Wednesday, 25 July 2018 14:30 (20 minutes)

Is supersymmetry fading? Or is there still enough experimental evidence to support our faith in it? In search of a quantitative answer, I review the latest GAMBIT results for the CMSSM, NUHM1 and 2, MSSM7 and MSSM9.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: BALAZS, Csaba (Monash University)

Presenter: BALAZS, Csaba (Monash University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **124** Type: **Talk (closed)**

Precise Predictions for SUSY production at e+e- colliders

We present full one-loop calculations for SUSY particle production at e+e- colliders. This includes hard and soft QED/QCD radiation and a proper treatment of complex phases. We show the relevance of the higher-order corrections for the extraction of the underlying SUSY parameters.

Parallel Session

Precision Calculations and MC tools

Primary author: HEINEMEYER, Sven (CSIC (Madrid, ES))

Presenter: HEINEMEYER, Sven (CSIC (Madrid, ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **125** Type: **Talk (closed)**

High Precision Predictions for SUSY Higgs-Boson Masses

Wednesday, 25 July 2018 16:10 (20 minutes)

We review recent progress in the prediction of SUSY Higgs boson masses, focusing on the MSSM and its extensions. The corrections are being included into the public code FeynHiggs. Numerical examples are presented, showing the improved higher-order calculations.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: HEINEMEYER, Sven (CSIC (Madrid, ES)); BAHL, Henning (MPI Munich); HAHN, Thomas (MPI f. Physik); HOLLIK, Wolfgang (Hamburg University (DE)); PASSEHR, Sebastian (Sorbonne Universite); RZEHAK, Heidi Angelika (Syddansk Universitet (DK)); WEIGLEIN, Georg Ralf (Deutsches Elektronen-Synchrotron (DE))

Presenter: HEINEMEYER, Sven (CSIC (Madrid, ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **126** Type: **Talk (closed)**

Higher-order calculations in the munuSSM

Tuesday, 24 July 2018 14:30 (24 minutes)

We present the renormalization of the munuSSM and its application to higher-order corrections in the scalar sector. We show the phenomenological relevance of these higher-order calculations and compare with the corresponding results in the NMSSM.

Parallel Session

Precision Calculations and MC tools

Primary authors: HEINEMEYER, Sven (CSIC (Madrid, ES)); BIEKOTTER, Thomas (IFT (Madrid)); MUNOZ, carlos (Universidad Autonoma de Madrid)

Presenter: BIEKOTTER, Thomas (IFT (Madrid))

Session Classification: Precision Calculations and MC tools

Contribution ID: **127** Type: **Talk (closed)**

Performance of Missing Transverse Momentum Reconstruction in High Pile-Up

Thursday, 26 July 2018 17:20 (20 minutes)

Missing Transverse Momentum is an extremely important quantity in the searches for RPC Supersymmetry. The accurate reconstruction of this quantity in high pile-up conditions is challenging. Missing transverse momentum is reconstructed from the vector sum of reconstructed objects. Energy from pile-up collisions enter jet cones altering the scale of jets and also increasing the resolution. Additionally jets from pile-up can be reconstructed and included in the missing transverse energy calculation. Methods to improve the reconstruction of missing transverse momentum have been developed through improving the resolution of jets, and selection of jets that should be included in the calculation. These will be presented and the residual pile-up dependence shown. The significance of the observed missing transverse momentum offers a powerful discriminant and techniques to evaluate this based on the objects in a given event has been developed and will also be presented.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: VALENTE, Marco (Universite de Geneve (CH))

Presenter: VALENTE, Marco (Universite de Geneve (CH))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **128** Type: **Talk (closed)**

Highlights of top-quark properties measurements at ATLAS and CMS

Wednesday, 25 July 2018 14:50 (20 minutes)

The top quark is the heaviest known fundamental particle. As it is the only quark that decays before it hadronizes, this gives the unique opportunity to probe the properties of bare quarks. This talk will focus on a few recent precision measurements of top quark properties in top-quark pair and single top-quark events by the ATLAS Collaboration. Measurements of the top quark mass and searches for rare top-quark interactions are also presented.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: CHEN, Xin (Tsinghua University (CN))

Presenter: CHEN, Xin (Tsinghua University (CN))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **131** Type: **Talk (closed)**

A smoking gun of Higgs Inflation in the NMSSM

Tuesday, 24 July 2018 18:20 (20 minutes)

We study the electroweak phenomenology of Higgs Inflation within the Next-to-minimal Supersymmetric Standard Model (NMSSM). The model has a superconformal symmetry at high scales which is broken by the non-minimal coupling to supergravity responsible for early universe inflation. At low energies, however, the model differs from the usual NMSSM. With an emphasis on the Higgs and Neutralino sectors of the model, we work out possible smoking gun signatures of Higgs Inflation at the electroweak scale.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: HOLLIK, Wolfgang (Deutsches Elektronen-Synchrotron (DE)); LIEBLER, Stefan Rainer (KIT - Karlsruhe Institute of Technology (DE)); MOORTGAT-PICK, Gudrid; WEIGLEIN, Georg Ralf (Deutsches Elektronen-Synchrotron (DE)); PASSEHR, Sebastian (Sorbonne Universite)

Presenter: HOLLIK, Wolfgang (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **132** Type: **Talk (closed)**

Darkside latest results and the future liquid argon dark matter program

Tuesday, 24 July 2018 14:50 (20 minutes)

DarkSide uses a dual-phase Liquid Argon Time Projection Chamber to search for WIMP dark matter. The talk will present the latest result on the search for low mass ($M_{WIMP} < 20GeV/c^2$) and high mass ($M_{WIMP} > 100GeV/c^2$) WIMPs from the current experiment, DarkSide-50, running since mid 2015 a 50-kg-active-mass TPC, filled with argon from an underground source. The next stage of the Darkside program will be a new generation experiment involving a global collaboration from all the current Argon based experiments.
DarkSide-20k, is designed as a >20-tonne fiducial mass TPC with SiPM based photosensors, expected
to achieve an instrumental background well below that from coherent scattering of solar and atmospheric neutrinos. Like its predecessor DarkSide-20k will be housed at the Gran Sasso (LNGS) underground laboratory, and it is expected to attain a WIMP-nucleon cross section exclusion sensitivity of $10^{-47}\ cm^2$ for a WIMP mass of $1TeV/c^2$ in a 5 yr run.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: SANTORELLI, Roberto (Centro de Investigaciones Energéti cas Medioambientales y Tecno)

Presenter: SANTORELLI, Roberto (Centro de Investigaciones Energéti cas Medioambientales y Tecno)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **133** Type: **Talk (closed)**

Higher-order corrections to scalar couplings in BSM models with extended Higgs sectors

Monday, 23 July 2018 16:20 (20 minutes)

The precise study of the Higgs boson properties – in particular its mass and couplings – is of paramount importance for the study of BSM models with enlarged Higgs sectors.
In particular, when investigating the high-scale behaviour of these models, the scalar quartic couplings must be extracted from the physical spectrum. I will show that it is then crucial to include all known higher-order corrections to this matching, and that the common habit of combining an N-1 loop matching together with N-loop RGE running often proves insufficient.
Moreover, there is also a growing interest for Effective Field Theories as they provide a framework to study the effects of heavy New Physics. In this context, I will present recent work on the matching of the scalar quartic couplings between general renormalisable theories, focusing especially on how to address the mixing among states and how a possible loss of accuracy due to large logarithmic contributions can be avoided.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: BRAATHEN, Johannes (LPTHE Paris)

Co-authors: GOODSELL, Mark Dayvon (Centre National de la Recherche Scientifique (FR)); Dr KRAUSS, Manuel E. (Bonn University); OPFERKUCH, Toby (Universität Bonn); SLAVICH, Pietro (LPTHE Paris); STAUB, Florian (KIT - Karlsruhe Institute of Technology (DE))

Presenter: BRAATHEN, Johannes (LPTHE Paris)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **134** Type: **Talk (closed)**

Realization of a spontaneous gauge and supersymmetry breaking vacuum

Wednesday, 25 July 2018 18:20 (20 minutes)

It is one of the major issues to realize a vacuum which breaks supersymmetry (SUSY) and R-symmetry, in a supersymmetric model. We study the model, where the same sector breaks the gauge symmetry and SUSY. In general, the SUSY breaking model without gauge symmetry has a flat direction at the minimum of F-term scalar potential. When we introduce U(1) gauge symmetry to such a SUSY breaking model, there can appear a runaway direction. Such a runway direction can be lifted by loop effects, and the gauge symmetry breaking and SUSY breaking are realized. The R-symmetry, that is assigned to break SUSY, is also spontaneously broken at the vacuum. This scenario can be extended to non-Abelian gauge theories. We also discuss application to the Pati-Salam model and the SU(5) grand unified theory. We see that non-vanishing gaugino masses are radiatively generated by the R-symmetry breaking and the gauge messenger contribution.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: OMURA, Yuji (KMI, Nagoya University); Prof. KOBAYASHI, Tatsuo; Dr SETO, Osamu

Presenter: OMURA, Yuji (KMI, Nagoya University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **135** Type: **Talk (closed)**

Spontaneous SUSY breaking in natural SO(10) GUT

Monday, 23 July 2018 16:20 (20 minutes)

In natural GUT, various problems in SUSY GUT, including the doublet-triplet splitting problem, can be solved with a natural assumption in which all interactions (incl. higher dimensional interactions) which are allowed by the symmetry are intoduced with O(1) coefficients. In the models, the Fayet-Iliopoulos (FI) term plays an important role. The FI term can also play an critical role in breaking SUSY spontaneously. Surprisingly, if the number of singlets is reduced by one from a natural GUT, then spontaneous SUSY breaking can be realized in the natural GUT. Unfortunately, it had been considered that because of the approximate U(1)R symmetry, the induced gaugino mass becomes much smaller than the sfermion masses. However, as discussed in the paper (arXiv:1712.05107), when SUGRA effects are considered, the gaugino masses can be larger because maximal U(1)R breaking, the constant term in the superpotential, can give larger masses to the gauginos in SUGRA. In this talk, we consider spontaneous SUSY breaking in an explicit natural SO(10) GUT and discuss the phenomenology of the predicted light particles and SUSY breaking parameters.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: Dr MAEKAWA, Nobuhiro (Nagoya Univ. KMI); Dr OMURA, Yuji (Nagoya Univ. KMI); Dr SHIGEKAMI, Yoshihiro (KEK); Mr YOSHIDA, Manabu (Nagoya Univ.)

Presenter: Dr MAEKAWA, Nobuhiro (Nagoya Univ. KMI)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **136** Type: **Talk (closed)**

Indirect Probe of Minimal Dark Matter at Collider

Wednesday, 25 July 2018 18:00 (20 minutes)

A massive particle charged under the electroweak gauge symmetry, such as a Higgsino and Wino, is one of the most promising candidate of the dark matter and called "Minimal dark matter." Such electroweakly interacting particle will affect the standard model processes thorough quantum effects. In this talk, I will discuss search strategies for such a dark matter with precision measurements of the standard model processes at current and future colliders. This indirect search will be as strong as the direct production search with mono-X and missing energy.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SHIRAI, Satoshi (Kavli IPMU)

Co-authors: TAKEUCHI, Michihisa (Univ. of Tokyo); Dr MATSUMOTO, Shigeki (Kavli IPMU)

Presenter: SHIRAI, Satoshi (Kavli IPMU)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **137** Type: **Posters (last call deadline 30th June)**

Reinterpretation of searches for supersymmetry in models with variable R-parity-violating coupling strength and long-lived R-hadrons

Many searches for supersymmetric particles are dedicated to either R-parity conserving (RPC) or R-parity violating (RPV) scenarios with prompt decays. However, a large range of coupling strengths are allowed, ranging from 0 (RPC limit) to theoretically estimated maximal values of order one. Varying these values over the entire possible range allows coverage of a rich phenomenology which can be mapped onto a simplified model spectrum. These simplified models represent a transition from RPC scenarios with decays into final states with SM particles and a stable lightest supersymmetric particle (LSP), via intermediate scenarios including along-lived LSP due to moderate values of RPV coupling strength resulting in displaced final states, to prompt RPV decays of the LSP or other SUSY particles into SM-only final states. A reinterpretation of a selection of ATLAS SUSY analyses in simplified models with varying RPV coupling strength is performed to identify any potential gaps between the phase space covered by the dedicated RPC and RPV SUSY search program.
Displaced signals, similar to final states in scenarios with moderate λ'' can also emerge from Split SUSY inspired models, where gluinos can be long-lived massive particles hadronising into colourless bound states- the so-called R-hadrons - before decaying into quarks and the LSP. Depending on the lifetime of the gluino,its signature is very similar to the promptly decaying gluinos. Hence, the reinterpretation of long-lived gluino signals in the context of the ATLAS RPC 0L (2-6 jets + MET) SUSY analysis is of particular interest.
This poster presents the results of the reinterpretation of published ATLAS SUSY searches, originally designed for scenarios with either RPC or RPV with prompt LSP decays, in models with variable RPV coupling strength and with variable R-hadron lifetime.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: MAGERL, Veronika (Albert Ludwigs Universitaet Freiburg (DE))

Presenter: MAGERL, Veronika (Albert Ludwigs Universitaet Freiburg (DE))

Contribution ID: **138** Type: **Posters (last call deadline 30th June)**

Searches for electroweak production of supersymmetric gauginos and sleptons at LHC

Supersymmetry is one of the most searched-for extensions of the Standard Model. In its minimal realization, the Minimal Supersymmetric Standard Model, it predicts a new bosonic (fermionic) partner for each fundamental standard Model fermion (boson), as well as an additional Higgs doublet. The sector of sparticles with only electroweak interactions contains charginos, neutralinos, sleptons, and sneutrinos. Charginos and neutralinos are the mass eigenstates formed by linear superpositions of the superpartners of the charged and neutral Higgs bosons and electroweak gauge bosons. In R-parity conserving models, sparticles can only be produced in pairs and the lightest supersymmetric particle is stable. This is typically the lightest neutralino and can provide a natural candidate for dark matter. When produced in the decay of heavier SUSY particles, a neutralino LSP would escape detection, leading to an amount of missing transverse momentum significantly larger than for SM processes, a canonical signature that can be exploited to extract SUSY signals. In this poster, a set of recent searches for the electroweak production of charginos, neutralinos, sleptons, and gluinos decaying to final states with at least four leptons will be presented. These searches rely on proton-proton collision data delivered by the Large Hadron Collider at a center-of-mass energy of $\sqrt{s}$ = 13 TeV, collected and reconstructed with the ATLAS detector.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: ZINONOS, Zinonas (Max-Planck-Institut fur Physik, München (DE))

Presenter: ZINONOS, Zinonas (Max-Planck-Institut fur Physik, München (DE))

Contribution ID: **140** Type: **Posters (last call deadline 30th June)**

Search for displaced lepton jets with the ATLAS experiment

Several possible extensions of the Standard Model predict the existence of a dark sector that is weakly coupled to the visible one: i.e. the two sectors couple via the vector portal, where a dark photon with mass in the MeV to GeV range mixes kinetically with the SM photon. If the dark photon is the lightest state in the dark sector, it will decay to SM particles, mainly to leptons and possibly light mesons. Due to its weak interactions with the SM, it can have a non-negligible lifetime. At the LHC, these dark photons would typically be produced with large boost resulting in collimated jet-like structures containing pairs of leptons and/or light hadrons, the so-called lepton-jets (LJs). This work is focused on the search for "displaced LJs", which are produced away from the interaction point and their constituents are limited to electrons, muons, and pions. The requested topology includes two LJs eventually accompanied by leptons. The most recent ATLAS results using proton-proton collisions data at a center of mass energy of 13 TeV will be presented

Parallel Session

Alternatives to Supersymmetry

Primary author: SALVATORE, Daniela (Universita della Calabria (IT) - INFN)

Presenter: SALVATORE, Daniela (Universita della Calabria (IT) - INFN)

Contribution ID: **142** Type: **Talk (closed)**

Collider search for minimal dark matter

Thursday, 26 July 2018 15:30 (20 minutes)

Electroweakly charged dark matter always has charged partners. The mass differences between the dark matter and the partners are not so large and the they often have rather long lifetime, which can be seen in the collider experiments as a disappearing track. Based on 1703.09675 and ongoing works, I will discuss the current and future constraints for the minimal dark matter.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: FUKUDA, Hajime (The University of Tokyo)

Presenter: FUKUDA, Hajime (The University of Tokyo)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **143** Type: **Talk (closed)**

Two scalar singlet Higgs Portal and the Anomaly-cancelation on a leptophobic Z'-mediator with axially coupled DM

Tuesday, 24 July 2018 18:00 (20 minutes)

Di-lepton production at the LHC and Direct Detection (DD) limits put strong constraints on simplified DM models where the DM particle is a fermion, coupled to the SM through an extra U(1)' gauge boson, Z'. The first problem can be avoided by demanding vanishing Y'-charges for leptons (leptophobia). Then, the requirement of anomaly cancellation imposes strong and non-trivial constraints on the spectrum of the dark sector. On the other hand, DD limits can be avoided by requiring an axial coupling between the DM and the Z'. We clasify the (very few) possibilities fulfilling both requirements simultaneously, and explore their phenomenology.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: QUILIS, Javier (IFT, UAM-CSIC)

Presenter: QUILIS, Javier (IFT, UAM-CSIC)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **144** Type: **Talk (closed)**

Higgs alignment from extended supersymmetry

Tuesday, 24 July 2018 18:00 (20 minutes)

Based on arXiv:1801.08849, this talk will look at how Higgs alignment can be realised naturally in a low energy type-II Higgs doublet model, originating from Dirac gaugino models with extended supersymmetry at higher energies. It will be discussed how alignment, predicted at tree-level at the scale of the extended supersymmetry, is maintained in the low energy effective theory even after including quantum corrections and increasing the extended supersymmetry scale. A precision study is presented, alongside the associated implications for the Higgs mass and experimental constraints on the scale of the superpartners.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: WILLIAMSON, Sophie (LPTHE, Sorbonne Université)

Co-authors: BENAKLI, Karim (CNRS); GOODSELL, Mark Dayvon (Centre National de la Recherche Scientifique (FR))

Presenter: WILLIAMSON, Sophie (LPTHE, Sorbonne Université)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **145** Type: **Talk (closed)**

Searches for high-mass resonances in fully leptonic final states

Wednesday, 25 July 2018 17:20 (20 minutes)

Several theories beyond the Standard Model predict the existence of new heavy particles decaying into pairs of gauge bosons. In this presentation the latest ATLAS results on searches for resonances decaying into pairs of W bosons, Z bosons or photons focusing on fully leptonic decay channels, based on 36 fb-1 of pp collision data collected at 13 TeV will be discussed.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: FALKE, Peter Johannes (Centre National de la Recherche Scientifique (FR))

Presenter: FALKE, Peter Johannes (Centre National de la Recherche Scientifique (FR))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **147** Type: **Talk (closed)**

Common exotic decays of top partners

Wednesday, 25 July 2018 15:10 (20 minutes)

Many Standard Model extensions that address the hierarchy problem contain Dirac-fermion partners of the top quark, which are typically expected around the TeV scale. Searches for these vector-like quarks mostly focus on their decay into electroweak gauge bosons or Higgs plus a standard model quark. In this talk, backed by models of composite Higgs, we propose a set of simplified scenarios that include more exotic decay channels, which modify the search strategies and affect the bounds. Analysing several classes of underlying models, we show that exotic decays are the norm and commonly appear with large rates. All of these models contain light new scalars that couple to top partners with charge 5/3, 2/3, and −1/3. We identify the contributing particle content and novel top partner decays that occur most commonly, provide effective Lagrangians, benchmarks, and a brief discussion of phenomenological bounds and newly occurring final states.

Based on: arXiv:1803.00021 and work in progress

Parallel Session

Alternatives to Supersymmetry

Primary authors: FLACKE, Thomas (IBS CTPU); CACCIAPAGLIA, Giacomo (Lyon, IPN); BIZOT, Nicolas (Lyon, IPN)

Presenter: FLACKE, Thomas (IBS CTPU)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **148** Type: **Talk (closed)**

Primordial Black Holes from Affleck-Dine Baryogenesis

Thursday, 26 July 2018 17:20 (20 minutes)

In this talk, we propose a novel scenario which simultaneously explains O(10)M primordial black holes (PBHs) in the minimally supersymmetric standard model. Gravitational waves (GWs) events detected by LIGO-Virgo collaboration suggest an existence of black holes as heavy as 30Msol. In our scenario, as seeds of the PBHs, we make use of the baryon number perturbations which are induced by the special type of Affleck-Dine mechanism. Furthermore, the scenario does not suffer from the stringent constraints from CMB μ-distortion due to the Silk damping and pulsar timing. We find the scenario can explain not only the current GWs events consistently, but also dark matter abundance by the non-topological solitons formed after AffleckDine mechanism, called Q-balls.

Parallel Session

Cosmology and Gravitational Waves

Primary author: FUMINORI, Hasegawa (ICRR, The University of Tokyo, Kashiwa)

Presenter: FUMINORI, Hasegawa (ICRR, The University of Tokyo, Kashiwa)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **149** Type: **Talk (closed)**

Core formation from self-heating dark matter

Monday, 23 July 2018 17:30 (20 minutes)

This talk introduces a novel solution to astrophysical small-scale problems, (i.e. core/cusp and too-big-to-fail) by invoking a certain class of dark matter self-annihilating processes. Such processes lead to the formation of dark matter cores at late times by considerably reducing the inner mass density of dwarf-sized halos. An important aspect of this new solution is that the semi-annihilation effects are much more prominent in dwarf-sized halos than in the more massive halos that host galaxies and clusters, even if the corresponding cross sections are the same.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: CHU, Xiaoyong (Institute of High Energy Physics, Vienna (A))

Co-author: Dr GARCIA-CELY, Camilo (DESY)

Presenter: CHU, Xiaoyong (Institute of High Energy Physics, Vienna (A))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **150** Type: **Talk (closed)**

Singlet-Triplet Higgs Portal Dark Matter

Wednesday, 25 July 2018 15:30 (20 minutes)

We investigate the phenomenology of fermion dark matter as an admixture of weak singlet and triplet Majorana fields. Our model can be considered as a generalization of the wino-bino scenario in supersymmetry. The dark sector interacts with the Higgs boson through a pseudo-scalar portal, thus mitigating bounds from direct detection experiments. The observed dark matter abundance is obtained from active co-annihilation involving this portal or from pair annihilation through the Higgs resonance during thermal decoupling. This points to a dark sector around the weak scale, which can be probed at high-energy colliders. We explore collider signals with soft leptons and missing energy at the LHC and make predictions for future searches.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: FILIMONOVA, Anastasiia (Heidelberg University); WESTHOFF, Susanne (Heidelberg University)

Presenter: FILIMONOVA, Anastasiia (Heidelberg University)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **151** Type: **Talk (closed)**

Constraints from LHC-data on supersymmetric particles in scenarios with light right-handed neutrinos

Thursday, 26 July 2018 14:30 (20 minutes)

Natural SUSY models have Higgsinos as the lightest supersymmetric particles with masses of at most a few hundred GeV. Assuming that the gauginos are significantly heavier this implies that the relic dark matter density is significan below the observed values. At the same time neutrino masses need to be explaine. We propse thus a model with light right-handed (s)neutrinos where the right-handed sneutrinos are the lightest supersymmetric particles. We discuss to which extent recent LHC data constrain such scenarios.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Prof. POROD, Werner (Uni. Wurzburg)

Presenter: Prof. POROD, Werner (Uni. Wurzburg)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **152** Type: **Talk (closed)**

Search for K+->pi+nunu at CERN

Monday, 23 July 2018 18:10 (20 minutes)

The decay K+⟶π+νν, with a very precisely predicted branching ratio of less than 10-10, is one of the best candidates to reveal indirect effects of new physics at the highest mass scales. The NA62 experiment at CERN SPS is designed to measure the branching ratio of the K+⟶π+νν with a decay-in-flight technique, novel for this channel. NA62 took data in 2016, 2017 and another year run is scheduled in 2018. Statistics collected in 2016 allows NA62 to reach the Standard Model sensitivity for K+⟶π+νν, entering the domain of 10-10 single event sensitivity and showing the proof of principle of the experiment. The analysis data is reviewed and the preliminary result from the 2016 data set presented.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: PICCINI, Mauro (INFN - Sezione di Perugia (IT))

Presenter: PICCINI, Mauro (INFN - Sezione di Perugia (IT))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **153** Type: **Talk (closed)**

Search for exotic particles at NA62

Tuesday, 24 July 2018 15:50 (20 minutes)

The high-intensity setup, trigger system flexibility, and detector performance – high-frequency tracking of beam particles, redundant PID, ultra-high-efficiency photon vetoes — make NA62 particularly suitable for searching new-physics effect from different scenarios. Results from a search for invisible dark photons produced from pi0 decays are given. Fixed target experiments are a particularly useful tool in the search of very weakly coupled particles in the MeV-GeV range, which are of interest, e.g. as potential Dark Matter mediators. The NA62 experiment at the CERN SPS is currently taking data to measure rare kaon decays. Owing to the high beam-energy and a hermetic detector coverage, NA62 also has the opportunity to directly search for a plaethora of long-lived beyond-the Standard Model particles, such as Axion-like Particles and Dark Photons. In this talk, we will review the status of this searches and give prospects for future data taking at NA62.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: LAZZERONI, Cristina (University of Birmingham (GB)); MINUCCI, Elisa (Universite Catholique de Louvain (UCL) (BE))

Presenter: MINUCCI, Elisa (Universite Catholique de Louvain (UCL) (BE))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **154** Type: **Talk (closed)**

PhenoAI and iDarkSurvey: Learning (from) high-dimensional models

Monday, 23 July 2018 16:00 (20 minutes)

Although the standard model of particle physics is successful in describing physics as we know it, it is known to be incomplete. Many models have been developed to extend the standard model, none of which have been experimentally verified. One of the main hurdles in this effort is the dimensionality of these models, yielding problems in analysing, visualising and communicating results. Because of this, most current day analyses are done using simplified models, but in this process descriptive power is lost. However, by using machine learning on simulated model points, we show that we can overcome these problems and predict both binary exclusion an continuous likelihood in any parameter space. This functionality is implemented in the PhenoAI framework, allowing non-expert users of machine learning to use trained machine learning models in their own analyses. The simulated data can be stored in our new webbased database and model visualisation tool iDarkSurvey. This tool will be open to the scientific to store all calculated model data.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: Mr ATTENA, Jisk (Netherlands eScience Center); Mr CARON, Sascha (Nikhef National institute for subatomic physics (NL)); Mr DIBLEN, Faruk (Netherlands eScience Center); Mr HESKES, Tom (Radboud University Nijmegen); Mr OTTEN, Sydney (RWTH Aachen); Mr ROLBIECKI, Krzysztof (University of Warsaw); Mr RUIZ DE AUSTRI, Roberto (IFIC); Mr KIM, Jong Soo (University of the Witwatersrand); Mr STIENEN, Bob (Radboud University Nijmegen)

Presenter: Mr STIENEN, Bob (Radboud University Nijmegen)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **155** Type: **Talk (closed)**

Understanding gauge and top-bottom-tau Yukawa couplings as IR fixed points in the MSSM with vector-like family

Monday, 23 July 2018 15:40 (20 minutes)

We use the IR fixed point predictions for gauge couplings and the top Yukawa coupling in the MSSM extended with vectorlike families to infer the scale of vectorlike matter and superpartners. We quote results for several extensions of the MSSM and present results in detail for the MSSM extended with one complete vectorlike family. We find that for a unified gauge coupling α_G>0.3 vectorlike matter or superpartners are expected within 1.7 TeV (2.5 TeV) based on all three gauge couplings being simultaneously within 1.5% (5%) from observed values. This range extends to about 4 TeV for α_G>0.2. We also find that in the scenario with two additional large Yukawa couplings of vectorlike quarks the IR fixed point value of the top Yukawa coupling independently points to a multi-TeV range for vectorlike matter and superpartners. Assuming a universal value for all large Yukawa couplings at the GUT scale, the measured top quark mass can be obtained from the IR fixed point for tan β⊠4. The range expands to any tan β >3 for significant departures from the universality assumption. Considering that the Higgs boson mass also points to a multi-TeV range for superpartners in the MSSM, adding a complete vectorlike family at the same scale provides a compelling scenario where the values of gauge couplings and the top quark mass are understood as a consequence of the particle content of the model.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: DERMISEK, Radovan (Indiana University (US))

Presenter: DERMISEK, Radovan (Indiana University (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **156** Type: **Talk (closed)**

Duration of classicality of a degenerate quantum scalar field

Wednesday, 25 July 2018 17:40 (20 minutes)

Dark matter axions and other highly degenerate bosonic fluids are commonly described by classical field equations. As our recent work, we evaluated the duration of classicality of a homogeneous condensate with attractive contact interactions. In their classical descriptions, such condensate persists forever. Taking into account the quantum description, however, parametric resonance causes quanta to jump in pairs out of the condensate into other modes. We estimated in each case the time scale over which the condensate is depleted.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: Mr CHAKRABARTY, Sankha (University of Florida); Dr ENOMOTO, Seishi (University of Florida); Ms HAN, Yaqi (University of Florida); Prof. SIKIVIE, Pierre (University of Florida); Ms TODARELLO, Elisa (University of Florida)

Presenter: Dr ENOMOTO, Seishi (University of Florida)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **157** Type: **Talk (closed)**

Majorana vs Pseudo-Dirac Neutrinos at Electron-Positron Colliders

Tuesday, 24 July 2018 15:10 (20 minutes)

Neutrino oscillation phenomenology requires an explanation for the origin of neutrino masses. Low-scale models, generally motivated by symmetry arguments, have been shown to be testeable at current and future colliders.

We consider the possibility of distinguishing the Pseudo-Dirac or Majorana nature of new heavy neutrinos at Electron-Positron colliders. We show that lepton number violating decays can be distinguished by analysing the angular distribution of heavy neutrino decays, with a very strong dependence on the ratio of their mass difference and decay widths.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: Dr JONES-PEREZ, Joel (PUCP); Prof. HERNANDEZ, Pilar; Mr SUAREZ--NAVARRO, Omar (PUCP)

Presenter: Dr JONES-PEREZ, Joel (PUCP)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **158** Type: **Talk (closed)**

Non-Universal Gaugino Masses in the NMSSM

Tuesday, 24 July 2018 14:50 (20 minutes)

We study the Next-to-Minimal Supersymmetric Standard Model (NMSSM)
with non-universal gaugino masses at the unification scale.
A singlet superfield is added to the minimal supersymmetric (SUSY)
extension of the Standard Model.
Its vacuum expectation value gives a SUSY-scale mass term for higgsinos.
The presence of the singlet field makes the Higgs potential complicated
and it is non-trivial to find the parameter space
where the correct electroweak symmetry breaking is realized.
Such parameter space is restrictive
if the universal boundary condition
is imposed for soft SUSY breaking parameters at the unification scale.
In this talk, we show that
a certain non-universal gaugino masses significantly relaxes this restriction
even though the trilinear couplings and the soft masses,
including the singlet self-trilinear coupling A_κ
and the singlet soft mass m_S^2, obey the universal boundary condition.
With the non-universality of the gaugino masses,
the higgsino is the lightest SUSY particle
and its thermal relic abundance can accommodate with the observed dark matter density.
We also argue upper bounds on masses of SUSY particles in this scenario
and its testability at future hadron colliders.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: NAGATA, Natsumi; Prof. KOBAYASHI, Tatsuo; KAWAMURA, Junichiro (Keio University)

Presenter: KAWAMURA, Junichiro (Keio University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **159** Type: **Talk (closed)**

Improved analysis for CLFV processes $\mu N(eN) \to \tau X$ with gluon operators

Tuesday, 24 July 2018 17:20 (20 minutes)

We revisit charged lepton flavor violating (CLFV) scattering processes $\ell_i N \to \tau X$ ($\ell_i \ni e, \mu$) mediated by Higgs. (Although in this talk we focus on Higgs CLFV, our results hold for other CLFV mediators which couple with gluon and/or heavy quarks.) We point out that a new subprocess $\ell_i g \to \tau g$ via the effective interactions of Higgs and gluon gives the dominant contribution to $\ell_i N \to \tau X$ for an incident beam energy of $E_\ell \leq 1\,\text{TeV}$ in fixed target experiments. Furthermore, in the light of quark number conservation, we consider quark pair-production processes $\ell_i g \to \tau q \bar{q}$ (q denotes quarks) instead of $\ell_i q \to \tau q$. This corrects the threshold energy of each subprocess contributing to $\sigma(\ell_i N \to \tau X)$. Reevaluation of $\sigma(\ell_i N \to \tau X)$ including all of relevant subprocesses shows that the search for $\ell_i N \to \tau X$ could serve a complementary opportunity with other relevant processes to shed light on the Higgs CLFV. This talk is based on PLB772 (2017) 279.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: YAMANAKA, Masato (Kyoto Sangyo University); TAKEUCHI, Michihisa (Univ. of Tokyo); UESAKA, Yuichi (Osaka University)

Presenter: YAMANAKA, Masato (Kyoto Sangyo University)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **160** Type: **Talk (closed)**

Long-lived particle searches at MoEDAL

Wednesday, 25 July 2018 15:10 (20 minutes)

We present a study of searching for massive long-lived particles at the MoEDAL detector. MoEDAL is sensitive to highly ionizing avatar such as magnetic monopoles or massive (meta-)stable charged particles and we focus on the latter in this talk. In the ATLAS and CMS analyses for long-lived particles, some conditions are usually required for triggering or reducing the cosmic ray background, whereas those conditions are not necessary at MoEDAL, due to its extremely low background.
On the other hand, MoEDAL requires the particle to have low velocities (e.g., beta < 0.2 for the particles with unit charge), which result in small signal cross-sections. Using Monte Carlo simulations, we compare MoEDAL vs ATLAS/CMS sensitivities for various long-lived particles in supersymmetric models, and seek for a scenario where MoEDAL is complementary to ATLAS and CMS.

This contribution is based on an upcoming article.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Dr SAKURAI, Kazuki (University of Warsaw)

Co-authors: Dr MITSOU, Vasiliki (Univ. of Valencia and CSIC (ES)); VIVES GARCIA, Oscar Manuel (Univ. of Valencia and CSIC (ES)); RUIZ DE AUSTRI, Roberto; MAMUZIC, Judita (IFIC Valencia); SANTRA, Arka (Univ. of Valencia and CSIC (ES))

Presenter: Dr SAKURAI, Kazuki (University of Warsaw)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **162** Type: **Talk (closed)**

Cosmological domain walls in the Standard Model and beyond

Thursday, 26 July 2018 17:00 (20 minutes)

Cosmological domain walls have been widely studied in numerical lattice simulations in the past. The main effort was to understand the dynamics of domain walls in the case of spontaneous breaking of global discrete symmetries which are often present in supersymmetric theories. It was found that networks formed by cosmological domain walls are (meta)stable if vacua between which walls interpolate are connected by the (approximate) symmetry.

However, the scenario in which vacua belong to different orbits of the action of the symmetry group is possible too. It is realized, for example, by domain walls of the Higgs field in the Standard Model. Investigating the dynamics of Higgs domain walls in extensions of the Standard Model we found that degeneracy of minima of the potential is insufficient to ensure longevity of the networks.

Results of our studies on the influence of asymmetry of the potential on the dynamics of cosmological domain walls will be presented.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: LALAK, Zygmunt Adam (University of Warsaw (PL)); LEWICKI, Marek (Kings College London); OLSZEWSKI, Pawel (University of Warsaw); KRAJEWSKI, Tomasz (University of Warsaw)

Presenter: KRAJEWSKI, Tomasz (University of Warsaw)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **163** Type: **Talk (closed)**

Fast approximation of SUSY NLO cross-sections using Deep Learning

Tuesday, 24 July 2018 14:54 (24 minutes)

Although deep learning might appear as a magic black box one only needs to throw data at to receive a solution, the practical reality is always different and often difficult. This talk shall guide through an example for the process of constructing an AI for predicting a physical quantity, namely the pMSSM-19 NLO electroweakino production cross-section at the LHC for 13 TeV. Naively, one could assume that this is merely a simple regression task but as I will demonstrate, classifiers, active learning and feature engineering including an injection of deeper expert knowledge played a crucial role for solving this task and will, if not necessary, at least be beneficial for many other tasks. While the available Monte Carlo methods take several minutes per cross-section, the resulting AI is able to deliver $\approx 10^5$ NLO cross-sections per second with an average error of about $0.1\,\%$ and a maximum error below uncertainties.

Parallel Session

Precision Calculations and MC tools

Primary authors: OTTEN, Sydney (Radboud University Nijmegen and University of Amsterdam); ROLBIECKI, Krzysztof (University of Warsaw); RUIZ DE AUSTRI, Roberto; KIM, Jong Soo; TATTERSALL, Jamie (RWTH Aachen); CARON, Sascha (Nikhef National institute for subatomic physics (NL))

Presenter: OTTEN, Sydney (Radboud University Nijmegen and University of Amsterdam)

Session Classification: Precision Calculations and MC tools

Contribution ID: **164** Type: **Talk (closed)**

Quantum scale symmetry via constrained dimensional regularization

Tuesday, 24 July 2018 17:40 (20 minutes)

I will describe a version of the dimensional regularization of a classically scale invariant theory, motivated by the requirement to preserve scale invariance at the level of loop corrections. The theory is embedded in a nonrenormalizable Lagrangian, where both the dimensionful regulator \mu and suppression scale of higher-dimensional interactions are interpreted as a vev of a new dynamical scalar field that mixes with the Higgs. The method is applied to an SM-like theory, where the electroweak symmetry and the scale symmetry are broken spontaneously together. The shape of the scalar effective potential and interpretation of the high energy Higgs vacuum are modified. Based on: arXiv:1608.05336 (Eur.Phys.J.C76(2016)no.12,656), arXiv:1612.09120 (Phys.Rev.D96(2017)no.5,055034).

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: OLSZEWSKI, Pawel (University of Warsaw)

Presenter: OLSZEWSKI, Pawel (University of Warsaw)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **165** Type: **Talk (closed)**

Multistep Single-Field Strong Phase Transitions from New TeV Scale Fermions

Thursday, 26 July 2018 15:30 (20 minutes)

In spite of the vast literature on the subject of first order Electroweak Phase Transitions (EWPT), which can provide the necessary conditions for generating the Baryon Asymmetry in the Universe, fermion-induced EWPTs still remain a rather uncharted territory. In this talk, we consider a simple fermionic extension of the Standard Model (SM) involving one $SU(2)_L$ doublet and two singlet Vector-Like Leptons (VLLs), strongly coupled to the Higgs scalar and with masses close to the TeV scale. We show how such a simple scenario can give rise to a non-trivial thermal history of the Universe, involving strongly first order multistep phase transitions occurring at temperatures close to the electroweak (EW) scale. Finally, we investigate the distinct Gravitational Wave (GW) signatures of these phase transitions at future GW detectors, such as eLISA, and briefly discuss how the VLLs can be searched for at the LHC.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: ANGELESCU, Andrei (University of Nebraska-Lincoln); HUANG, Peisi (Texas A&M University)

Presenter: ANGELESCU, Andrei (University of Nebraska-Lincoln)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **166** Type: **Talk (closed)**

Effective Theories of Flavor and the Non-Universal MSSM

Monday, 23 July 2018 17:30 (20 minutes)

Flavor symmetries à la Froggatt-Nielsen (FN) provide a compelling way to explain the hierarchies of fermionic masses and mixing angles in the Yukawa sector. In Supersymmetric (SUSY) extensions of the Standard Model where the mediation of SUSY breaking occurs at scales larger than the breaking of flavor, this symmetry must be respected not only by the Yukawas of the superpotential, but by the soft-breaking masses and trilinear terms as well. Here, I will show that contrary to naive expectations, even starting with completely flavor blind soft-breaking in the full theory at high scales, the low-energy sfermion mass matrices and trilinear terms of the effective theory, obtained upon integrating out the heavy mediator fields, are strongly non-universal.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: LÓPEZ IBÁÑEZ, María Luisa (Università di Roma Tre); DAS, Dipankar (Saha Institute of Nuclear Physics); VIVES GARCIA, Oscar Manuel (Univ. of Valencia and CSIC (ES)); MELIS, Aurora; PEREZ, Michael (University of Flordia)

Presenter: LÓPEZ IBÁÑEZ, María Luisa (Università di Roma Tre)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **167** Type: **Talk (closed)**

The prediction of the W boson mass in an R-symmetric model

Tuesday, 24 July 2018 18:15 (25 minutes)

SUSY continues to elude direct searches at Run 2 of the LHC. Hence, indirect probes like electroweak precision observables are relevant to explore the parameter space of a model. The mass of W boson is such an observable where the LHC experiments are on their way improve on the uncertainties of the experimental result. The prediction for M_W has been studied in depth in the MSSM and NMSSM.

Here, we show the implementation of an on-shell calculation for M_W in the Minimal R-symmetric Supersymmetric SM (MRSSM) extending previous work. This also includes a comparison of different renormalisation schemes and their respective uncertainties when applying them to the calculation of M_W in a BSM model.

Parallel Session

Precision Calculations and MC tools

Primary authors: DIESSNER, Philip (DESY); WEIGLEIN, Georg Ralf (Deutsches Elektronen-Synchrotron (DE))

Presenter: DIESSNER, Philip (DESY)

Session Classification: Precision Calculations and MC tools

Contribution ID: **168** Type: **Posters (last call deadline 30th June)**

Constraining sparticles at the LHC in a supersymmetric seesaw scenario

We work a scenario inspired by natural supersymmetry, where neutrino mass is explained within a seesaw scenario. We extend the Minimal Supersymmetric Standard Model by adding light right-handed neutrinos and their superpartners, the R-sneutrinos, and consider the lightest neutralinos to be higgsino-like.
We consider the possibility of having a R-sneutrino as lightest supersymmetric particle. Assuming that some squarks and gauginos are heavy, we systematically evaluate the bounds on slepton and squark masses due to existing LHC data.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Mr CERNA VELAZCO, Nhell Heder (Pontificia Universidad Católica del Perú)

Co-authors: JONES-PEREZ, Joel (PUCP); POROD, Werner Rudolf (Julius Maximilians Universitaet Wuerzburg (DE)); Mr FABER, Thomas (Julius Maximilians Universitaet Wuerzburg (DE))

Presenter: Mr CERNA VELAZCO, Nhell Heder (Pontificia Universidad Católica del Perú)

Contribution ID: **170** Type: **Talk (closed)**

New physics scales and local family symmetry in a quartification SUSY GUT

Monday, 23 July 2018 15:20 (20 minutes)

I will present the quartification Grand Unified Theory as a new extension of the supersymmetric trinification model with a local family SU(3)_F symmetry. I will discuss its origin inspired by the breaking of E8 into E6 x SU(3)_F and will briefly address how such a construction may possibly provide a chiral theory. The evolution of the gauge couplings to low energy-scales will be thoroughly investigated taking into account possible non-universalities in the unification condition emerging from higher dimensional operators. It will be shown that such corrections to the gauge-kinetic function have a significant impact on the subsequent breaking scales, thus on the scale of new-physics. Based on this analysis I will classify possible low-energy scenarios, how can we address the fermion mass hierarchies and mixing, and which new phenomena are expected.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: PASECHNIK, Roman (Lund university); DE AGUIAR E PESTANA DE MORAIS, Antonio (LIP Laboratorio de Instrumentacao e Fisica Experimental (LIP)-Un); Dr MORAIS, Antonio (CIDMA, Aveiro University (P))

Presenter: Dr MORAIS, Antonio (CIDMA, Aveiro University (P))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **173** Type: **Talk (closed)**

Flavor and CP Violation in SU(5) with Right-handed Neutrinos Revisited

Thursday, 26 July 2018 16:10 (20 minutes)

The observed Higgs boson at the LHC gives information of the supersymmetric (SUSY) extensions of the standard model. In particular, to explain the mass of the observed Higgs boson, the SUSY scale should be above several TeV scale.
Further, the mixings and CP phases in the neutrino sector have been revealed by various neutrino experiments.

In the supersymmetric grand unified theories (SUSY GUTs) with type-I seesaw, we can use the experimental data as inputs, and then we can predict several observables.
Particularly, the flavor violation and CP violation in the sfermion sector relate with the large mixing and CP violation in the neutrino sector if the SUSY breaking is communicated to the visible sector above the GUT scale.

In this work, we revisited the status of SUSY GUTs with right-handed neutrinos.
We found the parameter region where the observed Higgs mass is explained and predicted flavor and CP observables are consistent with current constraints.
Further, future experiments for electric dipole moments will be able to test this model.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Dr KUWAHARA, Takumi (IBS)

Presenter: Dr KUWAHARA, Takumi (IBS)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **174** Type: **Talk (closed)**

Charged Fermions Below 100 GeV

Thursday, 26 July 2018 15:10 (20 minutes)

How light can a fermion be if it has unit electric charge? We revisit the lore that LEP robustly excludes charged fermions lighter than about 100 GeV. We review LEP chargino searches, and find them to exclude charged fermions lighter than 90 GeV, assuming a higgsino-like cross section. However, if the charged fermion couples to a new scalar, destructive interference among production channels can lower the LEP cross section by a factor of 3. In this case, we find that charged fermions as light as 75 GeV can evade LEP bounds, while remaining consistent with constraints from the LHC. As the LHC collects more data, charged fermions in the 75-100 GeV mass range *serve as a target for future monojet and disappearing track searches.*

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: EGANA-UGRINOVIC, Daniel (CN Yang Institute, Stony Brook University); RUDERMAN, Joshua Thomas (NYU); LOW, Matthew (Institute for Advanced Study)

Presenter: EGANA-UGRINOVIC, Daniel (CN Yang Institute, Stony Brook University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **175** Type: **Talk (closed)**

Higgs Pair Production at Future Hadron Colliders: From Kinematics to Dynamics

Wednesday, 25 July 2018 17:20 (20 minutes)

The measurement of the triple Higgs coupling is a key benchmark for the LHC and future colliders. It directly probes the Higgs potential and its fundamental properties in connection to new physics beyond the Standard Model. We show how the invariant mass distribution of the Higgs pair offers a systematic way to extract the Higgs self-coupling, focusing on the leading channel pp ⟶ hh + X ⟶ b¯b γγ + X. We utilize new features of the signal events at higher energies and estimate the potential of a high-energy upgrade of the LHC and a future hadron collider with realistic simulations. We find that the high-energy upgrade of the LHC to 27 TeV would reach a 5σ observation with an integrated luminosity of 2.5 ab−1. It would have the potential to reach 15% (30%) accuracy at the 68% (95%) confidence level to determine the SM Higgs boson self-coupling. A future 100 TeV collider could improve the self-coupling measurement to better than 5% (10%) at the 68% (95%) confidence level.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: TAKEUCHI, Michihisa (Univ. of Tokyo)

Presenter: TAKEUCHI, Michihisa (Univ. of Tokyo)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **176** Type: **Talk (closed)**

Sub-MeV Dark Matter Interactions with Electrons: Cosmological Constraints and Detection Prospects

Tuesday, 24 July 2018 15:50 (20 minutes)

Sub-MeV dark matter remains unconstrained by direct detection, and there are several well-motivated candidates in this mass range. Electron recoil experiments have been proposed as a technique to detect such a light particle, but little is known about the extent of cosmological restrictions on a generic light species coupled to electrons. We study cosmological constraints on a light dark matter particle coupled to electrons in the framework of an effective field theory, which subsumes a broad class of models with a heavy mediator. We study constraints from primordial nucleosynthesis, the dark matter relic abundance, and the effective number of neutrino species ($N_{\rm eff}$) at CMB formation. We demonstrate the implications of our results for detection prospects in electron recoil experiments, and highlight the regions of parameter space which may be amenable to direct detection by such techniques.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: D'ERAMO, Francesco (University of Padua); LEHMANN, Benjamin (UC Santa Cruz); PROFUMO, Stefano

Presenter: LEHMANN, Benjamin (UC Santa Cruz)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **177** Type: **Talk (closed)**

Revisiting the Dark Matter Relic Abundance Calculation: The Case of Early Kinetic Decoupling

Wednesday, 25 July 2018 17:00 (20 minutes)

Today's standard way to calculate the thermal relic abundance of dark matter via chemical decoupling relies on the assumption that particles remain in kinetic equilibrium throughout the freeze-out process. However, is this assumption always justified?
The talk aims to address this question and discuss the consequences of more accurate treatments. Two methods are presented: One that combines higher momentum moments of the underlying Boltzmann equation and another that numerically solves the evolution of the full phase-space distribution of the dark matter particles. The implications are illustrated for the Scalar Singlet model, often referred to as the simplest benchmark model for WIMP dark matter.It is here explicitly shown that even in this simple model the predictions of the dark matter abundance can be affected by up to an order of magnitude.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr GUSTAFSSON, Michael (Göttingen University)

Presenter: Dr GUSTAFSSON, Michael (Göttingen University)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **178** Type: **Talk (closed)**

Primordial black holes in the axion-like curvaton model and the LIGO events

Wednesday, 25 July 2018 15:50 (21 minutes)

For a realistic scenario of inflationary primordial black holes (PBHs), a highly blue-tilted power spectrum of primordial perturbations is required. In the axion-like curvaton model, which is base on the supersymmetric axion model, such a spectrum is achieved. I will show that PBHs formed in this model can explain the massive black holes implied by the LIGO gravitational wave (GW) events. Large scalar curvature perturbations induce primordial GWs via the second-order effects, and they are compared with the constraints from the pulsar timing array experiments. In calculating the secondary GWs, it is important to take into account the effect of non-Gaussianity that a fixed amount of PBHs can be produced by a smaller power spectrum.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: ANDO, Kenta (ICRR, University of Tokyo); Mr INOMATA, Keisuke (ICRR, University of Tokyo); KAWASAKI, Masahiro (The University of Tokyo); MUKAIDA, Kyohei (Kavli IPMU); Prof. YANAGIDA, Tsutomu T. (Kavli IPMU, University of Tokyo)

Presenter: ANDO, Kenta (ICRR, University of Tokyo)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **180** Type: **Talk (closed)**

Beyond-Standard-Model Physics at the High-Luminosity LHC

Thursday, 26 July 2018 17:40 (20 minutes)

The High-Luminosity Large Hadron Collider (HL-LHC) is expected to deliver an integrated luminosity of up to 3000 fb-1. The very high instantaneous luminosity will lead to about 200 proton-proton collisions per bunch crossing ("pileup") superimposed to each event of interest, therefore providing extremely challenging experimental conditions. The sensitivity to find new physics Beyond the Standard Model (BSM) physics is significantly improved and will allow to extend the reach for heavy vector bosons, for SUSY, dark matter and exotic long-lived signatures, to name a few.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: KELLER, Henning (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: KELLER, Henning (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **181** Type: **Talk (closed)**

Dark Matter, Gravity Waves and Proton Decay

Wednesday, 25 July 2018 17:40 (20 minutes)

We implement inflation in realistic supersymmetric and non-supersymmetric extensions of the Standard Model. We compare and contrast a number of predictions related to primordial gravity waves, dark matter and proton decay.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: SHAFI, Qaisar (University of Delaware)

Presenter: SHAFI, Qaisar (University of Delaware)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **182** Type: **Talk (closed)**

B-L Miracle as gauged PQ symmetry

Thursday, 26 July 2018 17:40 (20 minutes)

The Peccei-Quinn (PQ) solution to the strong CP problem requires an anomalous global U(1) symmetry, the PQ symmetry. The origin of such a convenient global symmetry is quite puzzling from the theoretical point of view in many aspects. In this talk, we propose a simple prescription which provides an origin of the PQ symmetry. There, the global U(1) PQ symmetry is virtually embedded in a gauged U(1) PQ symmetry. Due to its simplicity, this mechanism can be implemented in many conventional models with the PQ symmetry. Finally, we also propose an attractive concrete model, where a gauged U(1) PQ symmetry corresponds to the B-L gauge symmetry.

Parallel Session

Formal Field Theory and Strings

Primary author: SUZUKI, Motoo (Kavli IPMU, Tokyo (JP))

Presenter: SUZUKI, Motoo (Kavli IPMU, Tokyo (JP))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **183** Type: **Talk (closed)**

Jet Observables and Stops at 100 TeV Collider

Thursday, 26 July 2018 18:00 (20 minutes)

A future proton-proton collider with center of mass energy around 100 TeV will have a remarkable capacity to discover massive new particles and continue exploring weak scale naturalness. In this work we will study its sensitivity to two stop simplified models as further examples of its potential power: pair production of stops that decay to tops or bottoms and Higgsinos; and stops that are either pair produced or produced together with a gluino and then cascade down through gluinos to the lightest superpartner (LSP). In both simplified models, super-boosted tops or bottoms with transverse momentum of order TeV will be produced abundantly and call for new strategies to identify them. We will apply a set of simple jet observables, including track-based jet mass, N-subjettiness and mass-drop, to tag the boosted hadronic or leptonic decaying objects and suppress the standard model as well as possible supersymmetric (SUSY) backgrounds. Assuming 10% systematic uncertainties, the future 100 TeV collider can discover (exclude) stops with masses up to 6 (7) TeV with 3 inverse attobarn of integrated luminosity if the stops decay to Higgsinos. If the stops decay through gluinos to LSPs, due to additional SUSY backgrounds from gluino pair production, a higher luminosity of about 3 inverse attobarn is needed to discover stops up to 6 TeV. We will also discuss how to use jet observables to distinguish simplified models with different types of LSPs. The boosted top or bottom tagging strategies developed in this paper could also be used in other searches at a 100 TeV collider. For example, the strategy could help discover gluino pair production with gluino mass close to 11 TeV with 3 inverse attobarn of integrated luminosity.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: Mr LEUNG, Shing Chau (Brown University); Prof. FAN, JiJi (Brown University); Dr JAISWAL, Prerit (Florida State University)

Presenter: Mr LEUNG, Shing Chau (Brown University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **184** Type: **Talk (closed)**

Slepton Non-Universality in the Flavor-Effective MSSM

Monday, 23 July 2018 17:50 (20 minutes)

Supersymmetric theories supplemented by an underlying flavor-symmetry provide a rich playground formodel building aimed at explaining the flavor structure of the Standard Model. In the case where supersymmetry breaking is mediated by gravity, the soft-breaking Lagrangian typically exhibits large tree-level flavor violating effects, even if it stems from an ultraviolet flavor-conserving origin. Here, I will show the results of our phenomenological analysis of these models with a particular emphasis on the leptonic flavor observables. We consider some representative models which aim to explain the flavor structure of the lepton sector.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: VIVES GARCIA, Oscar Manuel; LÓPEZ IBÁÑEZ, María Luisa (Università di Roma Tre); PEREZ , Michael Jay; MELIS, Aurora (IFIC & University of Valencia)

Presenter: MELIS, Aurora (IFIC & University of Valencia)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **185** Type: **Talk (closed)**

Higgs decays in the NMSSM

Wednesday, 25 July 2018 18:20 (20 minutes)

We calculate all NMSSM Higgs-boson decays to SM particles at the full one-loop level. Special attention is paid to treat the MSSM part exactly as in the pure MSSM calculation. In this way any deviations can be attributed directly to the extended Higgs (and neutralino) structure in the NMSSM. We compare our results with several approximations used in the literature and emphasize the numerical and phenomenological relevance of the full one-loop corrections. These results will be included in the upcoming version of the code FeynHiggs.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: HEINEMEYER, Sven (CSIC (Madrid, ES)); DOMINGO, Florian (DESY); PASSEHR, Sebastian (Sorbonne Universite); WEIGLEIN, Georg Ralf (Deutsches Elektronen-Synchrotron (DE))

Presenter: HEINEMEYER, Sven (CSIC (Madrid, ES))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **186** Type: **Talk (closed)**

(In)dependence of various LFV observables in the non-minimal SUSY

Tuesday, 24 July 2018 17:40 (20 minutes)

We investigate the muon anomalous magnetic moment, the μ⟶eγ branching ratio and the μ⟶e conversion rate in the nuclei from the point of view of the planned μ⟶e conversion experiments.

In the MSSM these processes are strongly correlated through tanβ enhanced contributions. We demonstrate how in the Minimal R-symmetric Supersymmetric Standard Model the μ⟶eγ branching ratio and the μ⟶e conversion rate in the nuclei give distinct bounds on the parameter space. We also consider the supersymmetric contributions to the muon anomalous magnetic moment, generated by a subset of topologies contributing to the LFV observables. We briefly discuss the generic implementation of the aforementioned observables into the FlexibleSUSY spectrum-generator generator.

Looking at the current μ⟶eγ searches, the analysis points to the need of constructing a dedicated μ⟶e conversion experiment to cover as large parameter space as possible in the non-minimal supersymmetric models.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: Dr KOTLARSKI, Wojciech (TU - Dresden); STOECKINGER-KIM, Hyejung (TU Dresden); Prof. STÖCKINGER, Dominik (TU Dresden)

Presenter: Dr KOTLARSKI, Wojciech (TU - Dresden)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **187** Type: **Talk (closed)**

Indirect detection of (Late-decoupling) Semi-Annihilating Dark Matter

Tuesday, 24 July 2018 17:00 (20 minutes)

Semi-annihilation describes non-decay processes with an odd number of external dark sector states. The canonical example is an initial state of two dark particles and a final state of one dark plus one or more standard model particles. It is a generic feature of dark matter whenever the symmetry group enforcing stability is not a discrete Z_2. Semi-annihilation changes the expected signals in current dark matter searches, weakening limits from direct and collider searches, but can still be probed using cosmic ray observations. We discuss generic features of semi-annihilating searches and derive model-independent bounds using effective operators. We additionally discuss the relation between semi-annihilation and kinetic decoupling of the dark and visible sectors. The scattering processes that maintain thermal contact are related by crossing symmetry to dark matter annihilation, which can have an important effect on thermal freeze out. However, interesting parameter space remains where the indirect signals today can be significantly enhanced. We illustrate this general feature using a specific example, a dark matter explanation of the AMS positron flux.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: SPRAY, Andrew (CoEPP, University of Melbourne)

Co-author: CAI, Yi (The University of Melbourne)

Presenter: SPRAY, Andrew (CoEPP, University of Melbourne)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **189** Type: **Talk (closed)**

The fate of the Littlest Higgs Model with T-parity under 13 TeV LHC Data

Wednesday, 25 July 2018 14:50 (20 minutes)

Little Higgs models are a class of models to solve the hierarchy
problem by protecting the Higgs mass at one loop with the help
of global symmetries.
We were studying the constraints by recasting the most prominent SUSY signatures like jets (and leptons) plus missing transverse energy.
In order to relax bounds from direct detection searches for dark matter we also consider the collider phenomenology for the case of T-parity violation.
Furthermore, we give prospects for the high-luminosity runs of the LHC.

Parallel Session

Alternatives to Supersymmetry

Primary authors: Dr DERCKS, Daniel (Uni. Hamburg); Prof. MOORTGAT-PICK, Gudrid (DESY, Uni. Hamburg); Dr REUTER, Juergen (DESY); SHIM, So Young (DESY)

Presenter: SHIM, So Young (DESY)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **190** Type: **Talk (closed)**

Towards the identification of the flavour structure of SUSY

Thursday, 26 July 2018 15:50 (20 minutes)

Despite the absence of experimental evidence, Supersymmetry remains attractive from the theoretical and phenomenological point of view. In order to comply with the stringent experimental constraints, non-minimal realizations of the theory have to be considered. While typical studies are carried out assuming minimal flavour violation (MFV), I will focus on the hypothesis of non-minimal flavour violation (NMFV) in the MSSM.

I will first show that this framework is viable with respect to current flavour constraints and also with respect to present LHC data. Moreover, it can be inspired from Grand Unification frameworks including flavour symmetries.

I will then discuss possibilities to disentangle the MFV and NMFV hypotheses based on the assumption of observing a squark-like state at the LHC.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: HERRMANN, Björn (LAPTh Annecy); BERNIGAUD, Jordan (LAPTh Annecy)

Presenter: HERRMANN, Björn (LAPTh Annecy)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **191** Type: **Talk (closed)**

Search for LFV Higgs and Flavon decays at future colliders

Wednesday, 25 July 2018 18:00 (20 minutes)

Models with extended Higgs sector predict that the diagonal Higgs couplings to fermions could deviate from the SM predictions, while non-diagonal flavor-violating Higgs couplings could appear too. We describe these possibilities within the context of multi-Higgs doublet models that employ the Froggart-Nielsen mechanism to generate the Yukawa hierarchies. The mixing of the Higgs doublets with the Flavon field induces plenty of interesting signals, including: corrections to the diagonal couplings of the SM-like Higgs, LFV Higgs decay h -> tau mu and the FCNC top decay $t \to ch$. Here we discuss the reach of LHC and VLHC to search for the LFV signals from the flavon decays.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: Prof. DIAZ-CRUZ, Lorenzo (FCFM and CIFFU BUAP)

Presenter: Prof. DIAZ-CRUZ, Lorenzo (FCFM and CIFFU BUAP)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **192** Type: **Talk (closed)**

Big-bang nucleosynthesis and Leptogenesis in CMSSM

Thursday, 26 July 2018 14:50 (20 minutes)

We have investigated the constrained minimal supersymmetric standard model with three right-handed Majorana neutrinos whether there still is a parameter region which is consistent with all existing experimental data/limits such as Leptogenesis and the dark matter abundance and we also can solve the Lithium problem. Using Casas-Ibarra parameterization, we have found that a very narrow parameter space of the complex orthogonal matrix elements where the lightest slepton can have a long lifetime, that is necessary for solving the Lithium problem. Further, under this condition, there is a parameter region that can give an explanation for the experimental observations. We have studied three cases of the right-handed neutrino mass ratio \mbox{\em (i)} $M_2 = 2 \times M_1$, \mbox{\em (ii)} $M_2 = 4 \times M_1$, \mbox{\em (iii)} $M_2 = 10 \times M_1$ while $M_3 = 40 \times M_1$ is fixed. We have obtained the mass range of the lightest right-handed neutrino mass that lies between 10^9 GeV and 10^{11} GeV. The important result is that its upper limit is derived by solving the Lithium problem and the lower limit comes from Leptogenesis. Calculated low-energy observables of these parameter sets such as BR($\mu \to e\gamma$) is not yet restricted by experiments and will be verified in the near future. This is based on the work arXiv:1803.07686 .

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Dr SATO, Joe (Saitama University)

Co-authors: YAMANAKA, Masato (Kyoto Sangyo University); SHIMOMURA, Takashi (Miyazaki University); TAKANISHI, Yasutaka (Saitama University); KUBO, Munehiro (Saitama University)

Presenter: Dr SATO, Joe (Saitama University)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **193** Type: **Talk (closed)**

Production of squarks at the LHC in R-symmetric SUSY

Wednesday, 25 July 2018 17:00 (20 minutes)

Experimental limits from LHC searches on the masses of SUSY states are becoming quite stringent, especially for the gluino of the MSSM. The MRSSM is an alternative supersymmetric model featuring an unbroken R-symmetry. This leads leads to the prediction of a Dirac-type gluino. Compellingly, it is natural for a Dirac gluino to have a large mass outside the current bounds. The Dirac nature also has a strong effect on the production cross section of squarks.

For an accurate prediction of the production strongly interacting SUSY states at the LHC next-to leading order corrections are relevant and need to be considered. Recently, these results become available for the case of SUSY QCD with a Dirac gluino. In this talk I will present results on how the production of strongly interacting MRSSM states at Run 2 of the LHC is constrained including these corrections. Special emphasis will also be put on a comparison to the MSSM.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: DIESSNER, Philip (DESY); KOTLARSKI, Wojciech (TU - Dresden); Prof. STÖCKINGER, Dominik (TU Dresden); KALINOWSKI, Jan Henryk (University of Warsaw (PL))

Presenter: DIESSNER, Philip (DESY)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **195** Type: **Talk (closed)**

Anatomy of b -> c decays

Monday, 23 July 2018 15:00 (20 minutes)

There have been recent excitement regarding certain B-decays both in the charged and neutral current sectors. In the charged sector, the measurement of R_D and R_{D^*} may point to the existence of Physics Beyond the Standard Model, and is thus worth discussing threadbare. Building on our earlier paper (JHEP 1701 (2017) 125), we carry out a comprehensive analysis of these anomalies in as model-independent a fashion as possible. Specifically, using just the six-dimensional SU(2)xU(1) gauge invariant Standard Model effective theory operators, we explicitly calculate the different tensions and correlations between certain neutral current decays and the $R_{D^{(*)}}$ anomalies. We explore the constraints that these neutral current processes impose on the possible explanations of the observed anomalies.

Additionally, we also consider the viability of the Composite Higgs paradigm (with and without leptoquarks) and partial compositeness as a natural explanation of the anomalies. We also show the various tensions (particularly in the $\Delta F = 2$ processes) without assuming a specific flavour structure in the composite Higgs sector.

Our new analysis (with Dr. D. Ghosh, Dr. A. Azatov, E. Venturini and F. Sgarlata) will be uploaded on arXiv soon.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: BARDHAN, Debjyoti (Ben Gurion University of the Negev)

Co-author: GHOSH, Diptimoy (ICTP)

Presenter: BARDHAN, Debjyoti (Ben Gurion University of the Negev)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **196** Type: **Talk (closed)**

Probing ~100 GeV wino-like dark matter at the LHC

Thursday, 26 July 2018 17:20 (20 minutes)

The Minimal Supersymmetric Standard Model (MSSM) predicts the existence of a total of four neutralinos, the lightest of which is one of the strongest cold dark matter (DM) candidates. The nature of this neutralino DM depends on the relative sizes of the bino, wino and higgsino mass parameters in the neutralino mass matrix. At the LHC, the trilepton channel, which is one of the most important modes for analysing certain Standard Model processes as well as for probing new physics, has been adapted for the supersymmetric DM search also. However, the selection criteria for events with three leptons and missing transverse momentum have mainly been defined assuming the DM to be bino-like. For a sufficiently large accumulated luminosity, the trilepton probe has been shown to carry promise for certain MSSM parameter space regions predicting such a DM. By carrying out a thorough signal-to-background analysis, we have established that the scope of this search channel extends to an interesting alternative candidate, the wino-like DM, also. In fact, for such a DM this topology can be sensitive to two different processes: (i) lightest chargino plus heavy neutralino production, and (ii) lightest neutralino plus heavier chargino production. The complementarity between these two modes ensures that, with slight optimisation of the cuts employed for event selection, the wino-like DM can become accessible at the LHC Run-II with an integrated luminosity as low as 100/fb, if it exists with a mass just above 100 GeV.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr MUNIR, Shoaib (KIAS, Seoul)

Co-authors: KHALIL, Shaaban (Center for Theoretical Physics); MORETTI, Stefano (Science and Technology Facilities Council STFC (GB)); Dr ABDALLAH, Waleed (Cairo University, Egypt)

Presenter: Dr MUNIR, Shoaib (KIAS, Seoul)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **197** Type: **Talk (closed)**

Mass-degenerate NMSSM Higgs bosons and the effects of quantum interference

Monday, 23 July 2018 16:00 (20 minutes)

The next-to-minimal supersymmetric Standard Model (NMSSM) contains two additional singlet-like Higgs bosons, one scalar and one pseudoscalar, besides the three neutral ones of the MSSM. A signature of either of these new Higgs bosons at the Large Hadron Collider (LHC) can prove crucial for establishing the non-minimal nature of supersymmetry. However, their masses are essentially free parameters of the theory, and it is possible for the singlet-like scalar to be almost mass-degenerate with the 125 GeV SM-like Higgs boson. When the mass difference between the two of them is comparable to the sum of their decay widths, their propagators can mutually interfere quantum mechanical. Thus, when calculating the cross section for a process with Higgs bosons as mediators, the complete Higgs propagator matrix ought to be taken into account. We performed a detailed analysis of the impact of the interference effects on the production of photon pairs with an invariant mass near 125 GeV in gluon fusion at the LHC. We found that these effects can become sizeable, which invalidates the commonly adopted approach of narrow-width approximation. Furthermore, there also exists the possibility of the new scalar being nearly mass-degenerate, alternatively, with the heavy MSSM-like scalar. When these scalars are very heavy, their partial decay widths in the di-photon channel are negligible. We, therefore, used the tau-tau decay channel instead, for investigating the interference effects for such heavy Higgs bosons also. We have found that, whether the mass-degenerate scalar pairs are light or heavy, owing to the poor mass resolutions of their respective final states, the LHC might not have sensitivity to the interference effects.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: Dr MUNIR, Shoaib (KIAS, Seoul)

Co-authors: DAS, Biswaranjan (IIT Guwahati); POULOSE, Poulose (IIT Guwahati); MORETTI, Stefano (Science and Technology Facilities Council STFC (GB))

Presenter: Dr MUNIR, Shoaib (KIAS, Seoul)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **198** Type: **Talk (closed)**

Matching BSM physics to the SMEFT and the Weak Hamiltonian with 1-loop accuracy

Tuesday, 24 July 2018 15:30 (20 minutes)

A systematic procedure to obtain the 1-loop low-energy effective Lagrangian resulting from integrating out the heavy fields of a given ultraviolet theory is presented in this talk. It is shown that the matching coefficients are determined entirely by the hard region of the functional determinant involving the heavy fields. This represents an important simplification with respect the conventional matching approach, where the full and effective theory contributions have to be computed separately and a cancellation of the infrared divergent parts has to take place. I will discuss how the method can be used to compute the non-SM interactions among SM particles at the electroweak scale from specific BSM setups (such as the MSSM or the 2HDM), but also to derive the constraints imposed by the SMEFT at 1-loop on the coefficients of the low-energy effective theory of quarks and leptons.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: RUIZ-FEMENIA, Pedro (Universidad Autónoma de Madrid); PORTOLES, Jorge (Instituto de Fisica Corpuscular); Dr FUENTES-MARTIN, Javier (University of Zurich)

Presenter: RUIZ-FEMENIA, Pedro (Universidad Autónoma de Madrid)

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **199** Type: **Talk (closed)**

Baryogenesis with the non-adiabatic Berry phase

Thursday, 26 July 2018 15:10 (20 minutes)

The geometric phase (Pancharatnam-Berry phase) results from the geometrical properties of the parameter space of the Hamiltonian. In this paper, we show that the non-adiabatic Berry phase can generate the effective chemical potential, which can bias the matter and the antimatter number densities without introducing the derivative coupling of the field. Our scenario is consistent with the Legendre transformation and gives the Hamiltonian in the expected form. The mechanism can be extended to more complex situations, which gives a natural but non-trivial extension of the spontaneous baryogenesis scenario.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: MATSUDA, Tomohiro (Saitama Institute of Technology); Dr ENOMOTO, Seishi (University of Florida)

Presenter: MATSUDA, Tomohiro (Saitama Institute of Technology)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **200** Type: **Talk (closed)**

New physics in b->c cbar s couplings? A model independent study

Monday, 23 July 2018 15:20 (20 minutes)

Effective b->c cbar s operators affect a range of B meson processes, providing a rich phenomenological testing ground for studies of new physics. It is often assumed that such operators will not generate a sizeable BSM contribution, however a comprehensive model independent treatment implies that some observables are sensitive to new physics effects, motivating a phenomenological study of the impact of these effects and the possible interplay between them.
In this talk I will show that by investigating the impact of BSM effects on B meson lifetime observables, radiative and rare decay, individual constraints upon various possible new physics scenarios are deduced. I highlight that renormalization group effects are important in linking charmed operators to rare and radiative decay, revealing a sensitivity upon chiral structure of operators, which plays an important role in constraining possible scenarios. Further, by allowing Wilson coefficient to be complex, new weak phases are introduced into decay amplitudes which yield non-SM effects in CP violating asymmetries providing an extra probe of new physics in charm couplings. In short, by considering many measurements in which charmed operators could contribute, this exploratory study provides useful constraints upon new physics signals.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: Ms LESLIE, Kirsten (University of Sussex)

Co-authors: Dr JÄGER, Sebastian (University of Sussex); Mr KIRK, Matthew (IPPP Durham); Prof. LENZ, Alexander (IPPP Durham)

Presenter: Ms LESLIE, Kirsten (University of Sussex)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **201** Type: **Talk (closed)**

Neutrino masses from Planck-scale lepton number breaking

Tuesday, 24 July 2018 14:50 (20 minutes)

We consider an extension of the Standard Model by right-handed neutrinos and we argue that, under plausible assumptions, a neutrino mass of O(0.1)eV is naturally generated by the breaking of the lepton number at the Planck scale, possibly by gravitational effects, without the necessity of introducing new mass scales in the model. Some implications of this framework are also briefly discussed.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: Prof. IBARRA, Alejandro (Technical University of Munich); Mr STROBL, Patrick (Technical University of Munich); Dr TOMA, Takashi (Technical University of Munich)

Presenter: Dr TOMA, Takashi (Technical University of Munich)

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **202** Type: **Talk (closed)**

Dark Matter Accretion in Neutron Stars

Monday, 23 July 2018 17:50 (20 minutes)

If Dark Matter (DM) interacts with nucleons and/or electrons it can be trapped in celestial bodies. For a Neutron Star (NS), DM accumulating in the center could form a core which could further gravitationally collapse into a black hole. The requirement that such collapses do not occur gives constraints on the DM mass and interaction strength. Such phenomenon crucially depends on the amount of DM that can accumulate in NS. In this talk, we re-evaluate in detail the maximum amount of DM that could be accumulated in NS by carefully considering the fact that neutrons form a highly degenerate fermi plasma. We find that for DM masses below 1 GeV constraints are significantly smaller than previously obtained in the literature.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr GARANI, Raghuveer (Universite Libre De Bruxelles)

Co-authors: Dr GENOLINI, Yoann (Universite Libre De Bruxelles); Dr HAMBYE, Thomas (Universite Libre De Bruxelles)

Presenter: Dr GARANI, Raghuveer (Universite Libre De Bruxelles)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **203** Type: **Talk (closed)**

Supersymmetric Dirac-Born-Infeld action from N=2 supergravity

Thursday, 26 July 2018 14:50 (20 minutes)

In this talk, we discuss the partial breaking of N=2 supergravity. It is known that the supersymmetric Dirac-Born-Infeld (DBI) type action appears as a Nambu-Goldstone mode of the partial breaking in the rigid N=2 theory. In this work, we try to reveal the supergravity couplings to the DBI type action on the basis of component and superspace approaches. We compare our action directly obtained from the N=2 supergravity with the previous works which only focus on the remaining N=1 supersymmetry. The super-Higgs mechanism and its phenomenological implications are also discussed.

Parallel Session

Formal Field Theory and Strings

Primary authors: ABE, Hiroyuki (Waseda University); AOKI, Shuntaro (Waseda University); IMAI, Sosuke; Dr SAKAMURA, Yutaka (Japan/KEK)

Presenter: AOKI, Shuntaro (Waseda University)

Session Classification: Formal Field Theory and Strings

Contribution ID: **204** Type: **Talk (closed)**

Hidden local $U(1)$ symmetry realizing a neutrinophilic two-Higgs-doublet model with dark matter

Monday, 23 July 2018 16:20 (20 minutes)

We discuss a neutrinophilic two Higgs doublet model realized by a hidden local $U(1)$ symmetry, where active neutrinos are Dirac type, and a fermionic DM candidate is naturally induced as a result of remnant symmetry. In addition, a physical Goldstone boson is arisen as a consequence of two types of gauge singlet bosons and contributes to the DM phenomenologies as well as additional neutral gauge boson. Then we will analyze the relic density of DM within the safe range of direct detection searches, and show the allowed region of dark matter mass. This presentation is based on arXiv:1709.06406.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: NOMURA, Takaaki (Korea Institute for Advanced Study); Dr OKADA, Hiroshi (NCTS, Taiwan)

Presenter: NOMURA, Takaaki (Korea Institute for Advanced Study)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **205** Type: **Talk (closed)**

Falsifying the pMSSM with Genetic Algorithms

Monday, 23 July 2018 15:00 (20 minutes)

Current experimental searches for new physics seem to have cornered the simplest versions of the Minimal Supersymmetric Standard Model (MSSM). Then, we are compelled to consider less constrained scenarios such as the phenomenological MSSM (pMSSM). However, scanning the parameter space of the pMSSM looking for configurations that fulfil all the experimental bounds is known to be a computationally intensive task, due to the high dimensionality of the model and because its predictions must be contrasted with an increasing number of datasets. We address this task, which is indeed an optimization problem, with a heuristic search technique, genetic algorithms (GAs). We consider the effectiveness of GAs, in assessing and analysing the pMSSM with its parameters defined at high energy. We demonstrate that with this approach it is entirely feasible to exclude the pMSSM at a relatively low computational cost, and to identify the main culprit that apparently it cannot be reconciled with the anomalous magnetic moment of the muon. Finally, this technique can be used to test new observables, we consider as an example the Fermi-LAT Galactic Centre excess and show that it is also not accommodated by the pMSSM, at least, within the region of the parameter space considered in this work.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Dr ROBLES, Sandra (The University of Melbourne)

Co-authors: CERDENO, David G. (University of Durham); ABEL, Steven Adam (University of Durham (GB))

Presenter: Dr ROBLES, Sandra (The University of Melbourne)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **206** Type: **Talk (closed)**

Probing Inelastic Dark Matter with Neutron Stars\

Monday, 23 July 2018 18:10 (20 minutes)

Neutron stars (NSs) are promising indirect probes for dark matter (DM), dark kinetic heating of NSs is within the reach of forthcoming infrared telescopes and only depends on the amount of accumulated DM. Inelastic DM is suppressed at tree level in direct detection experiments. Assuming that kinetic heating of NSs is only due to DM scattering and using an effective operator approach on fermionic DM that scatters inelastically, we show that NSs can set bounds on the cutoff scale of these operators for DM masses spanning several orders of magnitude regardless of momentum suppression.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr ROBLES, Sandra (The University of Melbourne)

Presenter: Dr ROBLES, Sandra (The University of Melbourne)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **207** Type: **Talk (closed)**

Perspectives of monojet searches at the LHC on supersymmetric Dark Matter

Thursday, 26 July 2018 18:20 (20 minutes)

The impact of the current searches at the LHC for monojets is compared to the current limits from direct searches for dark matter (DM) in the framework of the NMSSM. The DM annihilation cross section is ten orders of magnitude larger than limits on the scattering cross section. This can be explained, if the interactions are predominantly due to Higgs exchange, since the Higgs boson couples only weakly to the light quarks inside nuclei. The LHC limits cannot be visualized by a single exclusion contour in the usual cross section versus LSP mass plot in Supersymmetry, but the excluded points scatter, sometimes even below the neutrino floor from the diffuse neutrino background, a region hard to investigate by direct searches.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: DE BOER, Wim (KIT - Karlsruhe Institute of Technology (DE)); BESKIDT, Conny Renate (KIT - Karlsruhe Institute of Technology (DE)); KAZAKOV, Dmitri (JINR/ITEP)

Presenter: BESKIDT, Conny Renate (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **208** Type: **Talk (closed)**

Can we discover a light singlet-like NMSSM Higgs boson at the LHC?

Monday, 23 July 2018 15:00 (20 minutes)

In the next-to minimal supersymmetric standard model (NMSSM) an additional singlet-like Higgs boson with small couplings to the standard model (SM) particles is introduced. Although the mass can be well below the discovered 125 GeV Higgs boson its small couplings may make a discovery at the LHC difficult.
We use a novel scanning technique to efficiently scan the whole parameter space and determine the range of cross sections and branching ratios for a light singlet-like Higgs boson below 125 GeV. This allows to determine the perspectives for the future discovery potential at the LHC. Specific LHC benchmark points are proposed. A discovery of such a light Higgs singlet would strongly point to a singlino as a dark matter candidate.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: BESKIDT, Conny Renate (KIT - Karlsruhe Institute of Technology (DE)); DE BOER, Wim (KIT - Karlsruhe Institute of Technology (DE)); KAZAKOV, Dmitri (JINR/ITEP)

Presenter: BESKIDT, Conny Renate (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **209** Type: **Talk (closed)**

Asymptotic Scale Invariance, Electroweak Vacuum Stability and Higgs Inflation

Thursday, 26 July 2018 14:50 (20 minutes)

We discuss a possibility that our electroweak vacuum is absolutely stable even if the top Yukawa coupling is larger than the critical value. Such a scenario can be realized without introducing new particles if we adopt a renormalization prescription which respects the asymptotic scale invariance at the quantum level. Instead, the theory becomes non-renormalizable and the perturbative unitarity is violated at some energy scale. We argue that the perturbative computation of the Higgs effective potential is still justified and hence the quantum scale invariance can actually stabilize our vacuum. We also discuss the possibility of the Higgs inflation with uncertainties due to the violation of the perturbative unitarity.

Parallel Session

Cosmology and Gravitational Waves

Primary author: Dr SHIMADA, Kengo (EPFL)

Presenter: Dr SHIMADA, Kengo (EPFL)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **210** Type: **Talk (closed)**

Dark Matter, LHC signals and muon (g-2) in some SUSY-GUT's.

Wednesday, 25 July 2018 17:20 (20 minutes)

We compare models with a non-universal
gaugino and/or sfermion sector in different grand unification scenarios,
namely SO(10), SU(5), flipped SU(5) and Pati-Salam unification. We explore the different
constraints arising from LHC supersymmetry searches and dark
matter experiments. We also investigate whether the models can predict a
significant SUSY contribution to the muon g-2. We find that future LHC
searches are able to constrain the different SUSY GUT scenarios in a
complementary way with dark matter searches.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: GOMEZ, Mario E. (Universidad de Huelva); LOLA, Magda; SHAFI, qaisar (university of delaware); RUIZ DE AUSTRI, Roberto

Presenter: GOMEZ, Mario E. (Universidad de Huelva)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **211** Type: **Talk (closed)**

Spontaneous Leptogenesis in Continuum-Clockwork Axion Models

Wednesday, 25 July 2018 15:10 (20 minutes)

The mechanism of "spontaneous leptogenesis" — in which the matter-antimatter asymmetry is generated via motion of a scalar field coupled to the electroweak gauge bosons — provides an interesting alternative to more traditional thermal leptogenesis models. While an axion-like field is a natural candidate for these models, the observed asymmetry requires an axion mass so large it decays shortly after leptogenesis. In this talk, we demonstrate how effective axion potentials that arise from continuum clockwork models can yield simultaneously sufficient production of baryon asymmetry, and a stable dark matter candidate with the appropriate abundance. Moreover, we find non-trivial dynamics early in the axion field evolution which exhibit a "tracking" behavior — similar to that found in quintessence models — where the axion follows a radiation-like equation of state before undergoing coherent oscillations. As a result of these dynamics, axion-photon isocurvature perturbations are generically suppressed, thereby enlarging the viable parameter space for our model.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: Dr BAE, Kyu Jung (IBS-CTPU); Dr KOST, Jeff (Institute of Basic Science); Dr SHIN, Chang Sub (IBS-CTPU)

Presenter: Dr KOST, Jeff (Institute of Basic Science)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **212** Type: **Talk (closed)**

Gravitational waves from first order electroweak phase transition in models with the U(1)_X gauge symmetry

Wednesday, 25 July 2018 15:10 (20 minutes)

In this talk, we consider the standard model extension with a dark sector with the $U(1)_X$ Abelian gauge symmetry, which is spontaneously broken by dark Higgs mechanism. We discuss patterns of the electroweak phase transition and detectability of gravitational waves (GWs) when strongly first order phase transition occurs. We find the collider bounds exclude a part of parameter space that could generate detectable GWs otherwise. We show that GWs produced in the multi-step phase transitions can be detected by future observations such as DECIGO and LISA. Furthermore, we discuss the complementarity of dark photon searches or dark matter searches with the GW observations in the models of the dark gauge symmetry. This talk is based on arXiv:1802.02947 [hep-ph] in collaborated with Katsuya Hashino, Shinya Kanemura, Mitsuru Kakizaki and Pyungwon Ko.

Parallel Session

Cosmology and Gravitational Waves

Primary author: Dr MATSUI, Toshinori (Korea Inst. for Advanced Study (KIAS))

Co-authors: Mr HASHINO, Katsuya (University of Toyama (Osaka University)); Prof. KAKIZAKI, Mitsuru (University of Toyama); Prof. KANEMURA, Shinya (Osaka University); Prof. KO, Pyungwon (Korea Inst. for Advanced Study (KIAS))

Presenter: Dr MATSUI, Toshinori (Korea Inst. for Advanced Study (KIAS))

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **213** Type: **Talk (closed)**

Particle Physics with KM3NeT

Monday, 23 July 2018 15:40 (20 minutes)

Neutrino telescopes have a wide scientific scope both for particle physics and astroparticles. The next-generation undersea detector, KM3NeT, is currently under construction on two sites in the Mediterranean: ORCA, a dense detector located close to the French coast –near the location of its predecessor, ANTARES–, and ARCA, a sparse detector located close to the Italian coast. ORCA, with an energy threshold at the GeV scale, is designed to determine the neutrino mass ordering. It will also offer good sensitivity to parameters of neutrino oscillations like theta_23. Other topics related to neutrino properties are the search for tau neutrino appearance –which will allow to test the unitarity of the PMNS matrix–, non-standard neutrino interactions, sterile neutrinos and neutrino decays. In addition to this, another fundamental topic is the search for dark matter, for which neutrino telescopes have particular advantages: they offer a potential smoking gun for searches in the Sun and the best limits worldwide for dark matter annihilation at large masses (from searches in the Galactic Centre). In this talk we will review the potential for particle physics of KM3NeT and the construction status of the project.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: ZORNOZA GOMEZ, Juan de Dios (IFIC)

Presenter: ZORNOZA GOMEZ, Juan de Dios (IFIC)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **214** Type: **Talk (closed)**

N=1 superfield description of 6D SUGRA and its 4D effective theory

Thursday, 26 July 2018 14:30 (20 minutes)

We express 6D SUGRA in terms of 4D N=1 superfields. This description is useful when we consider extra-dimensional models and derive their 4D effective theories. We consider 6D SUGRA compactified on the sphere and the torus with 4D branes, and solve the superfield equations of motion under the assumption that the background preserves N=1 SUSY. Such N=1 description of the background solution enables a systematic derivation of 4D effective theory.

Parallel Session

Formal Field Theory and Strings

Primary authors: Prof. ABE, Hiroyuki (Waseda University); Mr AOKI, Shuntaro (Waseda University); Mr IMAI, Sosuke (Waseda University); Dr SAKAMURA, Yutaka (KEK)

Presenter: Dr SAKAMURA, Yutaka (KEK)

Session Classification: Formal Field Theory and Strings

Contribution ID: **216** Type: **Talk (closed)**

Results from the ANTARES neutrino Telescope and perspectives for KM3NeT

Monday, 23 July 2018 15:20 (20 minutes)

ANTARES, the deep-underwater Cherenkov neutrino telescope in the Northern hemisphere, has been taking data continuously since 2007. Its primary goal is the search for astrophysical neutrinos in the TeV-PeV range. Thanks to its excellent angular resolution, ANTARES has performed dedicated searches for promising neutrino source candidates and several interesting regions like the Galactic Plane or the Fermi Bubbles have been explored, using for the first time its sample of cascade events. The results on the search for Dark Matter with the ANTARES detector, looking for neutrinos from the Centre of Galaxy, from the Sun and from the Centre of the Earth will be presented. ANTARES is actively developing a manifold multi-messenger program: latest experimental results from searches of neutrinos from Gamma Ray Burst sources or neutrinos correlated with the recently discovered gravitational wave signals will be reported. So far no significant correlation with external observations has been detected. The high quality of the data provided by ANTARES and the competitiveness of the results achieved, despite the modest size of the detector if compared to IceCube, demonstrate the tremendous potential of the new, much larger array, KM3NeT. The status and the perspectives of the KM3NeT project for neutrino astronomy will be reported.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr NAVAS CONCHA, Sergio (Universidad de Granada (ES))

Presenter: Dr NAVAS CONCHA, Sergio (Universidad de Granada (ES))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **217** Type: **Talk (closed)**

Attacking QCD uncertainties in Monte Carlo event generators for gamma-ray dark matter searches

Monday, 23 July 2018 16:00 (20 minutes)

We discuss QCD uncertainties in the modelling of the gamma-ray energy spectra from Dark-Matter (DM) annihilation in the galaxy center and beyond.
Dark Matter particles, being neutral, cannot couple directly to photons.
Photons are instead produced as the result of the fragmentation and decay of the particles the DM annihilates into.
In phenomenological studies the photons energy spectra are typically computed using Monte Carlo event generators.
These results have however intrinsic uncertainties due to the specific model used and the choice in model parameters, which are difficult to asses and which are typically neglected.
We derive a new set of hadronisation parameters (tune) for the Pythia8 Monte Carlo generator from a fit to LEP data at the Z peak.
For the first time we derive a conservative set of uncertainties on the shower and hadronisation model parameters.
Their impact on the gamma-ray energy spectra from DM annihilation into different SM particles is evaluated. The spectra and their uncertainties are provided in tabulated form for future use.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: AMOROSO, Simone (Deutsches Elektronen-Synchrotron (DE)); SKANDS, Peter (Monash University (AU)); RUIZ DE AUSTRI, Roberto; CARON, Sascha (Nikhef National institute for subatomic physics (NL)); JUEID, Adil (Faculty of Sciences and Techniques, Tangier)

Presenter: AMOROSO, Simone (Deutsches Elektronen-Synchrotron (DE))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **218** Type: **Talk (closed)**

General bounds on hidden CFTs

Wednesday, 25 July 2018 14:30 (20 minutes)

I present the most general bounds we can make on operators in hidden CFTs, which are weakly coupled to the SM via a heavy mediator. The conformal symmetry dictates an unusual phase space for the generated particles, which led H. Georgi to coin the term 'Unparticles'. Using the unparticle formalism, we constrain a large class of hidden valley theories without the need to specify their particle and symmetry content.

Our novel result is a consistent theory of unparticle final states in a generic CFT, where previous searches specialised to specific unparticle operators, and its application to current experimental runs. The phenomenology includes collider searches (LHC 2) and low-E experiments.

Parallel Session

Alternatives to Supersymmetry

Primary authors: Mr MAX, Kevin (SNS Pisa); CONTINO, Roberto (Scuola Normale Superiore, Pisa); MISHRA, Rashmish (University of Maryland)

Presenter: Mr MAX, Kevin (SNS Pisa)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **219** Type: **Talk (closed)**

Multi-peaked signatures of primordial gravitational waves from multi-step electroweak phase transition

Wednesday, 25 July 2018 14:50 (20 minutes)

The first-order electroweak phase transition in the early universe could occur in multiple steps leading to specific multi-peaked signatures in the primordial gravitational wave (GW) spectrum. In this talk we argue that these signatures are generic phenomena in multi-scalar extensions of the Standard Model. In a simple example of such an extension, we study the emergence of reoccurring and nested vacuum bubble configurations and their role in the formation of multiple peaks in the GW spectrum. The conditions for potential detectability of these features by the forthcoming generation of interferometers are discussed.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: Dr MORAIS, Antonio (CIDMA, Aveiro University (P)); PASECHNIK, Roman (Lund university); Mr VIEU, Thibault (Ecole Normale Supérieure, Paris)

Presenter: Dr MORAIS, Antonio (CIDMA, Aveiro University (P))

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **220** Type: **Talk (closed)**

Light axino dark matter and freeze-in production

Wednesday, 25 July 2018 14:50 (20 minutes)

I consider the keV scale axino dark matter in the supersymmetric Dine-Fischler-Srednicki-Zhitnitsky (DFSZ) axion model. The axino dark matter is dominantly produced from freeze-in processes, and it decays into a monochromatic photon that can be measured by X-ray observations. However, keV scale dark matter normally has a tension with the constraints from Ly-alpha forest data. In this talk, I will present details of the freeze-in production of DFSZ axino dark matter that relieves the tension. I will also discuss how the bilinear R-parity violation lead to axino dark matter decay.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: Dr BAE, Kyu Jung (Institute for Basic Science); KAMADA, Ayuki (Institute for Basic Science); LIEW, Seng Pei (Technische Universit¨at M¨unchen); YANAGI, Keisuke (University of Tokyo)

Presenter: Dr BAE, Kyu Jung (Institute for Basic Science)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **221** Type: **Talk (closed)**

Gauge/Fermion Production in Axion Inflation

Thursday, 26 July 2018 14:30 (20 minutes)

A Chern-Simons coupling with a gauge field is common in axion inflation. It is well known that this coupling leads to interesting phenomenology via the resonant production of helical gauge fields; e.g., gravitational wave, magnetogenesis, leptogenesis, etc. In this talk, we extend the previous analysis to the case where chiral fermions are charged under this gauge field which couples with the inflaton via the Chern-Simons coupling. This is the case for instance with the SM gauge group. We discuss how this coupling modifies the phenomenology by the associated production of these chiral fermions.

Parallel Session

Cosmology and Gravitational Waves

Primary author: MUKAIDA, Kyohei (Kavli IPMU)

Co-author: DOMCKE, Valerie (SISSA)

Presenter: MUKAIDA, Kyohei (Kavli IPMU)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **222** Type: **Talk (closed)**

ANAIS-112: A test of DAMA/LIBRA dark matter signal at the Canfranc Underground Laboratory

Tuesday, 24 July 2018 15:10 (20 minutes)

For more than 20 years the DAMA/LIBRA collaboration has reported a positive annual modulation in the low-energy detection rate of their NaI(Tl) detectors with very high C.L., that has been recently updated to 12.9σ. The interpretation of this result as a WIMP signal in standard models is, however, in strong tension with the null results of other experiments. Therefore there is an urge to verify the DAMA result independently, using the same target and technique.
This is the goal of the ANAIS experiment, in operation at the Canfranc Underground Laboratory with 112 kg of NaI(Tl) scintillators. After a commissioning period, the dark matter data taking started in August 2017. Here we present details of the detectors performance (light collection, low energy calibration, event selection, stability..) and a detailed background model. We will also discuss the physics potential of the experiment.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: MARTINEZ, Maria (Universidad de Zaragoza); Dr AMARÉ, Julio (Universidad de Zaragoza); Mr COARASA, Ivan (Universidad de Zaragoza); CEBRIAN, Susana (Universidad de Zaragoza); Dr GARCÍA, Eduardo (Universidad de Zaragoza); Dr OLIVÁN, Miguel Ángel (Universidad de Zaragoza); Dr ORTIGOZA, Ysrael (Universidad de Zaragoza); Mr ORTIZ DE SOLÓRZANO, Alfonso (Universidad de Zaragoza); Dr PUIMEDÓN, Jorge (Universidad de Zaragoza); Dr SALINAS, Ana (Universidad de Zaragoza); Dr SARSA, Maria Luisa (Universidad de Zaragoza); Dr VILLAR, José Ángel (Universidad de Zaragoza); Dr VILLAR, Patricia (Universidad de Zaragoza)

Presenter: MARTINEZ, Maria (Universidad de Zaragoza)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **223** Type: **Talk (closed)**

Flavour Anomalies in Rare Decays at LHCb

Monday, 23 July 2018 16:20 (21 minutes)

Rare decays are powerful probes for Physics beyond the Standard Model (SM), as new particles can have a large impact on physics observables. Recent results on lepton universality tests and measurements of branching fractions and angular distributions of rare b->sll decays have shown tensions with the SM predictions. The LHCb experiment is ideally suited for the study of the these flavour anomalies, due to its large acceptance, precise vertexing and powerful particle identification capabilities. The latest results from LHCb on the flavour anomalies will be presented and their interpretation will be discussed.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); RAMOS PERNAS, Miguel (Universidade de Santiago de Compostela (ES))

Presenter: RAMOS PERNAS, Miguel (Universidade de Santiago de Compostela (ES))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **224** Type: **Talk (closed)**

CP violation in B decays at LHCb

Monday, 23 July 2018 16:00 (20 minutes)

Precision measurements of CP violating observables in b hadron decays are powerful probes to search for physics effects beyond the Standard Model. The most recent results on CP violation in the decay, mixing and interference of b hadrons obtained by the LHCb Collaboration will be presented, with particular focus on results obtained exploiting the data collected during the Run 2 of LHC.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); GARCIA PARDINAS, Julian (Universitaet Zuerich (CH))

Presenter: GARCIA PARDINAS, Julian (Universitaet Zuerich (CH))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **225** Type: **Talk (closed)**

Charm Mixing and CPV at LHCb

Tuesday, 24 July 2018 18:00 (20 minutes)

LHCb has collected the world's largest sample of charmed hadrons. This sample is used to measure $D^0 - \bar{D}^0$ mixing and to search for direct and indirect CP violation. New measurements from several decay modes are presented.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary authors: MUELLER, Katharina (Universitaet Zuerich (CH)); ALEXANDER, Michael Thomas (University of Glasgow (GB))

Presenter: ALEXANDER, Michael Thomas (University of Glasgow (GB))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **227** Type: **Talk (closed)**

Sudakov log resummation for indirect detection of heavy WIMP dark matter

Tuesday, 24 July 2018 17:40 (20 minutes)

In some models for WIMP dark matter, radiative corrections dominate over the LO contributions in the computation of annihilation cross sections relevant for indirect detection. These corrections need to be resummed to all orders in perturbation theory for theoretical predictions to be sensible.

In this talk I will employ -and briefly review- resummation methods that are traditionally used in other contexts (colliders, etc.) in order to mitigate those large radiative corrections that, on top of the Sommerfeld effect, are encountered in the phenomenology of heavy DM models. Although most of the discussion can be applied to a larger family of models and detection channels, I will focus on the pure wino model and the spectral gamma-ray line feature.

More specifically, we use the soft collinear effective theory (SCET) approach to resum the large Sudakov corrections (at NLL' accuracy) for the computation of the semi-inclusive photon energy spectrum in $\chi 0 \chi 0 \longrightarrow \gamma + X$ in the vicinity of the maximal photon energy $E\gamma = m\chi$.

Results and phenomenological aspects in light of the CTA gamma-ray telescope will of course be also presented and discussed.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: VOLLMANN, Martin (Technische Universität München (TUM)); BENEKE, Martin (Technische Universitaet Muenchen (DE)); BROGGIO, Alessandro; Mr HASNER, Caspar (Technical University of Munich)

Presenter: VOLLMANN, Martin (Technische Universität München (TUM))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **228** Type: **Talk (closed)**

Self-interacting dark matter and muon $g-2$ in a gauged $\mathrm{U}(1)_{L_\mu - L_\tau}$ model

Wednesday, 25 July 2018 15:50 (21 minutes)

We construct a self-interacting dark matter model that could simultaneously explain the observed muon anomalous magnetic moment. It is based on a gauged $\mathrm{U}(1)_{L_\mu - L_\tau}$ extension of the standard model, where we introduce a pair of vector-like fermions as the dark matter candidate and a new Higgs boson to break the symmetry at the 10 MeV scale. The new gauge boson has sizable contribution to muon $(g-2)$, while being consistent with other experimental constraints. The $\mathrm{U}(1)_{L_\mu - L_\tau}$ Higgs boson acts as a light force carrier, mediating dark matter self-interactions with a velocity-dependent cross section. It is large enough in galaxies to thermalize the inner halo and explain the diverse rotation curves and diminishes towards galaxy clusters. Since the light mediator dominantly decays to the $\mathrm{U}(1)_{L_\mu - L_\tau}$ gauge boson and neutrinos, the astrophysical and cosmological constraints are weak. We study thermal evolution of the model in the early Universe and derive a lower bound on the gauge boson mass.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: YANAGI, Keisuke (University of Tokyo)

Co-authors: KAMADA, Ayuki (IBS-CTPU); YU, Hai-Bo (University of California, Riverside); KANETA, Kunio

Presenter: YANAGI, Keisuke (University of Tokyo)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **229** Type: **Talk (closed)**

GW forest from the string axiverse

Wednesday, 25 July 2018 14:30 (20 minutes)

We study emission processes of gravitational waves (GWs) from string axions with various masses. First, we clarify the conditions of the onset of violent parametric amplification of inhomogeneous axions. Then, we investigate the fate of the instability with lattice simulations. We analyze GW production processes due to the axion dynamics and find the pre-oscillon formation stage is important for GW production. Finally, we argue that there appear peaks of GW spectrum at various frequencies, dubbed the GW forest. Thus, the string axiverse could be scientific target of the future multi-frequency gravitational wave observations.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: Prof. SODA, Jiro (Kobe University); Dr KITAJIMA, Naoya (Nagoya University); Dr URAKAWA, Yuko (Nagoya University)

Presenter: Prof. SODA, Jiro (Kobe University)

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **230** Type: **Talk (closed)**

Pure higgsinos: a status update

Tuesday, 24 July 2018 14:30 (20 minutes)

Pure higgsinos are among the simplest and best-motivated candidates for a weakly-interacting thermal relic. However they are rather elusive, evading easy constraint by experiment due to their weak interactions with ordinary matter and small inter-state splittings. I will review the current experimental constraints on pure higgsinos, and present ways in which we can improve the sensitivity to such compressed weak states at current and future hadron colliders.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: Dr MAHBUBANI, Rakhi (EPFL); ZURITA, José Francisco (KIT)

Presenter: Dr MAHBUBANI, Rakhi (EPFL)

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **231** Type: **Talk (closed)**

Searches for heavy resonances decaying into Z, W and Higgs bosons at CMS

Thursday, 26 July 2018 14:30 (20 minutes)

A summary of searches for heavy resonances with masses exceeding 1 TeV decaying into dibosons is presented, performed on data produced by LHC pp collisions at $\sqrt{s}$ = 13 TeV and collected with the CMS detector during 2016 and 2017. The common feature of these analyses is the boosted topology, namely the decay products of the considered bosons (both electroweak W, Z bosons and the Higgs boson) are expected to be highly energetic and close in angle, leading to a non-trivial identification of the quarks and leptons in the final state. The exploitation of jet substructure techniques allows to increase the sensitivity of the searches where at least one boson decays hadronically. Various background estimation techniques are adopted, based on data-MC hybrid approaches or relying only in control regions in data. Results are interpreted in the context of the Warped Extra Dimension and Heavy Vector Triplet theoretical models, two possible scenarios beyond the standard model.

Parallel Session

Alternatives to Supersymmetry

Primary author: SCHAFER, Daniela (KIT - Karlsruhe Institute of Technology (DE))

Presenter: SCHAFER, Daniela (KIT - Karlsruhe Institute of Technology (DE))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **232** Type: **Talk (closed)**

Search for new resonances coupling to third generation quarks at CMS

Wednesday, 25 July 2018 16:10 (20 minutes)

We present an overview of searches for new physics with top and bottom quarks in the final state, using proton-proton collision data collected with the CMS detector at the CERN LHC at a center-of-mass energy of 13 TeV. The results cover non-SUSY based extensions of the SM, including heavy gauge bosons, 3rd generation leptoquarks, or excited third generation quarks. Decay channels to vector-like top partner quarks, such as T', are also considered. We explore the use of jet substructure techniques to reconstruct highly boosted objects in events, enhancing the sensitivity of these searches.

Parallel Session

Alternatives to Supersymmetry

Primary author: ERBACHER, Robin (University of California Davis (US))

Presenter: ERBACHER, Robin (University of California Davis (US))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **233** Type: **Talk (closed)**

Searches for Massive Vector-like Quarks at CMS

Wednesday, 25 July 2018 15:50 (20 minutes)

We present results of searches for massive vector-like top and bottom quark partners using proton-proton collision data collected with the CMS detector at the CERN LHC at a center-of-mass energy of 13 TeV. Single and pair production of vector-like quarks are studied, with decays into a variety of final states, containing top and bottom quarks, electroweak gauge and Higgs bosons. We search using several categories of reconstructed objects, from multi-leptonic to fully hadronic final states. We set exclusion limits on both the vector-like quark mass and cross sections, for combinations of the vector-like quark branching ratios.

Parallel Session

Alternatives to Supersymmetry

Primary author: IORIO, Alberto Orso Maria (Universita e sezione INFN di Napoli (IT))

Presenter: IORIO, Alberto Orso Maria (Universita e sezione INFN di Napoli (IT))

Session Classification: Alternatives to Supersymmetry

Contribution ID: **234** Type: **Posters (last call deadline 30th June)**

Search for Supersymmetry in Events with a Higgs Decaying to Two Photons Using the Razor Variables in CMS

A search for supersymmetry is carried out in proton-proton collisions with a center of mass energy of 13 TeV and an integrated luminosity of 35.9 fb−1 collected with the CMS experiment at the CERN LHC. Events are selected by requiring one Higgs boson candidate decaying into two photons in association with at least one jet. Events are categorized according to the properties of the Higgs boson candidate(s) and H(Z)bb candidate(s). The razor variables (MR and R^2) are used to improve discrimination between SUSY signals and the standard model backgrounds. The search is carried out by fitting the diphoton invariant mass distribution in each search region. The results of the search are interpreted in the context SUSY simplified models of bottom squark production and electroweak productions.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: MAO, Jiajing (California Institute of Technology (US))

Presenter: MAO, Jiajing (California Institute of Technology (US))

Contribution ID: **235** Type: **Talk (closed)**

Results of the WIMP search with the XENON1T experiment

Tuesday, 24 July 2018 14:30 (20 minutes)

XENON1T is a direct dark matter search experiment, currently taking data at the Laboratori Nazionali del Gran Sasso (LNGS), Italy, and the first multi-ton scale detector of this kind. The experiment is based on a xenon dual-phase (liquid-gas) time projection chamber with ~2000 kg of target mass (out of 3200 kg total xenon mass), exploiting both scintillation and ionization signals to discriminate neutrons and Weakly Interacting Massive Particles (WIMPs) from electronic recoil background.
During the first data run of 34 live days, XENON1T reached the lowest electronic recoil background achieved in a dark matter detector and set the most stringent limit to spin-independent WIMP-nucleon elastic scattering, to $7.7\times10^{-47}\mathrm{cm}^2$ cross section for a 35 GeV/c^2 WIMP mass at 90% confidence level.
In February 2018 XENON1T has completed a longer science run, collecting 279 live days of data. In this talk we will present the results of the WIMP search with the XENON1T experiment.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Ms AGOSTINI, Federica (Department of Physics and Astrophysics, University of Bologna and INFN-Bologna, 40126 Bologna, Italy)

Presenter: Ms AGOSTINI, Federica (Department of Physics and Astrophysics, University of Bologna and INFN-Bologna, 40126 Bologna, Italy)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **241** Type: **Talk (closed)**

Unassociated Gamma-ray Sources as Targets for Indirect DM Detection with Fermi-LAT

Wednesday, 25 July 2018 18:00 (20 minutes)

We perform a search of Dark Matter (DM) subhalo candidates among unassociated catalogued sources present in the most recent Fermi-LAT point-source catalogs (3FGL, 2FHL and 3FHL). These LCDM-predicted DM subhalos are promising candidates for gamma-ray emission from WIMP annihilation in the LAT energy band. Several selection criteria are applied, based on the expected properties of the DM-induced emission from DM subhalos, which allow us to significantly reduce the list of potential candidates. Then, by characterizing the LAT sensitivity to DM subhalos and by comparing our remaining candidates' list to state-of-the-art predictions based on the Via Lactea II N-body cosmological simulation, we place conservative and robust constraints on the annihilation cross section as a function of DM particle mass. These complementary constraints are comparable to those obtained from LAT observations of dwarf galaxies.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Mr CORONADO-BLÁZQUEZ, Javier (Instituto de Física Teórica (IFT UAM-CSIC))

Presenter: Mr CORONADO-BLÁZQUEZ, Javier (Instituto de Física Teórica (IFT UAM-CSIC))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **242** Type: **Talk (closed)**

Precise Higgs mass predictions in the (N)MSSM

Tuesday, 24 July 2018 17:25 (25 minutes)

The discovery of the Higgs boson with a mass of 125.09 GeV significantly constrains the allowed parameter space of the many SUSY models that predict the mass of the lightest Higgs boson to be of the order of the Z mass at tree-level. In these models, among which the MSSM is probably the most studied, large loop corrections are necessary to obtain a light Higgs boson mass compatible with the experimentally measured value. Large corrections, however, lead to a large uncertainty, making a precise Higgs mass prediction very challenging in the viable MSSM parameter space.

In this talk I review recent developments regarding the precision prediction of the lightest CP-even Higgs boson mass in the real (N)MSSM. Different calculational methods, such as fixed-order, effective field theory or hybrid calculations are presented and compared in viable (N)MSSM parameter regions regarding their precision in the Higgs mass prediction.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: VOIGT, Alexander (RWTH Aachen)

Presenter: VOIGT, Alexander (RWTH Aachen)

Session Classification: Precision Calculations and MC tools

Contribution ID: **243** Type: **Talk (closed)**

Investigating sleptons with smaller mass gaps at the LHC and indirect detection experiments

Thursday, 26 July 2018 18:20 (20 minutes)

Sparticls with smaller mass gaps are used successfully to understand the correct dark matter content of the universe. In this talk, I will discuss slepton pair-production processes with soft leptons (plus at least one jet) and small missing transverse energyassociated with a mass difference between the lightest neutralino and the lightest slepton (Δm) is ⊠60 GeV. We utilize the angular separation of the leptons from each other and from the missing transverse energy, as well as the angular separation between the jet and the missing transverse energy, to distinguish signal from background events. Using our search strategy the LHC will be able to exclude m_{\tilde l}≈200 GeV for Δm⊠60 GeV at 1.5−3σ with 1000 fb^{−1} of integrated luminosity. Although we focus on a particular model, the results generalize to a variety of scenarios in which the dark matter and a leptonic partner are nearly degenerate in mass, and especially to scenarios featuring a scalar mediator. I would also investigate thes dark matter scenarios in the indirect detection experiments.

Base on papers: Phys.Rev. D96 (2017) no.7, 075037, Phys.Rev. D91 (2015) no.5, 055025, to appear.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: Prof. DUTTA, Bhaskar (Texas A&M University (US))

Presenter: Prof. DUTTA, Bhaskar (Texas A&M University (US))

Session Classification: Supersymmetry: Models, Phenomenology and Experimental Results

Contribution ID: **245** Type: **Talk (closed)**

Color Unified Dynamical Axion

Thursday, 26 July 2018 17:20 (20 minutes)

In this talk I present a model with an enlarged color sector which solves the strong CP problem via new massless fermions. QCD color is unified with another non-Abelian group with a large confinement scale. The spontaneous breaking of the unified color group provides a source of naturally large axion mass due to small size instantons, and as a result no very light axions are present in the low-energy spectrum. The axion scale may be not far from the TeV region which translates to observable signals at colliders. This model naturally enlarges the parameter space for axions which solve the strong CP problem well beyond that of invisible axion models.

Parallel Session

Alternatives to Supersymmetry

Primary authors: GAVELA LEGAZPI, Belen (Universidad Autonoma de Madrid (ES)); Prof. GAILLARD, Mary K. (UC Berkeley and LBNL); QUILEZ LASANTA, Pablo (Universidad Autónoma de Madrid and IFT UAM/CSIC); Dr HOUTZ, Rachel (Universidad Autónoma de Madrid and IFT UAM/CSIC); DEL REY, Rocío (Universidad Autónoma de Madrid - IFT)

Presenter: Dr HOUTZ, Rachel (Universidad Autónoma de Madrid and IFT UAM/CSIC)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **247** Type: **Talk (closed)**

Slepton pair and electroweakinos associated production at NLO+NLL with resummation-improved parton densities for the LHC Run-II

Tuesday, 24 July 2018 15:42 (24 minutes)

We make use of the recently released threshold-resummation improved PDF sets to consistently calculate theoretical predictions for slepton pair production and electroweakinos associated production at NLO+NLL accuracy. The updated cross sections have been carried out for the ongoing Run-II of the LHC and for the relevant processes that are considered in experimental searches. We study the cases of phenomenological interest concerning left-handed selectron/smuon, right-handed and maximally mixed stau production and the electroweakinos in their mostly Higgsinos and mostly gauginos configuration. A factorisation method is
applied to exploit the (smaller) PDF uncertainty of the global PDF sets and at the same time to avoid the issues arising in the refitting of threshold-resummation improved PDF replicas in Mellin space. The reduction of the scale uncertainty due to the resummation instead is taken into account explicitly. Accordingly to the expectations, we find that the effects of the resummation in the fit of the PDFs partially compensate the enhancement of cross section which typically follows the resummation in the partonic matrix elements.

Parallel Session

Precision Calculations and MC tools

Primary authors: FIASCHI, Juri (Westfälische Wilhelms-Universität Münster); KLASEN, Michael

Presenter: FIASCHI, Juri (Westfälische Wilhelms-Universität Münster)

Session Classification: Precision Calculations and MC tools

Contribution ID: **248** Type: **Talk (closed)**

Dark matter searches with ground based Cherenkov gamma-ray telescopes

Monday, 23 July 2018 15:00 (20 minutes)

A promising way to identify the nature of dark matter (DM) and to measure its
properties and spatial distribution is to search for the gamma rays produced in annihilation or decay of DM particles in the local Universe.
In particular, ground-based Cherenkov gamma-ray telescopes are sensitive to WIMPs of mass above ~100 GeV. The current generation of instruments, such as H.E.S.S., MAGIC and VERITAS have conducted deep observations searching for such DM signals. In the near future, the next-generation Cherenkov Telescope Array, will increase the sensitive of these searches by almost one order of magnitude.
In this talk I will review the experimental current status and future prospects of DM indirect searches with Cherenkov telescopes.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr RICO, Javier (IFAE-BIST)

Presenter: Dr RICO, Javier (IFAE-BIST)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **249** Type: **Talk (closed)**

Decays of (more or less) exotic Higgs bosons

Tuesday, 24 July 2018 16:06 (24 minutes)

In this talk, the status of the predictions for the partial decay widths of different more or less exotic Higgs bosons, i.e. SM-like Higgs bosons in extensions of the Standard Model as well as additional neutral or charged Higgs bosons, will be discussed. I will comment on different possible parameter definitions and the resulting consequences. In particular, I will report on recent results for Higgs decays to four fermions within the Two-Higgs-Doublet model and the extension of Prophecy4f.

Parallel Session

Precision Calculations and MC tools

Primary author: RZEHAK, Heidi Angelika (Syddansk Universitet (DK))

Presenter: RZEHAK, Heidi Angelika (Syddansk Universitet (DK))

Session Classification: Precision Calculations and MC tools

Contribution ID: **250** Type: **Talk (closed)**

Weak Gravity Conjecture constraints on the SM and Beyond

Thursday, 26 July 2018 15:30 (21 minutes)

It is known that not every effective field theory could be embedded in quantum gravity, but only those which are consistent with the QG conjectures. Does these constraints have an impact in low energy physics? Recently, Ooguri and Vafa argued using a strong approach of the Weak Gravity Conjecture that non-supersymmetric stable AdS vacua are incompatible with quantum gravity. It is also known that compactifying the Standard Model to 3 or 2 dimensions can give rise to AdS vacua. Using the fact that those vacua must be absent, several constraints are set on the SM and BSM particles, obtaining a lower bound on the cosmological constant in terms of the masses of the neutrinos. Moving forward one can translate those into an upper bound for the EW scale around the TeV range.

Parallel Session

Formal Field Theory and Strings

Primary authors: MARTIN-LOZANO, Victor (IFT-UAM/CSIC); VALENZUELA, Irene; IBANEZ SANTIAGO, Luis Enrique (Universidad Autonoma de Madrid (ES))

Presenter: MARTIN-LOZANO, Victor (IFT-UAM/CSIC)

Session Classification: Formal Field Theory and Strings

Contribution ID: **251** Type: **Talk (closed)**

TeV Astroparticle Physics: Recent Highlights from VERITAS

Tuesday, 24 July 2018 16:10 (20 minutes)

VERITAS is a ground-based gamma-ray observatory consisting of an array of four atmospheric Cherenkov telescopes located in southern Arizona, USA. VERITAS carries out an extensive observation program of the gamma-ray sky at energies above 0.1 TeV (VHE). The majority of the sources detected by VERITAS are active galactic nuclei, with gamma-ray emission originating in their relativistic jets. TeV observations of active galaxies help us constrain models of leptonic and hadronic particle acceleration processes in the relativistic jets of blazars. Additionally, VHE observations of blazars can be used to constrain the spectral energy distribution of the extragalactic background light (EBL), and the strength and correlation length of the intergalactic magnetic field (IGMF). Observations by VERITAS of the Galactic center and nearby dwarf spheroidal galaxies provide constraints on particle dark matter with masses above a few hundred GeV. VERITAS also plays a key role in multi-messenger astrophysics, operating at an opportune moment for making new discoveries. As both gamma-rays and neutrinos are produced in hadronic interactions, a joint study has the potential for revealing powerful cosmic accelerators. VERITAS looks for connections between very-high-energy gamma-rays and astrophysical neutrinos by following up on highly-energetic neutrinos discovered by IceCube. In this talk I will present some recent highlights of particle-astrophysics studies carried out with VERITAS.

Parallel Session

Dark Matter, Astroparticle Physics

Primary authors: Prof. MUKHERJEE, Reshmi (Barnard College, Columbia University); VERITAS COLLABORATION

Presenter: Prof. MUKHERJEE, Reshmi (Barnard College, Columbia University)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **252** Type: **Posters (last call deadline 30th June)**

R-parity Conserving Minimal SUSY U(1)x Model

We propose a simple gauged U(1)x extension of the minimal supersymmetric Standard Model (MSSM), where R-parity is conserved as usual in the MSSM. The U(1)_X group is a linear combination of the B-L (baryon number minus lepton number) U(1) and the SM U(1)_Y hyper-charge gauge groups. Three MSSM singlet chiral multiplets with a unit U(1)_X charge are introduced, ensuring the model free from gauge and gravitational anomalies. We assign an odd R-parity for two of the singlet chiral multiplets and hence they are identified with the right-handed neutrino superfields, while an even R-parity is assigned to the other one (Φ). The scalar component of Φ plays the role of a Higgs field to break the U(1)x symmetry through its negative mass squared, which is radiatively generated by the renormalization group running of soft supersymmetry (SUSY) breaking parameters from a high energy. This radiative U(1)x symmetry breaking leads to its breaking scale being at the TeV naturally. Because of our novel R-parity assignment, three light neutrinos are Dirac particles with one massless state. Since R-parity is conserved, the lightest neutralino is a prime candidate of the dark matter as usual. In our model, the lightest eigenstate of the mixture of the U(1)x gaugino and the fermionic component of Φ appears as a new dark matter candidate. We investigate phenomenology of this dark matter particle. We also discuss collider phenomenology of our model. In particular, the U(1)x gauge boson (Z'), once discovered at the Large Hadron Collider, can be a probe to determine the number of (right-handed) Dirac neutrinos with its invisible decay width, in sharp contrast with the conventional U(1)x extension of the SM or MSSM where the right-handed neutrinos are heavy Majorana particles and decay to the SM leptons.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: Dr TAKAHASHI, Daisuke; Dr ODA, Satsuki; Prof. OKADA, Nobuchika (U.A., USA); Dr PAPAPIETRO, Nathan

Presenter: Dr TAKAHASHI, Daisuke

Contribution ID: **253** Type: **Posters (last call deadline 30th June)**

Non-minimal quartic inflation in classically conformal U(1)' extended standard model

A classically conformal U(1)′ extended Standard Model (SM)
is a simple and well-motivated extension of the SM,
where a new anomaly free U(1)′ gauge symmetry is introduced
along with a U(1)′ Higgs field Φ and three right-handed neutrinos.
In this model, the U(1)′ gauge symmetry is broken
by the Coleman-Weinberg mechanism naturally at the TeV scale,
which subsequently triggers the electroweak symmetry breaking.
In this context, we consider quartic inflation with non-minimal gravitational coupling,
where the U(1)′ Higgs field Φ is identified with inflation.
Through the Coleman-Weinberg mechanism, the quartic coupling of Φ
has a relation with the U(1)′ gauge coupling and the Majorana Yukawa couplings
of the right-handed neutrinos, and as a result
the inflationary predictions correlate with the gauge coupling and the Majorana Yukawa couplings.
Combining the constraints from the electroweak vacuum stability,
the search result for a U(1)′ boson resonance at the LHC Run-2 and the Planck 2015 results,
we identify a phenomenologically viable parameter space.

Parallel Session

Cosmology and Gravitational Waves

Primary authors: Dr ODA, Satsuki (OIST, Japan); Dr TAKAHASHI, Dai-suke (OIST, Japan); Prof. OKADA, Nobuchika (Univercity of Alabama, USA); Dr RAUT, Digesh (University of Alabama)

Presenter: Dr ODA, Satsuki (OIST, Japan)

Contribution ID: **254** Type: **Talk (closed)**

Determination of the Higgs masses in the MSSM with heavy superparticles

Tuesday, 24 July 2018 17:00 (25 minutes)

I will review recent progress in the calculation of the Higgs masses in various MSSM scenarios with heavy superparticles. I will describe advances in the calculation of the matching conditions for the couplings of the EFT valid below the SUSY scale, in the combination of the resummed logarithmic corrections obtained in the EFT approach with the existing fixed-order calculations of the Higgs masses, and in the estimation of the residual theoretical uncertainties. I will also describe the implementation of these results in several public codes for the computation of the MSSM mass spectrum.

Parallel Session

Precision Calculations and MC tools

Primary author: SLAVICH, Pietro (LPTHE Paris)

Presenter: SLAVICH, Pietro (LPTHE Paris)

Session Classification: Precision Calculations and MC tools

Contribution ID: **255** Type: **Talk (closed)**

Searches for BSM Effects at BaBar

Tuesday, 24 July 2018 18:20 (20 minutes)

We report on multiple recent searches for supersymmetric, LFV/LNV, and other BSM effects with data collected by the BaBar experiment at the PEP-II e+e- collider. Using the entire BaBar dataset, we report the results of searches for: 1) the rare decay D0 -> Kpie+e-, and generic LFV/LNV D -> hh'll' decays; 2) Y(3S) -> e+mu- decays; and 3) beyond-SM T- and CP-violating effects in neutral B decays to charmonium.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: ALBERT, Justin (University of Victoria (CA))

Presenter: ALBERT, Justin (University of Victoria (CA))

Session Classification: BSM aspects of Flavour and Neutrino Physics

Contribution ID: **257** Type: **Talk (closed)**

Bottom and strange Yukawa couplings at the NNLO in the MSSM

Monday, 23 July 2018 17:30 (25 minutes)

I will review the calculation of the SUSY-QCD two-loop corrections to the strange and bottom Yukawa couplings in the MSSM. They include the resummation of the dominant corrections for large values of tan(beta), as well as the subleading terms induced by the trilinear Higgs couplings A_b,s. The phenomenological impact of the calculation will also be discussed.

Parallel Session

Precision Calculations and MC tools

Primary author: GHEZZI, Margherita (Paul Scherrer Institut)

Presenter: GHEZZI, Margherita (Paul Scherrer Institut)

Session Classification: Precision Calculations and MC tools

Contribution ID: **259** Type: **Talk (closed)**

Accelerated Cosmic Expansion and the Dark Energy Survey

Thursday, 26 July 2018 18:00 (20 minutes)

The striking discovery that the expansion of the Universe is not slowing down but accelerating has turned into one of the main mysteries in Cosmology. Large observational campaigns are being developed to seed light on this and other problems. I will briefly review this effort and then discuss The Dark Energy Survey (DES) : a state-of-the-art large-scale galaxy survey designed to understand, primarily, such acceleration by mapping 5000 deg^2 measuring the positions and shapes for 300 million galaxies up to redshift ~ 1, the light-curves of several thousand supernovae, and the masses of tens of thousands of galaxy clusters. I will present the latest cosmological results from the first year of observations, in particular those related to the combination of large-scale structure and weak gravitational lensing, and how they compare with those from other data-sets.

Parallel Session

Cosmology and Gravitational Waves

Primary author: CROCCE, Martin (Institute for Space Science (IEEC-CSIC))

Presenter: CROCCE, Martin (Institute for Space Science (IEEC-CSIC))

Session Classification: Cosmology and Gravitational Waves

Contribution ID: **260** Type: **Talk (closed)**

Primordial Black Holes from Axions

Thursday, 26 July 2018 16:10 (20 minutes)

The QCD axion, as well as more general Axion-Like Particles (ALPs) represent well motivated Dark Matter (DM) candidates. We investigate the possibility that a fraction of the total Axion DM abundance is made of Primordial Black Holes (PBHs). The basic ingredient is the existence of a long-lived network of axionic domain walls attached to strings, which eventually annihilates providing an extra contribution to the total axion abundance. This setup is characteristic of realizations of the QCD axion and of ALPs with domain wall number larger than one.
We show that the collapse of closed domain walls in this network may lead to the formation of PBHs depending on the value of the axion decay constant and on the temperature at which the network decays. This provides an alternative mechanism of PBHs formation, independent from the physics of cosmological inflation.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr ROMPINEVE, Fabrizio (IFAE)

Co-authors: Dr PUJOLÀS , Oriol (IFAE); PANICO, Giuliano (IFAE); Dr FERRER, Francesc; Dr MASSÓ, Eduard (IFAE)

Presenter: Dr ROMPINEVE, Fabrizio (IFAE)

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **261** Type: **Posters (last call deadline 30th June)**

First measurement of tW production cross-section at $\sqrt{s} = 13$ TeV with CMS

The inclusive cross-section for tW production in proton-proton collisions at $\sqrt{s} = 13$ TeV is measured of a dataset corresponding to an integrated luminosity of 35.9 fb^{-1} collected by the CMS experiment. The measurement is performed using events with one electron and one muon in the final state along with at least one b-quark jet, and exploits kinematic differences between the signal and the dominating $t\bar{t}$ background through the use of multivariant discriminants designed to separate the two processes. The measured cross-section of $\sigma = 63.1 \pm 1.8\,(\mathrm{stat}) \pm 6.4\,(\mathrm{syst}) \pm 2.1\,(\mathrm{lumi})$ pb is in agreement with Standard Model expectations.

Parallel Session

Electroweak, Top and Higgs Physics

Primary authors: Ms PRIYANKA, Priyanka (University of Delhi); GHOSH, Shamik (Saha Institute of Nuclear Physics (IN))

Presenters: Ms PRIYANKA, Priyanka (University of Delhi); GHOSH, Shamik (Saha Institute of Nuclear Physics (IN))

Contribution ID: **262** Type: **Posters (last call deadline 30th June)**

Focus Points of Bayesian Naturalness in MSSM and NMSSM

The Higgs boson discovery stirred interest in next-to-minimal supersymmetric models, due to the apparent fine-tuning required to accommodate it in minimal theories. To assess their naturalness, we compare fine-tuning in a $\mathbb{Z}3$ conserving semi-constrained Next-to-Minimal Supersymmetric Standard Model (NMSSM) to the constrained MSSM (CMSSM). We contrast popular fine-tuning measures with naturalness priors, which automatically appear in statistical measures of the plausibility that a given model reproduces the weak scale. Our comparison shows that naturalness priors provide valuable insight into the hierarchy problem and rigorously ground naturalness in Bayesian statistics. For the CMSSM and semi-constrained NMSSM we demonstrate qualitative agreement between naturalness priors and popular fine tuning measures. Thus, we give a clear plausibility argument that favours relatively light superpartners.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: KIM, Doyoun (IBS-CTPU)

Co-authors: Dr FOWLIE, Andrew (Monash University); Dr FARMER, Benjamin (Oskar Klein Centre); BALAZS, Csaba (Monash University); Dr HARRIES, Dylan (Charles University Prague); ATHRON, Peter

Presenter: KIM, Doyoun (IBS-CTPU)

Contribution ID: **263** Type: **Talk (closed)**

New Weak-Scale Physics in SO(10) with High-Scale Supersymmetry

Tuesday, 24 July 2018 18:00 (20 minutes)

Gauge coupling unification and the stability of the Higgs vacuum are among two of the cherished features of low-energy supersymmetric models. Though low-energy supersymmetry is still viable, it could be that supersymmetry is manifest only at very high energies. If this is the case, it is a legitimate question whether any or all of the problems with cures normally attributed to weak-scale supersymmetry can still be resolved. We argue that with the exception of the hierarchy problem, gauge coupling unification can occur in the context of supersymmetric SO(10) GUT when supersymmetry is broken above the inflationary scale, while the stability of the Higgs vacuum is ensured. Surprisingly, those two are achieved by requiring the presence of TeV-scale new physics which is also responsible for radiative electroweak symmetry breaking as well as a dark matter candidate. This weak-scale physics takes the form of a complex weak triplet scalar with zero hypercharge, originating from the 210 Higgs field breaking SO(10).

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary authors: ELLIS, Sebastian (SLAC); GHERGHETTA, Tony (University of Minnesota (US)); KANETA, Kunio; OLIVE, Keith Alison

Presenter: KANETA, Kunio

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **264** Type: **Posters (last call deadline 30th June)**

Leptonic sector in a 2HDM with a discrete flavor symmetry.

We propose a Standard Model extension in which we consider the type-III 2HDM plus massive neutrinos and the horizontal flavor symmetry S_3 (ν2HDM$\otimes S_3$). In this extension and with the explicit sequential breaking of S_3 symmetry, all Yukawa matrices in the flavor adapted basis are represented by means of a matrix with two texture zeroes. The active neutrinos are considered as Majorana particles and their masses are generated through the type-I seesaw mechanism. The unitary matrices that diagonalize to the mass matrices, as well as the flavor mixing matrices are expressed in terms of fermion mass ratios. In the mass basis, the entries of the Yukawa matrices naturally acquire the form of the so-called Cheng-Sher ansatz. In the leptonic sector, we compare the theoretical expressions of the flavor mixing angles with the current experimental data on masses and flavor mixing, through a χ^2 likelihood test. The results obtained are in very good agreement with the current experimental data. We also obtained an allowed value ranges for the "Dirac-like" phase factor, as well as for the two Majorana phase factors. Furthermore, we study the phenomenological implications of these numerical values of the CP-violation phases on the neutrinoless double beta decay, and for Long Base-Line neutrino oscillation experiments such as T2K, NOνA, and DUNE.

Parallel Session

BSM aspects of Flavour and Neutrino Physics

Primary author: Dr FELIX FCO., Gonzalez-Canales (Benemérita Universidad Autonóma de Puebla)

Co-authors: Dr OLGA, Felix-Beltran (Benemérita Universidad Autonóma de Puebla); Mr MOISES, Zeleny-Mora (Benemérita Universidad Autonóma de Puebla); Dr ENRIQUE, Barradas-Guevara (Benemérita Universidad Autonóma de Puebla)

Presenter: Dr FELIX FCO., Gonzalez-Canales (Benemérita Universidad Autonóma de Puebla)

Contribution ID: **265** Type: **Posters (last call deadline 30th June)**

Search for the supersymmetric partner of the top quark in fully hadronic final states at 13 TeV with the ATLAS detector

This contribution presents the search for the supersymmetric partner of the top quark in all-hadronic final states. The stop squark can be produced in pairs in the pp collisions produced in the LHC, and decay through different channels depending on the Supersymmetry (SUSY) parameters. This analysis focuses in the decays of the stop to top and neutralino, where the top quark decays hadronically, although other decay modes are considered. Final states are characterized by multiple jets and large missing transverse momentum, which arises from the neutralinos, that are not detected. The analysis presented is performed using 36.1 fb-1 of data collected with the ATLAS detector during 2015 and 2016. The results are shown in terms of exclusion limits on the masses of the SUSY particles.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: RODRIGUEZ PEREZ, Andrea (The Barcelona Institute of Science and Technology (BIST) (ES))

Presenter: RODRIGUEZ PEREZ, Andrea (The Barcelona Institute of Science and Technology (BIST) (ES))

Contribution ID: **266** Type: **Posters (last call deadline 30th June)**

SUSY searches for electroweak production with compressed mass spectra at ATLAS

Search for electroweak production of supersymmetric particles in scenarios with compressed mass spectra, using the final state with two low-momentum leptons of same flavour and opposite charge, and missing transverse momentum, is presented. Results are interpreted using the R-parity conserving models with small mass difference between the produced particles and the lightest neutralino. Exclusion limits are set on the next-to-lightest neutralino masses for the Higgsino and wino production, and slepton masses for the slepton pair production. In addition, an interpretation in terms of a Radiatively Driven Natural SUSY model, well motivated by low level of electroweak fine tuning, embedded in the Non-Universal Higgs masses model (NUHM2), is shown.

Parallel Session

Supersymmetry: Models, Phenomenology and Experimental Results

Primary author: MAMUZIC, Judita (IFIC Valencia)

Presenter: MAMUZIC, Judita (IFIC Valencia)

Contribution ID: **267** Type: **Posters (last call deadline 30th June)**

Spontaneous supersymmetry breaking induced by particle mixing

It is conjectured that flavor mixing furnishes a universal mechanism for the spontaneous breaking of supersymmetry. The conjecture is proved explicitly for the mixing of two chiral N = 1 supermultiplets and arguments for its general validity are given. That is an instance of the O'Raifeartaigh Lagrangian for which there is no tree-level nor perturbative breaking. Nonetheless, the dynamical breaking occurs due to the vacuum condensate, a mixing-induced nonperturbative effect that lifts the zero point energy.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr CAPOLUPO, Antonio (University of Salerno)

Presenter: Dr CAPOLUPO, Antonio (University of Salerno)

Contribution ID: **268** Type: **Posters (last call deadline 30th June)**

Spontaneous supersymmetry breaking induced by vacuum condensates

We propose a novel mechanism of spontaneous supersymmetry breaking which relies upon a ubiquitous feature of Quantum Field Theory, vacuum condensates. Such condensates play a crucial role in many phenomena. Examples include Unruh effect, superconductors, particle mixing, and quantum dissipative systems. We argue that in all these phenomena supersymmetry, when present, is spontaneously broken.
Evidence for our conjecture is given for the Wess–Zumino model, that can be considered as an approximation to the supersymmetric extensions of the above mentioned systems. The magnitude of the effect is estimated for a recently proposed experimental setup based on an optical lattice.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr CAPOLUPO, Antonio (Università di Salerno)

Presenter: Dr CAPOLUPO, Antonio (Università di Salerno)

Contribution ID: **269** Type: **Posters (last call deadline 30th June)**

Gravitino Problem In Modified Cosmology

In the standard scenario, gravitinos couple to ordinary matter only
through the gravitational interaction, so that their couplings are
Planck suppressed. This implies a (quite) long lifetime.
In general, particles with long lifetimes generate some issues in cosmology since if they decay after the BBN, then their decay products may destroy light elements,
destroying therefore the successful prediction of BBN.
These issues and the gravitino late abundance problem are reviewed in the framework of modified cosmologies.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: Dr LAMBIASE, Gaetano (University of Salerno)

Presenter: Dr LAMBIASE, Gaetano (University of Salerno)

Contribution ID: **270** Type: **Talk (closed)**

Effects of quantum statistics on relic density of Dark Radiation

Wednesday, 25 July 2018 18:20 (20 minutes)

The freeze-out of massless particles is investigated. The effects due to quantum statistics, Fermi-Dirac or Bose-Einstein, of all particles relevant for the process are analyzed. Solutions of appropriate Boltzmann equation are compared with those obtained using some popular approximate methods. As an application of general results the relic density of dark radiation in Weinberg's Higgs portal model is discussed.

Parallel Session

Dark Matter, Astroparticle Physics

Primary author: OLECHOWSKI, Marek (University of Warsaw (PL))

Presenter: OLECHOWSKI, Marek (University of Warsaw (PL))

Session Classification: Dark Matter, Astroparticle Physics

Contribution ID: **271** Type: **Talk (closed)**

Electroweak symmetry breaking by a neutral sector: Dynamical relaxation of the little hierarchy problem

Monday, 23 July 2018 16:40 (20 minutes)

We propose a new dynamical relaxation mechanism for the little hierarchy problem, based on a singlet extension of the minimal supersymmetric standard model (MSSM).

In this scenario, a small soft mass parameter of an MSSM singlet is responsible for the electroweak symmetry breaking and the non-zero Higgs vacuum expectation value, whereas the effect of a large soft mass parameter of the Higgs boson, $m_{h_u}^2$ is dynamically compensated by a flat direction of MSSM singlets.
The small singlet's soft mass and the Z boson mass can be protected, even if the stop mass is heavier than 10 or 20 TeV, since the gravity-mediated supersymmetry breaking effects and the relevant Yukawa couplings are relatively small.
A "focus point" of the singlet's soft mass parameter can emerge around the stop mass scale, and so various fine-tuning measures can reduce well below 100.
Due to the relatively large gauge-mediated effects, the MSSM superpartners are much heavier than the experimental bounds, and the unwanted flavor changing processes are adequately suppressed.

Parallel Session

Electroweak, Top and Higgs Physics

Primary author: KYAE, Bumseok (Pusan National University (Korea))

Presenter: KYAE, Bumseok (Pusan National University (Korea))

Session Classification: Electroweak, Top and Higgs Physics

Contribution ID: **272** Type: **Posters (last call deadline 30th June)**

Reinterpretation of searches for supersymmetry in models with variable R-parity-violating coupling strength

In Supersymmetric models with R-parity violation, depending on the coupling strength the lightest supersymmetric particle can be stable on detector level scales, long-lived, or decay promptly. We present a reinterpretation of ATLAS 13 TeV SUSY searches, originally designed for scenarios with either RPC or RPV with prompt LSP decays, in models with baryon-number-violating RPV with variable coupling strength λ''. Limits are derived for simplified models of pair-produced gluinos decaying to final states enhanced or depleted with top quarks, and models of pair-produced top squarks.

Parallel Session

Primary authors: FERRANDO, James Edward (Deutsches Elektronen-Synchrotron (DE)); AMOROSO, Simone (Deutsches Elektronen-Synchrotron (DE))

Presenter: AMOROSO, Simone (Deutsches Elektronen-Synchrotron (DE))

Contribution ID: **273** Type: **Talk (closed)**

Composite pNGB Dark Matter

Thursday, 26 July 2018 18:20 (20 minutes)

Non-minimal composite Higgs (CH) models, with additional Goldstone bosons (GB) beside the Higgs, do not only present a solution to the hierarchy problem but could also shed light on the dark matter (DM) puzzle. A realization of this scenario was presented in (arXiv:1707.07685): The symmmetry breaking structure is SO(7)/SO(6) and the DM is a complex GB, stabilized by an exact U(1). The couplings of the top quark break explicitly both the Higgs and the DM shift symmetries, linking the DM and Higgs potentials and predicting direct detection signals of the size currently tested by XENON1T.
In this talk we shortly review the main results of (arXiv:1707.07685) and present a new class of CH models, where the main breaking of the DM shift symmetry comes either from the light quarks or from the gauging of the stabilizing U(1) symmetry. This naturally explains the null results of direct detection experiments, while featuring an interesting complementary phenomenology.

Parallel Session

Primary author: RUHDORFER, Maximilian (Technische Universitaet Muenchen, Garching, Germany)

Presenter: RUHDORFER, Maximilian (Technische Universitaet Muenchen, Garching, Germany)

Session Classification: Alternatives to Supersymmetry

Contribution ID: **274** Type: **Talk (closed)**

Farewell

Friday, 27 July 2018 15:15 (5 minutes)

Parallel Session

Primary author: MARTINEZ-PEREZ, Mario (The Barcelona Institute of Science and Technology (BIST) (ES))

Presenter: MARTINEZ-PEREZ, Mario (The Barcelona Institute of Science and Technology (BIST) (ES))

Session Classification: Closing

Contribution ID: **275** Type: **Posters (last call deadline 30th June)**

Measurements of Standard model Higgs boson properties in the diphoton decay channel in CMS

The latest results of the measurement of the Higgs boson properties decaying into two photons with the full 2016 data, collected in pp collision at the center of mass energy 13 TeV at LHC will be presented. Signal strengths associated with the different Higgs boson production process, couplings to bosons and fermions, and effective couplings to photons and gluons are also to be discussed.

Parallel Session

Primary author: KOLE, Gouranga (Univ. of California San Diego (US))

Presenter: KOLE, Gouranga (Univ. of California San Diego (US))