Physics at the LHC and beyond

Report of Contributions

https://indico.desy.de/e/11875

Contribution ID: **0** Type: **not specified**

3rd Anniversary of Higgs Boson Discovery - what we know today

Tuesday, 29 September 2015 14:10 (30 minutes)

Presenter: QUAST, Guenter

Session Classification: Plenary Session

Contribution ID: **1** Type: **not specified**

Higgs physics landscape

Tuesday, 29 September 2015 14:50 (30 minutes)

Presenter: GROJEAN, Christophe

Session Classification: Plenary Session

Contribution ID: **2** Type: **not specified**

Direct SUSY production at the LHC: theory status

Tuesday, 29 September 2015 15:30 (30 minutes)

Presenter: KULESZA, Anna

Session Classification: Plenary Session

Contribution ID: **3** Type: **not specified**

LHC prospects for Dark Matter

Tuesday, 29 September 2015 16:40 (30 minutes)

Presenter: COVI, Laura

Session Classification: Plenary Session

Contribution ID: **4** Type: **not specified**

The Search for Dark Matter's Particle Identity (Circa 2015)

Tuesday, 29 September 2015 17:20 (30 minutes)

Presenter: HOOPER, Dan

Session Classification: Plenary Session

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

An effective field theory for jet processes

Wednesday, 30 September 2015 09:00 (30 minutes)

Presenter: NEUBERT, Matthias

Session Classification: Plenary Session

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

QCD at the LHC: theoretical results

Wednesday, 30 September 2015 09:40 (30 minutes)

Presenter: ZANDERIGHI, Giulia

Session Classification: Plenary Session

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

Status of Parton shower simulations

Wednesday, 30 September 2015 10:20 (30 minutes)

Presenter: KRAUSS, Frank

Session Classification: Plenary Session

Contribution ID: **8** Type: **not specified**

Quark Flavour Physics

Wednesday, 30 September 2015 11:30 (30 minutes)

Presenter: CIUCHINI, Marco

Session Classification: Plenary Session

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

Lepton Flavor and Number Physics

Wednesday, 30 September 2015 12:10 (30 minutes)

Presenter: RODEJOHANN, Werner

Session Classification: Plenary Session

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

Flavor from the Electroweak Scale

Thursday, 1 October 2015 09:00 (30 minutes)

Presenter: CARENA, Marcela

Session Classification: Plenary Session

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

Natural Alternatives

Thursday, 1 October 2015 09:40 (30 minutes)

Presenter: WEILER, Andreas

Session Classification: Plenary Session

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

SUSY-BSM and the LHC

Thursday, 1 October 2015 10:20 (30 minutes)

Presenter: TATTERSALL, Jamie

Session Classification: Plenary Session

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

Electroweak Precision Tests at the LHC and beyond

Thursday, 1 October 2015 11:30 (30 minutes)

Presenter: FREITAS, Ayres

Session Classification: Plenary Session

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

Top Physics at the LHC

Thursday, 1 October 2015 12:10 (30 minutes)

Presenter: MELNIKOV, Kirill

Session Classification: Plenary Session

Contribution ID: **15** Type: **not specified**

Jet Physics at the LHC

Friday, 2 October 2015 09:00 (30 minutes)

Presenter: TACKMANN, Frank (DESY)

Session Classification: Plenary Session

Contribution ID: **16** Type: **not specified**

Lattice QCD

Friday, 2 October 2015 09:40 (30 minutes)

Presenter: BALI, Gunnar

Session Classification: Plenary Session

Contribution ID: **17** Type: **not specified**

Parton Distributions for LHC Run 2

Friday, 2 October 2015 10:20 (30 minutes)

Presenter: FORTE, Stefano

Session Classification: Plenary Session

Contribution ID: **18** Type: **not specified**

Beyond the Standard Model at the LHC and Beyond

Friday, 2 October 2015 11:30 (30 minutes)

Presenter: ELLIS, John

Session Classification: Plenary Session

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

Future Prospects at the LHC

Friday, 2 October 2015 12:00 (30 minutes)

Presenter: WELLS, Pippa

Session Classification: Plenary Session

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

Future projects at the energy frontier

Friday, 2 October 2015 12:30 (28 minutes)

Presenter: DESCH, Klaus

Session Classification: Plenary Session

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

What lies beyond?

Wednesday, 30 September 2015 17:55 (55 minutes)

Astrophysics and cosmology require physics beyond the Standard Model to explain the origin of matter and the nature of dark matter, and there are many shortcomings of the Standard Model that also cry out for new physics. However, the LHC has found no solid direct evidence yet of physics beyond the Standard Model. What new physics may be out there, and what are the prospects for discovering it at the LHC or elsewhere?

Presenter: ELLIS, John (Kings College London)

Session Classification: Hertz Lecture

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

Boosted Dark Matter in IceCube and at the Galactic Center

Wednesday, 30 September 2015 16:50 (15 minutes)

We show that the event excess observed by the IceCube collaboration at TeV–PeV energies, usually interpreted as evidence for astrophysical neutrinos, can be explained alternatively by the scattering of highly boosted dark matter particles. Specifically, we consider a scenario where a ~ 4 PeV scalar dark matter particle φ can decay to a much lighter dark fermion χ, which in turn scatters off nuclei in the IceCube detector. Besides these events, which are exclusively shower-like, the model also predicts a secondary population of events at O(100TeV) originating from the 3-body decay $\varphi \longrightarrow \chi\chi a^{-}$, where a is a pseudo-scalar which mediates dark matter–Standard Model interactions and whose decay products include neutrinos. This secondary population also includes track-like events, and both populations together provide an excellent fit to the IceCube data. We then argue that a relic abundance of light Dark Matter particles χ, which may constitute a subdominant component of the Dark Matter in the Universe, can have exactly the right properties to explain the observed excess in GeV gamma rays from the galactic center region. Our boosted Dark Matter scenario also predicts fluxes of O(10) TeV positrons and O(100TeV) photons from 3-body cascade decays of the heavy Dark Matter particle φ, and we show how these can be used to constrain parts of the viable parameter space of the model. Direct detection limits are weak due to the pseudo-scalar couplings of χ. Accelerator constraints on the pseudo-scalar mediator a lead to the conclusion that the preferred mass of a is & 10 GeV and that large coupling to b quarks but suppressed or vanishing coupling to leptons are preferred.

Primary author: Dr WANG, Xiaoping (Johannes Gutenberg University Mainz)

Co-authors: Dr LIU, Jia (Johannes Gutenberg University Mainz); Prof. KOPP, Joachim (Johannes Gutenberg University Mainz)

Presenter: Dr WANG, Xiaoping (Johannes Gutenberg University Mainz)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Hiding Missing Energy in Missing Energy

Thursday, 1 October 2015 15:15 (15 minutes)

Searches for supersymmetry (SUSY) often rely on a combination of hard physics objects (jets, leptons) along with large missing transverse energy to separate New Physics from Standard Model hard processes. We consider a class of "double-invisible" SUSY scenarios: where squarks, stops and sbottoms have a three-body decay into {\em two} (rather than one) invisible final-state particles. This occurs naturally when the LSP carries an additional conserved quantum number under which other superpartners are not charged. In these topologies, the available energy is diluted into invisible particles, reducing the {\em observed} missing energy and visible energy. This can lead to sizable changes in the sensitivity of existing searches, dramatically changing the qualitative constraints on superpartners. % In particular, our studies would indicate that, for a massless LSP, unflavored squarks have limits reduced from 840
gev to ~ 520
gev, sbottoms from 650
gev to 500
gev and stops from 650
gev to 560
gev. In particular, for m_{LSP}
$gtrsim160$
gev, we find no robust constraints from the LHC at any squark mass for any generation, while for lighter LSPs we find significant reductions in constraints. If confirmed by a full reanalysis from the collaborations, such scenarios allow for the possibility of significantly more natural SUSY models. While not realized in the MSSM, such phenomenology occurs naturally in models with mixed sneutrinos, Dirac gauginos and NMSSM-like models.

Primary authors: Dr ALVES, Daniele (CCPP, New York University); Dr LIU, Jia (MITP, Johannes Gutenberg University Mainz); Prof. WEINER, Neal (CCPP, New York University)

Presenter: Dr LIU, Jia (MITP, Johannes Gutenberg University Mainz)

Session Classification: Particle Phenomenology

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

Lepton Jets from Radiating Dark Matter

Wednesday, 30 September 2015 16:35 (15 minutes)

The idea that dark matter forms part of a larger dark sector is very intriguing, given the high degree of complexity of the visible sector. In this paper, we discuss lepton jets as a promising signature of an extended dark sector. As a simple toy model, we consider an
O(GeV) DM fermion coupled to a new U(1)' gauge boson (dark photon) with a mass of order GeV and kinetically mixed with the Standard Model photon. Dark matter production at the LHC in this model is typically accompanied by collinear radiation of dark photons whose decay products can form lepton jets. We analyze the dynamics of collinear dark photon
emission both analytically and numerically. In particular, we derive the dark photon energy spectrum using recursive analytic expressions, using Monte Carlo simulations in Pythia, and using an inverse Mellin transform to obtain the spectrum from its moments. In the second
part of the paper, we simulate the expected lepton jet signatures from radiating dark matter at the LHC, carefully taking into account the various dark photon decay modes and allowing for both prompt and displaced decays. Using these simulations, we recast two existing
ATLAS lepton jet searches to significantly restrict the parameter space of extended dark sector models, and we compute the expected sensitivity of future LHC searches.

Primary authors: Dr LIU, Jia (PRISMA, MITP Mainz); Prof. KOPP, Joachim (PRISMA, MITP Mainz); Mr BUSCHMANN, Malte (PRISMA, MITP Mainz); Dr MACHADO, Pedro (IFT-UAM/CSIC, Madrid)

Presenter: Mr BUSCHMANN, Malte (PRISMA, MITP Mainz)

Session Classification: Particle Phenomenology

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

A Simple Model for Low Scale Baryogenesis and Neutron-Antineutron Oscillation

Thursday, 1 October 2015 14:45 (15 minutes)

A simple TeV scale model for baryon and lepton number violation is presented, where neutrino mass arises via a one loop radiative seesaw effect and B-violation obeys \Delta B = 2 selection rule, leading to observable neutron-antineutron oscillations. The stability of proton is connected to the neutrino mass generation. Matter-antimatter asymmetry is generated in this model via resonant baryogenesis mechanism, which can be realized at either above or below the electroweak scale, independent of the sphaleron processes. A novel six jet plus dilepton signal of this model can be searched for at the LHC.

Primary author: Dr DEV, Bhupal (TUM)

Co-author: Prof. MOHAPATRA, Rabi (University of Maryland)

Presenter: Dr DEV, Bhupal (TUM)

Session Classification: Cosmology & Astroparticle Physics

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

PERSPECTIVE STUDY OF CHARMONIUM, EXOTICS AND BARYONS WITH CHARM AND STRANGENESS

Thursday, 1 October 2015 17:20 (15 minutes)

The spectroscopy of charmonium and exotic states with hidden charm together with the spectroscopy of charmed and strange baryons is discussed. It is a good testing tool for the theories of strong interactions, including: QCD in both the perturbative and non-perturbative regimes, LQCD, potential models and phenomenological models [1, 2, 3]. An understanding of the baryon spectrum is one of the primary goals of non-perturbative QCD. In the nucleon sector, where most of the experimental information is available, the agreement with quark model predictions is astonishingly small, and the situation is even worse in the strange and charmed baryon sector. The experiments with antiproton-proton annihilation and proton-proton collisions are well suited for a comprehensive baryon spectroscopy program, in particular, in the spectroscopy of strange and charmed baryons. Charmed and strange baryons can be produced abundantly in both processes, and their properties can be studied in detail [1, 2, 3].
For this purpose an elaborated analysis of charmonium, charmed hybrids and tetraquark spectrum together with spectrum of charmed and strange baryons is given. The combined approach based on the quarkonium potential model and model of confinement on the three-dimensional sphere embedded into four-dimensional Euclidian space was proposed. The recent experimental data from different collaborations are analyzed. A special attention was given to the recently discovered XYZ-particles. The attempts of their possible interpretation are considered [4, 5]. Some of these states can be interpreted as higher-lying charmonium and tetraquarks with a hidden charm. It has been shown that charge/neutral tetraquarks must have their neutral/charged partners with mass values which differ by few MeV. This hypothesis coincides with that proposed by Maiani and Polosa [6]. Many heavy baryons with charm and strangeness are expected to exist. But much more data on different decay modes are needed before firmer conclusions can be made. These data can be derived directly from the experiments using a high quality antiproton beam with momentum up to 15 GeV/c planned at FAIR and proton-proton collisions with momentum up to 26 GeV/c planned at the superconducting accelerator complex NICA that is being built in Dubna nowadays.

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[2] N. Brambilla et al., European Physical Journal C 71:1534, (2011) 1
[3] J. Beringer et al., Review of Particle Physic, Physical. Review, D 86, (2012)
[4] M.Yu. Barabanov, A.S. Vodopyanov, Physics of Particles and Nuclei Letters, V.8, N.10, (2011) 1069
[5] M.Yu. Barabanov, A.S. Vodopyanov, S.L. Olsen, Physics of Atomic Nuclei, V.77, N.1, (2014) 126
[6] L. Maiani, F. Piccinini, A.D. Polosa, V. Riquer, Phys. Rev. Lett. 99 (2007) 182003

Primary author: Dr MIKHAIL, Barabanov (JINR)

Co-authors: Prof. VODOPYANOV, Alexander (JINR); Prof. OLSEN, Stephen (CUP IBR)

Presenter: Dr MIKHAIL, Barabanov (JINR)

Session Classification: Particle Phenomenology

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

Two-loop conformal anomaly in QCD

Thursday, 1 October 2015 14:25 (25 minutes)

QCD evolution equations in MS-like schemes can be recovered from the same equations in a modified theory, QCD in non-integer d=4−2ϵ dimensions, which enjoys exact scale and conformal invariance at the critical point. Restrictions imposed by the conformal symmetry of the modified theory allow one to obtain complete evolution kernels in integer (physical) dimensions at the given order of perturbation theory from the spectrum of anomalous dimensions added by the calculation of the special conformal anomaly at one order less. We discuss details of calculation of two-loop conformal anomaly.

Primary authors: Dr MANASHOV, Alexander (University of Hamburg); Mr STROHMAIER, Matthias (University of Regensburg); Prof. MOCH, Sven-Olaf (University of Hamburg); Prof. BRAUN, Vladimir (University of Regensburg)

Presenter: Dr MANASHOV, Alexander (University of Hamburg)

Session Classification: Strings & Mathematical Physics

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

Fermion representations in GUTs: on the quest for family unification

Wednesday, 30 September 2015 15:00 (15 minutes)

Grand unified theories have been with us for more than four decades. While attractive, the standard SU(5) and SO(10) models fail to shed light on the flavour problem since, just like the Standard Model, they too place the fermions in three copies of representations of the enlarged gauge group.

What about the possibility of having family unification by putting all fermions in a single representation? In this talk I will report on this possibility based on an extensive computer scan over (I) different unification groups G, (II) different embeddings of the SM group in G, and (III) different representations of G. It turns out that family unification is possible with large SU(N) groups - for example, one can place all fermions in the 171 representation of SU(19).

Primary author: Dr FONSECA, Renato (Instituto de Física Corpuscular (University of Valencia/CSIC))

Presenter: Dr FONSECA, Renato (Instituto de Física Corpuscular (University of Valencia/CSIC))

Session Classification: Particle Phenomenology

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

Searching for new physics in Higgs to four leptons

Thursday, 1 October 2015 14:15 (15 minutes)

In this talk, I will describe how kinematic distributions in the Higgs to four lepton channel can be used to probe the Standard Model (SM) as well as new physics scenarios. Higher order electroweak corrections make this channel sensitive to anomalous tensor structures in Higgs couplings, making this one of the best direct probes of several types of deviations from the SM including CP violation in the top Yukawa coupling. I will explore the reach of the LHC and future colliders to these scenarios.

Primary author: Prof. STOLARSKI, Daniel (CERN)

Presenter: Prof. STOLARSKI, Daniel (CERN)

Session Classification: Particle Phenomenology

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

Next-to-leading order electroweak corrections to pp → W + W – → 4 leptons at the LHC

Wednesday, 30 September 2015 14:15 (15 minutes)

Weak boson pair production processes are very sensitive to the gauge structure of the electroweak (EW) Standard Model. In certain regions of phase space EW corrections lead to significant distortions of differential distributions and their omission could easily be misinterpreted as signs of new physics. Providing not only QCD but also EW corrections for weak boson pair production processes in a fully differential form is therefore essential for further experimental precision tests of the SM.

In this talk we present our calculation of the next-to-leading order EW corrections to the process pp → W + W – → ν μ μ + e – ν¯ e at the LHC. Off-shell effects of the weak bosons as well as non-resonant contributions are fully included. For two equally important event-selection setups – W-pairs as signal process and as irreducible background to Higgs-physics –we present numerical results and discuss the particular effect of the EW corrections by means of several differential distributions, such as transverse momenta or invariant masses of the final state leptons.

Primary author: SALFELDER, Lukas (University of Tuebingen)

Presenter: SALFELDER, Lukas (University of Tuebingen)

Session Classification: Particle Phenomenology

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

NLO corrections to top-quark pair hadroproduction in association with (heavy) bosons

Wednesday, 30 September 2015 14:30 (15 minutes)

We present the calculation, in a completely automated approach, of the NLO EW corrections to ttH, ttZ and ttW production at hadron colliders within the MadGraph5_aMC@NLO framework. We discuss also the impact of NLO QCD corrections on ttH, ttV and ttVV production with V=W, Z, gamma. Relevant distributions for the 13-TeV LHC are considered and inclusive results from 8 to 100 TeV are shown, also for the production of two top-quark pairs (tttt). NLO QCD (matched with parton shower) results, in a realistic experimental set-up for the LHC at 13 TeV, are provided for signal and background processes involved in the searches for ttH production with the Higgs boson decaying either into leptons or photons.

This talk is based on arXiv:1507.05640, arXiv:1504.03446 and arXiv:1407.0823.

Primary authors: Dr PAGANI, Davide (UC Louvain); Prof. MALTONI, Fabio (UC Louvain); Dr SHAO, Hua-Sheng (CERN); Mr TSINIKOS, Ioannis (UC Louvain); Dr ZARO, Marco (Lpthe Jussieu); Prof. FRIXIONE, Stefano (CERN); Dr HIRSCHI, Valentin (SLAC)

Presenter: Dr PAGANI, Davide (UC Louvain)

Session Classification: Particle Phenomenology

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

Dynamical generation of the Peccei-Quinn scale in gauge mediation

Thursday, 1 October 2015 16:05 (15 minutes)

The Peccei-Quinn (PQ) mechanism provides an elegant solution to the strong CP problem. However astrophysical constraints on axions require the PQ breaking scale to be far higher than the electroweak scale. In supersymmetric models the PQ symmetry can be broken at an acceptable scale if the effective potential for the pseudo-modulus in the axion multiplet develops a minimum at large enough field values. In this work we classify systematically hadronic axion models in the context of gauge mediation and study their effective potentials at one loop. We find that some models generate a PQ scale comparable to the messenger scale. Our result may prove useful for constructing full realistic models of gauge mediation that address the strong CP problem. We also comment briefly on the cosmological aspects related to saxion and axino, and on the quality of the PQ symmetry.

Primary authors: Dr FESTUCCIA, Guido (University of Copenhagen); Dr UBALDI, Lorenzo (Tel-Aviv University); Mr OPFERKUCH, Toby (University Bonn)

Presenter: Mr OPFERKUCH, Toby (University Bonn)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **33** Type: **not specified**

Majorana Dark Matter at the LHC and IceCube – A Simplified Models Interpretation

Wednesday, 30 September 2015 16:05 (15 minutes)

We present an interpretation of searches for dark matter in a simplified model approach. Considering Majorana fermion dark matter and neutral vector mediators with axial-vector interaction we compare the limits obtained in mono-jet searches at the LHC with limits on the spin-dependent scattering cross-section set by the IceCube collaboration. We discuss the validity of the EFT limit and place new bounds on the parameter space of this model.

Primary author: Dr HEISIG, Jan (University of Hamburg)

Presenter: Dr HEISIG, Jan (University of Hamburg)

Session Classification: Particle Phenomenology

Contribution ID: **34** Type: **not specified**

Generating fermion masses and mixing angles in extra Higgs doublet models

Wednesday, 30 September 2015 14:00 (15 minutes)

We present a framework to generate the mass hierarchies and mixing angles of the fermionic sector of the Standard Model with two extra Higgs doublets and one right-handed neutrino. The masses of the first and second generation are generated by small quantum effects, explaining the hierarchy with the third generation.
The model also generates a natural hierarchy between the first and second generation after the assumption that the Yukawa couplings are of rank 1. All the quark and lepton mixing matrices can also be generated by quantum effects, reproducing the hierarchies of the experimental values. The parameters generated radiatively depend logarithmically on the heavy Higgs masses, therefore this framework can be reconciled with the stringent limits on flavor violation by postulating a sufficiently large new physics scale.

Primary authors: Prof. IBARRA, Alejandro (Technische Universität München); Ms SOLAGUREN-BEASCOA, Ana (Technische Universität München - Max Planck für Physik)

Presenter: Ms SOLAGUREN-BEASCOA, Ana (Technische Universität München - Max Planck für Physik)

Session Classification: Particle Phenomenology

Contribution ID: **35** Type: **not specified**

Scale invariant SUSY search with simplified topologies

Thursday, 1 October 2015 16:50 (15 minutes)

Due to the unknown stop, sbottom and neutralino masses, very different event shapes for squark pair production are imaginable, ranging from unboosted top/bottom quarks and low missing energy to highly boosted top/bottom quarks and large missing energy in the final state. In order to cover a wide range of possible event shapes and consequently stop, sbottom, and neutralino masses, we combined several top taggers based on jet substructure techniques to obtain a scale invariant search strategy. The performance of this approach is shown in a collider study.

Primary author: Mr SCHLAFFER, Matthias (DESY)

Presenter: Mr SCHLAFFER, Matthias (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **36** Type: **not specified**

Solitonic analogs of Nielsen-Olesen strings

Wednesday, 30 September 2015 17:20 (15 minutes)

First I will give a short comparison of topological defects and topological solitons for various space dimensions (D=1,2,3).
Then I will discuss properties of 2-dimensional solitons for
U(1) gauged easy-axis Heisenberg antiferromagnet, compare these
solitons both with 2D Nielsen-Olesen strings in the Abelian Higgs model and with 2D Belavin-Polyakov solitons in isotropic antiferromagnet model - and will show their dynamical stability.

Primary author: Dr BOGOLUBSKY, Igor (JINR, Dubna)

Presenter: Dr BOGOLUBSKY, Igor (JINR, Dubna)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **37** Type: **not specified**

Relic density of wino-like dark matter in the MSSM

Wednesday, 30 September 2015 14:00 (15 minutes)

We will discuss the relic density of TeV-scale wino-like neutralino dark matter in the pMSSM. We have recently developed a framework enabling us to compute the Sommerfeld enhanced relic density
in general pMSSM scenarios.
We will present the results of a thorough investigation of certain regions of parameter space, focusing in particular on departures from the well known pure wino scenario: namely the effect of sfermion masses and allowing higgsino or bino components of the LSP. The results reveal a number of phenomenologically interesting but so far unexplored regions of parameter space. Near the resonance in the Sommerfeld enhancement, the combined effect of non-decoupled sfermions and significant higgsino-wino mixing allows regions with both the correct relic density and the potential for sizeable indirect detection rates.

Primary authors: HRYCZUK, Andrzej (Technische Universitaet Muenchen); Dr BHARUCHA, Aoife (CPT Marseille); Mr DIGHERA, Francesco (Technische Universitaet Muenchen); Prof. BENEKE, Martin (Technische Universitaet Muenchen); RUIZ-FEMENIA, Pedro (Technische Universitaet Muenchen); RECKSIEGEL, Stefan (Technische Universitaet Muenchen)

Presenter: Mr DIGHERA, Francesco (Technische Universitaet Muenchen)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **38** Type: **not specified**

Interference effects in MSSM Higgs searches

Thursday, 1 October 2015 16:20 (15 minutes)

The interpretation of LHC searches for additional Higgs bosons has so far been restricted to cases without interference between close-by states. Phenomenological consequences of such interference terms will be presented. In the MSSM, the two heavier neutral Higgs bosons have similar masses in a wide part of the parameter space. Therefore, especially in the presence of CP-violating complex phases, interference effects can have a significant impact on the exclusion limits from searches for additional Higgs bosons.

Primary author: FUCHS, Elina (DESY)

Presenter: FUCHS, Elina (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **39** Type: **not specified**

Effective field theory over the edge: implications for Higgs physics

Thursday, 1 October 2015 14:30 (15 minutes)

Effective field theory (EFT) provides an efficient
framework to study the phenomenology of extended Higgs sectors
at the LHC. One caveat is that assuming a clear hierarchy of scales strongly suppresses the size of new physics deviations in an environment where partonic processes can probe a wide range of scales. We consider several modifications of the Higgs sector: a
singlet and doublet extension, scalar top partners, and a vector triplet. We systematically compare full model versus EFT–based
predictions relevant for the LHC Run II Higgs program.
We discuss which observables are accurately described by the EFT in the linear representation and identify those situations in which the EFT approach breaks down.

Primary author: Dr LOPEZ-VAL, David (CP3, Universite catholique de Louvain)

Co-authors: Prof. FREITAS, Ayres (University of Pittsburgh); Mr BREHMER, Johann (ITP, Heidelberg University); Prof. PLEHN, Tilman (ITP, Heidelberg University)

Presenter: Dr LOPEZ-VAL, David (CP3, Universite catholique de Louvain)

Session Classification: Particle Phenomenology

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

Dark Matter Self-Interactions via Collisionless Shocks in Cluster Mergers

Wednesday, 30 September 2015 14:45 (15 minutes)

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

Primary author: Dr SPETHMANN, Christian (NICPB Tallinn)

Co-authors: Mr VEERMAE, Hardi (NICPB Tallinn); Prof. RAIDAL, Martti (NICPB Tallinn); Dr HEIKINHEIMO, Matti (NICPB Tallinn)

Presenter: Dr SPETHMANN, Christian (NICPB Tallinn)

Session Classification: Cosmology & Astroparticle Physics

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

Symmetry restored in dibosons at the LHC?

Thursday, 1 October 2015 14:00 (15 minutes)

A number of LHC resonance search channels display an excess in the invariant mass region of 1.8 - 2.0 TeV. Among them is a 3.4 sigma excess in the fully hadronic decay of a pair of Standard Model electroweak gauge bosons, in addition to potential signals in the HW and dijet final states. We present a model-independent cross-section fit to the results of all ATLAS and CMS searches sensitive to these final states. We then interpret these results in the context of a Left-Right Symmetric Model, and show that a heavy right-handed gauge boson W_R can naturally explain the current measurements with just a single coupling gR ~ 0.4.

Primary authors: Mr TATTERSALL, Jamie (RWTH Aachen); Ms HEWETT, JoAnne (SLAC National Accelerator Laboratory); Mr KOPP, Joachim (Johannes Gutenberg University Mainz); Mr BREHMER, Johann (University of Heidelberg); Mr RIZZO, Thomas (SLAC National Accelerator Laboratory)

Presenter: Mr BREHMER, Johann (University of Heidelberg)

Session Classification: Particle Phenomenology

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

Seminatural Gauge Mediation from Product Group Unification

Thursday, 1 October 2015 16:50 (15 minutes)

We propose a focus point gauge mediation model based on the product group unification (PGU), which solves the double-triplet splitting problem of the Higgs multiplets. In the focus point gauge mediation, the electroweak symmetry breaking scale can be naturally explained even for multi-TeV stops. It is known that the focus point behavior appears if a ratio of the number of SU(2) doublet messengers to that of SU(3) triplet messengers is close to 2.5. Importantly, this ratio (effectively) appears in our scenario based on the PGU, if the messenger field is an adjoint representation of SU(5) gauge group. Therefore, our focus point scenario is very predictive. It is also pointed out the gravitino can be dark matter without spoiling the success of the thermal leptogenesis.

Primary author: Dr YOKOZAKI, Norimi (INFN, Rome)

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Presenter: Dr YOKOZAKI, Norimi (INFN, Rome)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

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

Generalisation of Teichmueller space

Thursday, 1 October 2015 17:35 (15 minutes)

The quantization of the Teichmueller spaces of Riemann surfaces has found important applications to conformal field theory and N=2 supersymmetric gauge theories. The aim of the talk is to construct generalizations of the quantum Teichmueller theory which would, in particular, describe the quantum theory of the Teichmueller spaces of Super-Riemann surfaces.
The starting point of the project was the observation that the quantum Teichm\"ueller theory can be build combinatorially from a simple quantum group, a deformation of the Borel half of SL(2). The idea is to replace the (quantum) group SL(2) by a suitable quantum super-group. The result is to demonstrate that the resulting quantum theory is nothing but the quantum theory of the Teichmueller spaces of Super-Riemann surfaces."

Primary author: AGHAEI, Nezhla (Desy)

Presenter: AGHAEI, Nezhla (Desy)

Session Classification: Strings & Mathematical Physics

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

mu-e Conversion for Models with Doubly Charged Scalars

Thursday, 1 October 2015 14:00 (15 minutes)

Apart from naturally explaining their smallness, models in which neutrino masses are generated only at the loop level are particularly interesting as they often contain electrically charged scalar fields. These additional particles contribute in particular to lepton flavour and/or number violating processes, like mu -> e gamma or neutrinoless double beta decay. On the other hand, at LHC new charged scalars could be identified from several decay and production channels, generating complementarity with low energy experiments.

Using a radiative model based on an effective vertex as example, we
discuss a setting involving a doubly charged scalar particle. We focus on a certain lepton flavour violating process, namely mu-e conversion in muonic atoms. This process is particularly interesting since future experiments will improve the bounds on the branching ratio by several orders of magnitude and thus will lead to strong constraints on the model space which could even challenge current LHC bounds. As this framework could stem from several known UV completions, our results are in fact rather general.

Primary author: GEIB, Tanja (Max Planck Insitute for Physics (Munich))

Presenter: GEIB, Tanja (Max Planck Insitute for Physics (Munich))

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

A novel approach to derive halo-independent limits on dark matter properties

Wednesday, 30 September 2015 14:15 (15 minutes)

We propose a new method that allows to place an upper limit on the dark matter elastic scattering cross section with nucleons which is independent of the velocity distribution. Our approach combines null results from direct detection experiments with indirect searches at neutrino telescopes, and goes beyond previous attempts to remove astrophysical uncertainties in that it directly constrains the particle physics properties of the dark matter. In addition, we discuss how this method can be used to derive a halo-independent lower limit on the scattering cross section of dark matter, in case of a positive signal at a future direct detection experiment.

Primary author: Mr WILD, Sebastian (TU München)

Presenter: Mr WILD, Sebastian (TU München)

Session Classification: Cosmology & Astroparticle Physics

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

Sterile Neutrino Dark Matter from Scalar Decay: General Features, Subleties and Related Issues

Thursday, 1 October 2015 14:15 (15 minutes)

Sterile neutrinos in the keV range are among the most promising candidates for dark matter. We investigate in detail a model that extends the Standard Model by a scalar singlet S and sterile neutrinos N_i.
The scalar couples to the Standard Model via a Higgs portal coupling, the size of which determines whether or not the scalar singlet S enters thermal equilibrium in the early Universe. Sterile neutrinos N_i on the other hand couple to the scalar via a Yukawatype interaction and also mix with active neutrino sector in general.
We present both analytical and numerical methods to solve the corresponding Boltzmann equations on the level of distribution functions, from which all relevant information can be extracted. We explore the paramter space of this setting by imposing limits from cosmological observations like the relic abundance, the effective number of neutrinos, or considerations of structure formation. Exploiting the distribution functions obtained, we show that some previous estimates on structure formation present in the literature can be refined considerably, opening up possibilities to address recent issues on structure formation on small scales. By comparing numerical computations to analytical estimates already present in the literature, we gain a deeper insight on the validity of some assumptions that have been made so far.

Primary author: Mr TOTZAUER, Maximilian (Max-Planck-Institute for Physics)

Presenter: Mr TOTZAUER, Maximilian (Max-Planck-Institute for Physics)

Session Classification: Cosmology & Astroparticle Physics

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

Unitarity and Bound-State Formation Constraints on Dark Matter

Wednesday, 30 September 2015 14:30 (15 minutes)

I present rigorous calculations of the constraints that perturbativity and unitarity apply to dark matter in the well-known portal scenarios. These provide the most stringent upper limit on dark matter mass in the thermal cosmology. I will also discuss the physics of dark matter bound states that can become important when the interactions of dark matter become so strong.

Primary author: Dr SHEPHERD, William (Niels Bohr International Academy)

Presenter: Dr SHEPHERD, William (Niels Bohr International Academy)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Semi-automated two-loop calculations at the example of Higgs masses in the MSSM

Thursday, 1 October 2015 14:30 (15 minutes)

Two-loop calculations with non-trivial renormalization are necessary for the determination of high-precision theory predictions of experimentally well-known quantities. A famous example is the mass of a Higgs-like particle which has been measured at the LHC with a precision at the sub-percent level. A possible interpretation of this particle is given by the Minimal Supersymmetric Standard Model (MSSM) as one of its five physical Higgs bosons. A precise prediction of the Higgs spectrum in the MSSM relies on higher-order corrections.
The main focus of this talk is set on the conceptual implementation in seven distinct steps of the top Yukawa coupling enhanced two-loop corrections to the Higgs spectrum in the complex MSSM. Each step is specific to the contribution computed here, but due to its modular structure the code can be adapted with little effort for similar calculations.
The complete code is part of the publicly available program FeynHiggs.

Primary authors: Dr PASSEHR, Sebastian (DESY); Dr HAHN, Thomas (Max Planck Institute for Physics)

Presenter: Dr PASSEHR, Sebastian (DESY)

Session Classification: Particle Phenomenology

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

Non-thermal cosmic Neutrino Background

Thursday, 1 October 2015 14:30 (15 minutes)

I will discuss that for Dirac neutrinos there could, in addition to the standard thermal cosmic neutrino background (CνB),
also exist a non–thermal neutrino background with comparable number density.
Today's relic density of the non–thermal background can be as large as 0.5*n_gamma.
It is constrained by the observational limits on the effective number of massless degrees of freedoms, N_eff, which thereby can be larger than 3.046 in the absence of any exotic states. Non–thermal relic neutrinos can be discovered by future experiments which are aiming to detect the CνB such as PTOLEMY.
I will also mention a scenario of chaotic inflation in which a non–thermal background can naturally be generated by inflationary preheating.
The non–thermal relic neutrinos, thus, may constitute a novel window into the very early universe.

Primary author: Mr TRAUTNER, Andreas (TU München)

Presenter: Mr TRAUTNER, Andreas (TU München)

Session Classification: Cosmology & Astroparticle Physics

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

Chiral fermions and anomaly cancellation on orbifolds with Wilson lines and flux

Thursday, 1 October 2015 17:05 (15 minutes)

We consider six-dimensional supergravity compactified on orbifolds with Wilson lines and flux. Both orbifold singularities and flux lead to chiral fermions in four dimensions. The six-dimensional bulk anomaly, the fixed point anomalies and also the four-dimensional chiral anomaly are cancelled by the Green-Schwarz mechanism. The effective four dimensional theory contains two axions with interesting implications for the effective four-dimensional theory.

Primary authors: Dr RUEHLE, Fabian (DESY); Mr SCHWEIZER, Julian (DESY); Mr DIERIGL, Markus (DESY); Prof. BUCHMULLER, Wilfried (DESY)

Presenter: Mr DIERIGL, Markus (DESY)

Session Classification: Strings & Mathematical Physics

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

Splitting SO(10) with a bulk flux

Thursday, 1 October 2015 17:20 (15 minutes)

Recently, a model with SO(10) symmetry and bulk flux in 6d was constructed. Anomalies can be canceled and the flux leads to interesting features. Notably, a U(1) flux breaks supersymmetry at a high scale in the matter sector while leaving it intact on gauge and Higgs multiplets. On the other hand, the flux creates a multiplicity for the matter fields while protecting them from symmetry breaking by Wilson lines.

I present the model as well as preliminary results on its phenomenology.

Primary authors: RUEHLE, Fabian (DESY); Mr SCHWEIZER, Julian (DESY); DIERIGL, Markus (DESY); BUCHMULLER, Wilfried (DESY)

Presenter: Mr SCHWEIZER, Julian (DESY)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **53** Type: **not specified**

Coannihilating Dark Matter at the LHC

Wednesday, 30 September 2015 16:50 (15 minutes)

We present a general classification of minimal models where Dark Matter coannihilates with another particle, X. Besides this new particle, such coannihilation processes typically require the existence of a mediator, M. Assuming tree-level and renormalizable interactions we construct all possible Dark Matter, X and M field content which respects gauge and Lorentz invariance. Using our framework one can identify the main categories of LHC signatures associated with coannihilation. We discuss the different aspects of these signatures, mentioning new possible topologies that could be explored at colliders.

Primary author: Dr BAKER, Michael (Johannes Gutenberg Universität, Mainz)

Co-authors: Dr THAMM, Andrea (Johannes Gutenberg Universität, Mainz); Dr KAMINSKA, Anna (Johannes Gutenberg Universität, Mainz); Dr YU, Felix (Johannes Gutenberg Universität, Mainz); Dr LIU, Jia (Johannes Gutenberg Universität, Mainz); Dr BROD, Joachim (Johannes Gutenberg Universität, Mainz); Prof. KOPP, Joachim (Johannes Gutenberg Universität, Mainz); Dr ZURITA, José (Johannes Gutenberg Universität, Mainz); Dr DE VRIES, Maikel (Johannes Gutenberg Universität, Mainz); Dr EL HEDRI, Sonia (Johannes Gutenberg Universität, Mainz); Dr WANG, Xiaoping (Johannes Gutenberg Universität, Mainz)

Presenter: Dr BAKER, Michael (Johannes Gutenberg Universität, Mainz)

Session Classification: Particle Phenomenology

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

Quantum Moduli Spaces of Flat Connections and Applications

Wednesday, 30 September 2015 16:50 (15 minutes)

Non-perturbative aspects of N=2 SUSY gauge theories of class S are encoded in the algebra of functions on the moduli space M-flat of flat SL(N)-connections on Riemann surfaces. Expectation values of Wilson and ‘t Hooft line operators are related to holonomies of flat connections and, in the low-energy effective theory, to Fock-Goncharov coordinates on M-flat.
We determine the non-commutative algebra of UV line operators from the quantization of Fock-Goncharov Laurent polynomials and find that it coincides with the skein algebra studied in the context of Chern-Simons theory. Another realization of the skein algebra is generated by Verlinde network operators in Toda field theory. These results provide evidence for the generalization of the AGT correspondence to higher-rank class S theories.

Primary author: Mrs COMAN-LOHI, Ioana (DESY)

Presenter: Mrs COMAN-LOHI, Ioana (DESY)

Session Classification: Strings & Mathematical Physics

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

Order g^2 susceptibilities in the symmetric phase of the Standard Model

Thursday, 1 October 2015 15:00 (15 minutes)

Susceptibilities of conserved charges such as baryon minus lepton number enter baryogenesis computations, since they provide the relationship between conserved charges and chemical potentials. Their next-to-leading order corrections are of order g, where g is a generic Standard Model coupling. They are due to soft Higgs boson exchange, and have been calculated recently, together with some order g^2 corrections.
Here we compute the complete g^2 contributions. Close to the electroweak crossover the soft Higgs contribution is of order g^2, and is determined by the non-perturbative physics at the magnetic screening scale.

Primary authors: Prof. BÖDEKER, Dietrich (Universität Bielefeld); Mr SANGEL, Marc (Universität Bielefeld)

Presenter: Mr SANGEL, Marc (Universität Bielefeld)

Session Classification: Cosmology & Astroparticle Physics

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

ATLAS Z + MET Excess in the MSSM

Thursday, 1 October 2015 16:35 (15 minutes)

The ATLAS collaboration recently found a 3 sigma excess in the search for events with large missing transverse energy, jets, and a dilepton peaked on the Z mass region. We study this excess in the minimal supersymmetric standard model (MSSM), especially focusing on the well-motivated split supersymmetry (SUSY) spectrum. We consider the following decay chain: gluino to gluon and Higgsino which subsequently decays to Bino and Z. The first branching ratio is enhanced by the heavy squark loop, and the second branching ratio is enhanced by the quasi-degenerate mass spectrum. The decay topology and the mass spectrum is helpful to circumvent constraints from other SUSY searches. This talk is based on arXiv:1506.07161.

Primary authors: Dr SHIRAI, Satoshi (DESY); Dr TERADA, Takahiro (The University of Tokyo, DESY); Mr LU, Xiaochuan (UC Berkeley, LBNL)

Presenter: Dr TERADA, Takahiro (The University of Tokyo, DESY)

Session Classification: Particle Phenomenology

Contribution ID: **57** Type: **not specified**

SUSY Higgs Mass and Collider Signals with a Hidden Valley

Thursday, 1 October 2015 15:00 (15 minutes)

We propose a framework of supersymmetric standard models that can ameliorate both the SUSY Higgs mass problem and the missing superpartner problem. New vectorlike matter fields couple to the Higgs and provide new loop contributions to its mass. To avoid a Landau pole for new Yukawa couplings, these fields are charged under a new gauge group, which confines and leads to a Hidden Valley-like phenomenology. The Hidden Valley sector is almost supersymmetric and ordinary sparticles decay to exotic new states which decay back to standard model particles and gravitinos with reduced missing energy. We find a viable parameter space of specific benchmark models which ameliorates both of the major phenomenological problems with supersymmetry. Predictions for upcoming LHC searches are also presented.

Primary author: Dr NAKAI, Yuichiro (Harvard University)

Co-authors: Prof. REECE, Matthew (Harvard University); Dr SATO, Ryosuke (KEK)

Presenter: Dr NAKAI, Yuichiro (Harvard University)

Session Classification: Particle Phenomenology

Contribution ID: **58** Type: **not specified**

Minimal Asymmetric Dark Matter

Wednesday, 30 September 2015 15:15 (15 minutes)

In the early Universe, any particle carrying a conserved quantum number and in chemical equilibrium with the thermal bath will unavoidably inherit a particle-antiparticle asymmetry. A new particle of this type, if stable, would represent a candidate for asymmetric dark matter (DM) with an asymmetry directly related to the baryon asymmetry. We study this possibility for a minimal DM sector constituted by just one (generic) $SU(2)_L$ multiplet χ carrying hypercharge, assuming that at temperatures above the electroweak phase transition an effective operator enforces chemical equilibrium between χ and the Higgs boson. We argue that limits from DM direct detection searches severely constrain this scenario, leaving as the only possibilities scalar or fermion multiplets with hypercharge y = 1, preferentially quintuplets or larger SU(2) representations, and with a mass in the few TeV range.

Primary author: Dr KRAUSS, Martin (INFN - LNF (Frascati))

Co-authors: Dr NARDI, Enrico (INFN - LNF (Frascati)); Dr BOUCENNA, Sofiane (INFN - LNF (Frascati))

Presenter: Dr KRAUSS, Martin (INFN - LNF (Frascati))

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **59** Type: **not specified**

f(R), String Theory, and the CMB beyond first order

Thursday, 1 October 2015 16:20 (15 minutes)

Both WMAP and PLANCK have hinted at a slight suppression of power in the CMB temperature spectrum at large angular scales. Yet this power loss is usually unaccounted for by models that are claimed to provide a best fit to the data at first order, such as the Starobinsky f(R) model. In a first step, we demonstrate how to obtain a viable observational signature in f(R) theory by explicitly constructing higher order terms to the Starobinsky model. In a second step, we outline a new inflationary scenario deriving from higher derivative corrections in String theory giving rise to a similar observational fingerprint.

Primary author: Mr BROY, Benedict (Deutsches Elektron-Synchrotron DESY)

Presenter: Mr BROY, Benedict (Deutsches Elektron-Synchrotron DESY)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **60** Type: **not specified**

WIMP inflation from scalar singlets

Thursday, 1 October 2015 16:35 (15 minutes)

I will discuss the idea to combine singlet inflation and Higgs Portal Dark Matter in such a way that the same particle (a gauge singlet scalar) first drives inflation and later freezes out to become cold dark matter. Considering the implications of the Higgs discovery, limits from LUX and observations by Planck, I will show that large regions of parameter space remain viable but will be fully explored in the near future. Finally, I will comment on the stability of the electroweak vacuum and how to avoid the problem of unitarity-violation during inflation.

Primary author: Dr KAHLHOEFER, Felix (DESY)

Presenter: Dr KAHLHOEFER, Felix (DESY)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **61** Type: **not specified**

Charge and Color Breaking minima in the MSSM: the bottom-up connection

Thursday, 1 October 2015 17:05 (15 minutes)

The Minimal Supersymmetric Standard Model (MSSM) is known for the possibility of creating (unwanted) charge and color breaking minima. Well-known bounds on MSSM parameters are known for special scenarios with an alignment of vacuum expectation values (vevs) in the direction of up-type or dow-type fields only. From the one-loop stability condition in the up-type Higgs direction, we find a new constraint from the stability against sbottom vevs aligned with the up-Higgs. By this constraint, we exclude regions with large tanbeta and large mu-parameters.

Primary author: Dr HOLLIK, Wolfgang Gregor (KIT/DESY)

Presenter: Dr HOLLIK, Wolfgang Gregor (KIT/DESY)

Session Classification: Particle Phenomenology

Contribution ID: **62** Type: **not specified**

Using CheckMATE and FRITZ to set automatised LHC constraints

Thursday, 1 October 2015 14:45 (15 minutes)

CheckMATE is a framework that allows the user to conveniently test simulated BSM physics events against current LHC data in order to derive exclusion limits. For this purpose, the data runs through a detector simulation and is then processed by a user chosen number of experimental analyses. These analyses determine event predictions of the signal for various kinematic regions of interest that can be compared to the experimental data with different statistical tools. The talk will illustrate the main aspects of the tool, discuss the most recent implemented features and gives an outlook on future developments.

Primary authors: Mr SCHMEIER, Daniel (University of Bonn); Prof. DREINER, Herbert (University of Bonn); Dr TATTERSALL, Jamie (RWTH Aachen); Dr KIM, Jong Soo (Universidad Autonoma de Madrid); Dr ROLBIECKI, Krzysztof (Universidad Autonoma de Madrid); Prof. DREES, Manuel (University of Bonn); Dr DESAI, Nishita (University of Heidelberg)

Presenter: Mr SCHMEIER, Daniel (University of Bonn)

Session Classification: Particle Phenomenology

Contribution ID: **63** Type: **not specified**

Precise predictions for Higgs-masses in the Next-to-Minimal Supersymmetric Standard Model (NMSSM)

Thursday, 1 October 2015 14:45 (15 minutes)

The NMSSM represents an elegant and well motivated alternative description for the observed phenomenology in high energy physics. In this theory a scalar singlet together with its superpartner is added to the Higgs-sector of the Minimal Supersymmetric Standard Model (MSSM). In order to allow significant testing of the NMSSM by experiments precise predictions for the parameters of the theory are a necessity.

The talk will focus on the prediction for the Higgs-masses in the NMSSM up to 2-loop order obtained by diagrammatic methods. While the calculation at 1-loop order is performed in the full NMSSM, the contributions at 2-loop order are taken from the MSSM as a very good approximation. The approximation will be motivated and its validity will be discussed in detail.

Primary authors: Dr WEIGLEIN, Georg (Deutsches Elektronen-Synchrotron (DESY)); GALETA, Leonardo (Instituto de Física de Cantabria (CSIC-UC)); DRECHSEL, Peter (Deutsches Elektronen-Synchrotron (DESY)); Dr HEINEMEYER, Sven (Instituto de Física de Cantabria (CSIC-UC))

Presenter: DRECHSEL, Peter (Deutsches Elektronen-Synchrotron (DESY))

Session Classification: Particle Phenomenology

Contribution ID: **64** Type: **not specified**

News on string vacua of particle physics

Wednesday, 30 September 2015 14:00 (25 minutes)

Phenomenologically appealing string vacua with either the Standard Model or some GUT spectrum and suitable orders of magnitudes of matter couplings are essential to establish string theory as the framework that unifies all fundamental interactions. I will present here recent results on the quest for such vacua based on Type II string theory with D-branes, and I will discuss their impact on new physics and cosmological scenarios.

Primary author: Prof. HONECKER, Gabriele (Johannes-Gutenberg-Universität Mainz)

Presenter: Prof. HONECKER, Gabriele (Johannes-Gutenberg-Universität Mainz)

Session Classification: Strings & Mathematical Physics

Contribution ID: **65** Type: **not specified**

Alternative Propagation Models for Cosmic Positrons

Wednesday, 30 September 2015 17:05 (15 minutes)

One aim of cosmic ray measurements is to search for possible signatures of annihilating or decaying dark matter. The excess of positrons measured at the top of the atmosphere has attracted a lot of attention in this context. On the other hand it has been proposed that the data might challenge the established diffusion model for cosmic ray propagation. We investigate variations in the diffusion model giving rise to changes in the spectral shape of the positron spectrum.

Primary author: Ms REINERT, Annika (Bethe Center for Theoretical Physics, Bonn)

Presenter: Ms REINERT, Annika (Bethe Center for Theoretical Physics, Bonn)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **66** Type: **not specified**

Gauge fields as dark matter

Wednesday, 30 September 2015 15:30 (15 minutes)

I discuss the scenario of a dark U(1) or SU(N) gauge group coupled to the Standard Model via the Higgs portal. It turns out that minimal CP-conserving hidden Higgs sectors entail stable massive gauge fields which fall into the WIMP category of dark matter candidates. For SU(N), N>2, DM consists of three components, two of which are degenerate in mass. In all of the cases, there are substantial regions of parameter space where the direct and indirect detection as well as relic abundance constraints are satisfied.

Primary author: Dr GROSS, Christian (Helsinki University)

Co-authors: LEBEDEV, Oleg (Helsinki University); MAMBRINI, Yann (LPT Orsay)

Presenter: Dr GROSS, Christian (Helsinki University)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

Contribution ID: **67** Type: **not specified**

Integrating in the Higgs Portal to Fermion Dark Matter

Wednesday, 30 September 2015 15:15 (15 minutes)

Fermion dark matter interacting with the standard model through a Higgs portal suggests the presence of new mediator states at the electroweak scale. Collider searches for the mediators are a powerful tool to experimentally probe the Higgs-portal interactions, complementary to direct dark matter detection searches. In this talk, I discuss search strategies and the discovery range for the mediators at the LHC and future colliders in minimal renormalizable models.

Primary authors: FREITAS, Ayres (University of Pittsburgh); ZUPAN, Jure (University of Cincinnati); WESTHOFF, Susanne (University of Pittsburgh)

Presenter: WESTHOFF, Susanne (University of Pittsburgh)

Session Classification: Particle Phenomenology

Contribution ID: **68** Type: **not specified**

Affleck-Dine baryogenesis after D-term inflation and a solution to the baryon-DM coincidence problem

Thursday, 1 October 2015 15:15 (15 minutes)

We investigate the Affleck-Dine baryogenesis after D-term inflation with a positive Hubble-induced mass term for a B-L flat direction. It stays at a large field value during D-term inflation, and just after inflation ends it starts to oscillate around the origin of the potential due to the positive Hubble-induced mass term. The phase direction is kicked by higher-dimensional Kahler potentials to generate the B-L asymmetry. We also provide a D-term inflation model which naturally explain the coincidence of the energy density of baryon and dark matter.

Primary author: Mr YAMADA, Masaki (Institute for Cosmic Ray Research, University of Tokyo)

Co-author: Prof. KAWASAKI, Masahiro (Institute for Cosmic Ray Research, University of Tokyo)

Presenter: Mr YAMADA, Masaki (Institute for Cosmic Ray Research, University of Tokyo)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **69** Type: **not specified**

Self-interacting dark matter and cosmology of a light scalar mediator

Wednesday, 30 September 2015 15:00 (15 minutes)

We consider a fermionic dark matter candidate interacting via a scalar mediator coupled with the Standard Model through a Higgs portal. Motivated by the core-cusp problem, we study dark matter self-interactions which lead us to the region of the parameter space where the scalar mediator is light. We illustrate the relevant features for dark matter abundance, direct search limits and collider constraints, and find out that the coupling of the scalar mediator to the Higgs boson has to be very small. Finally we show how the problems of a light scalar mediator in the early universe can be resolved.

Primary author: Mr VASKONEN, Ville (University of Jyväskylä)

Co-authors: Prof. KAINULAINEN, Kimmo (University of Jyväskylä); Dr TUOMINEN, Kimmo (University of Helsinki)

Presenter: Mr VASKONEN, Ville (University of Jyväskylä)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **70** Type: **not specified**

Neutral Higgs production in the MSSM with complex parameters

Thursday, 1 October 2015 16:05 (15 minutes)

The MSSM with complex parameters has emerged as an attractive SUSY candidate providing new sources of CP-violation, which are well motivated in the context of the observed imbalance between matter and antimatter in the universe. In order to study the effects of the complex parameters, which enter via loop contributions, an accurate prediction for the Higgs production cross-section is required. In this talk, we present a study of these effects carried out with an implementation in the program SusHi linked to FeynHiggs.

Primary author: PATEL, Shruti (DESY)

Co-authors: Dr WEIGLEIN, Georg (DESY); Dr LIEBLER, Stefan (DESY)

Presenter: PATEL, Shruti (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **71** Type: **not specified**

On the Soft Limit of the Large Scale Structure Power Spectrum: UV Dependence

Thursday, 1 October 2015 16:50 (15 minutes)

We derive a non-perturbative equation for the large scale structure power spectrum of long-wavelength modes. We use an operator product expansion together with relations between the three-point function and power spectrum in the soft limit. The resulting equation encodes the coupling to ultraviolet (UV) modes in two time-dependent coefficients, which may be obtained from response functions to (anisotropic) parameters, such as spatial curvature, in a modified cosmology. We argue that both depend weakly on fluctuations deep in the UV. As a byproduct, this implies that the renormalized leading order coefficient(s) in the effective field theory (EFT) of large scale structures receive most of their contribution from modes close to the non-linear scale. Consequently, the UV dependence found in explicit computations within standard perturbation theory stems mostly from counter-term(s). We confront a simplified version of our non-perturbative equation against existent numerical simulations, and find good agreement within the expected uncertainties. Our approach can in principle be used to precisely infer the relevance of the leading order EFT coefficient(s) using small volume simulations in an 'anisotropic separate universe' framework. Our results suggest that the importance of these coefficient(s) is a $\sim 10\%$ effect, and plausibly smaller.

Primary authors: SAGUNSKI, Laura (DESY Hamburg); GARNY, Mathias (CERN Theory Division); PORTO, Rafael A. (ICTP South American Institute for Fundamental Research, Sao Paulo, Brazil); KONSTANDIN, Thomas (DESY Hamburg)

Presenter: SAGUNSKI, Laura (DESY Hamburg)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **72** Type: **not specified**

LHC physics with GoSam 2.0

Wednesday, 30 September 2015 15:00 (15 minutes)

In this talk we give an overview over recent developments within GoSam, a publicly available package for the automated calculation of next-to-leading order corrections within and beyond the Standard Model. Besides the current developments we discuss the latest phenomenological applications and present results that are relevant for the Run 2 of the LHC.

Primary author: Mr GREINER, Nicolas (University of Zurich)

Presenter: Mr GREINER, Nicolas (University of Zurich)

Session Classification: Particle Phenomenology

Contribution ID: **73** Type: **not specified**

Cosmological aspects of the next-to-minimal supersymmetric standard model

Thursday, 1 October 2015 17:05 (15 minutes)

The next-to-minimal supersymmetric standard model (NMSSM) is a possible extension of the minimal supersymmetric standard model (MSSM) that introduces an additional gauge singlet superfield to solve the mu-problem of the MSSM. In this model there exists a discrete Z_3 symmetry, which can be spontaneously broken in the early universe leading to the formation of domain walls. In this work, we investigate cosmological constraints on the NMSSM by considering the domain wall production in the early universe. We specify the condition for the formation of domain walls in the context of inflationary cosmology and discuss the possibility to probe model parameters by observing gravitational waves produced from them.

Primary author: Mr SAIKAWA, Ken'ichi (Tokyo Institute of Technology)

Presenter: Mr SAIKAWA, Ken'ichi (Tokyo Institute of Technology)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **74** Type: **not specified**

Transverse momentum dependent (un)polarized gluon distributions in Higgs production

Thursday, 1 October 2015 16:20 (15 minutes)

We discuss transverse momentum dependent (un)polarized gluon distributions (gluon TMDs) and their proper definitions in the context of factorization theorems. All the gluon TMDs have a scale evolution driven by a universal evolution kernel which is resummed to NNLL. By an explicit NLO calculation of the three gluon TMDs which are matched onto leading twist parton distribution functions (PDFs) we demonstrate that they are free from rapidity divergences, and calculate the Wilson coefficients of their expansion in terms of the PDFs. We investigate the effects of evolution and discuss their impact on the transverse momentum spectrum of color singlet production, such as Higgs boson production in gluon fusion.

Primary author: KASEMETS, Tomas (Nikhef/Vu)

Presenter: KASEMETS, Tomas (Nikhef/Vu)

Session Classification: Particle Phenomenology

Contribution ID: **75** Type: **not specified**

Jet angular correlation in the top quark pair production

Thursday, 1 October 2015 16:35 (15 minutes)

In this talk I will discuss an azimuthal angle correlation between the two hardest jets in the top quark pair production at the LHC. The event samples are generated by merging the tree level matrix elements for the ttbar plus up to 2 or 3 partons with parton showers. I show that the generated event samples reproduce a strong correlation in the azimuthal angle difference between the two hardest jets, as predicted in the analysis based on the tree level matrix elements for the ttbar+2 partons. The effects of merging the matrix elements for the ttbar+3 partons and the merging algorithm dependence on the correlation will also be discussed.

Primary author: NAKAMURA, Junya (University of Tübingen)

Presenter: NAKAMURA, Junya (University of Tübingen)

Session Classification: Particle Phenomenology

Contribution ID: **76** Type: **not specified**

Adjoint $SU(5)$ GUT model with T_7 flavor symmetry

Wednesday, 30 September 2015 14:30 (15 minutes)

We propose an adjoint $SU(5)$ GUT model with a T_7 family symmetry and an extra $Z_2 \otimes Z_2' \otimes Z_3 \otimes Z_4 \otimes Z_{12}$ discrete group, that successfully describes the prevailing Standard Model (SM) fermion mass and mixing pattern. The observed hierarchy of the charged fermion masses and the quark mixing angles arises from the $Z_3 \otimes Z_4 \otimes Z_{12}$ symmetry breaking, which occurs near to the GUT scale. The light active neutrino masses are generated by type I and type III seesaw mechanisms mediated by the fermionic $SU(5)$ singlet and the adjoint **24**-plet. We construct several benchmark scenarios, which lead to $SU(5)$ gauge coupling unification and are compatible with the known phenomenological constraints originating from the lightness of neutrinos, proton decay, dark matter, etc. These scenarios contain TEV scale colored fields, which could give rise to a visible signal or be stringently constrained at the LHC.

Primary authors: Dr CAROLINA, Arbelaez (Postdoctoral researcher); Dr ANTONIO ENRIQUE, Carcamo (Postdoctoral researcher); Prof. SERGEY, Kovalenko (Associate Professor); Prof. IVAN, Schmidt (Associate Professor)

Presenter: Dr CAROLINA, Arbelaez (Postdoctoral researcher)

Session Classification: Particle Phenomenology

Contribution ID: **77** Type: **not specified**

Analytic Bootstrap for the O(N) Vector Models

Thursday, 1 October 2015 14:00 (25 minutes)

We study higher spin currents in the O(N) vector models using analytic conformal bootstrap. For large N we compare the predictions of the bootstrap for anomalous dimensions of higher spin currents against the available perturbative computations. We then generalize to arbitrary loop order. For small N our results can be tested using numerical bootstrap or future experiments.

Primary author: Mr ZHIBOEDOV, Alexander (Harvard University)

Co-author: Prof. ALDAY, Luis (Oxford University)

Presenter: Mr ZHIBOEDOV, Alexander (Harvard University)

Session Classification: Strings & Mathematical Physics

Contribution ID: **78** Type: **not specified**

Resummation of double-differential cross sections

Wednesday, 30 September 2015 16:20 (15 minutes)

LHC measurements involve cuts on several observables. Some lead to widely separated energy scales and require resummation. I will present an extension of SCET which enables the resummation of a class of double-differential measurements. Two prototypical application are 1) pp → Z + 0 jets, where the jet veto is imposed through the beam thrust event shape T, and the transverse momentum pT of the Z boson is measured and 2) the measurement of two angularities on a single jet. For the second application, the resummation on the two phase space boundaries was achieved recently (Larkoski, Moult, Neill, 2014). I will show how to go beyond this by identifying the factorization formula needed to achieve resummation in the intermediate regime, which involve additional collinear-soft modes. Numerical results for the resummed double-differential cross section will be presented.

Primary author: ZEUNE, Lisa (University of Amsterdam)

Presenter: ZEUNE, Lisa (University of Amsterdam)

Session Classification: Particle Phenomenology

Contribution ID: **79** Type: **not specified**

Partially Composite Dark Matter in Composite Higgs Model

Wednesday, 30 September 2015 16:05 (15 minutes)

In composite Higgs scenario, interactions to generate the top Yukawa coupling provide the Higgs potential due to the explicit breaking of a global symmetry. However, such a scenario generically requires a little cancellation in the leading contribution in order to achieve the correct electroweak symmetry breaking with VEV = 246 GeV. We, instead, consider the possibility that the dark matter (DM) sector also contributes to generate the Higgs potential. The contribution from DM balances against that from the top quark, then, such a small electroweak VEV (246 GeV) can be realized. In a consistent region of the parameter space, the DM thermal relic explains the observed DM abundance and the direct detection is found to be promising. We will also discuss the phenomenology of this scenario.

Primary authors: Dr ASANO, Masaki (Bonn University); Prof. KITANO, Ryuichiro (KEK)

Presenter: Dr ASANO, Masaki (Bonn University)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **80** Type: **not specified**

Transverse momentum resummation in Higgs production

Wednesday, 30 September 2015 16:05 (15 minutes)

With increasing statistics at the LHC an important observable of the Higgs-like boson is its transverse momentum distribution.
Its dominant contributions arise at small pT, where large logarithms log(pT/mH) need to be resummed to all orders to obtain a reliable theoretical prediction.
This resummation is conveniently performed in the impact parameter space, which is Fourier conjugate to transverse momentum space.
When transforming back to momentum space, well-known divergences arise from the QCD Landau pole and from vanishing impact parameter b=0.
Different approaches to treat these problems exist in the literature, but no study has been carried out to assess the differences between them.
We will discuss and compare these existing techniques.

Primary author: EBERT, Markus (DESY)

Co-author: TACKMANN, Frank (DESY)

Presenter: EBERT, Markus (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **81** Type: **not specified**

Dark Matter and Collider Phenomenology of Minimal Gauged U(1)_B and U(1)_L Models

Wednesday, 30 September 2015 16:20 (15 minutes)

Recently, a new class of models beyond the standard model was proposed wherein the baryonic and leptonic currents separately source U(1) gauge fields. In this talk, I describe the two most minimal viable models known. In these models, the requirement of anomaly cancellation conditions automatically imply the existence of a stable Fermionic dark matter candidate. In addition to dark matter phenomenology, prospects of baryogenesis, and collider signatures in these models will be discussed.

This talk will draw material from
P. Fileviez Perez, HP. Phys.Lett.B (2014) 232
P. Fileviez Perez, S. Ohmer, HP. Phys.Lett.B. (2014)
and focus on
S. Ohmer, HP. arXiv:1506.00954 (PRD accepted)

Primary author: Dr PATEL, Hiren (Max-Planck-Institute fuer Kernphysik)

Presenter: Dr PATEL, Hiren (Max-Planck-Institute fuer Kernphysik)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

Contribution ID: **82** Type: **not specified**

Discovering Displaced Higgs Portal Dark Matter at the LHC

Wednesday, 30 September 2015 17:05 (15 minutes)

We revisit the singlet complex scalar Higgs portal model. We introduce the U(1)_{\phi} breaking terms. These terms make small mass splitting. The small mass splitting make the displaced decay which could be a non-SM background signal. We find feasible way to discover the displaced higgs portal dark matter at the LHC.

Primary authors: Mr KANG, Dong Woo (Sungkyunkwan University / CERN); Dr MCCULLOUGH, Matthew (CERN); Dr SCHWALLER, Pedro (CERN)

Presenter: Mr KANG, Dong Woo (Sungkyunkwan University / CERN)

Session Classification: Particle Phenomenology

Contribution ID: **83** Type: **not specified**

Is a light singlet within an R-symmetric SUSY model viable?

Thursday, 1 October 2015 15:15 (15 minutes)

R-Symmetry is an additional symmetry which can be imposed on a supersymmetric model, leading to interesting phenomenological consequences like the prediction of Dirac Gauginos.
A model with a minimal implementation of this symmetry is the MRSSM and in this talk an analysis of its Higgs sector, as well as its dark matter and LHC phenomenology will be presented.

This model includes a singlet Higgs state, which could be actually lighter than the 125 GeV SM-like Higgs and evading LEP bounds.
Due to the interplay of parameters in the bosonic and fermionic sector in the model this scenario lets us put an upper bound on the mass of the lightest neutralino, which will then be the LSP of our model.
In this scenario, we will discuss the phenomenological impact of LHC searches and show how the LSP can be a viable dark matter candidate.

Primary author: Mr DIESSNER, Philip (Technische Universität Dresden)

Co-authors: Prof. STOECKINGER, Dominik (Technische Universität Dresden); Prof. KALINOWSKI, Jan (University of Warsaw); KOTLARSKI, Wojciech (Technische Universität Dresden)

Presenter: Mr DIESSNER, Philip (Technische Universität Dresden)

Session Classification: Particle Phenomenology

Contribution ID: **84** Type: **not specified**

GM2Calc - A tool for calculating the muon (g-2) in the MSSM

Thursday, 1 October 2015 14:00 (15 minutes)

We present GM2Calc, a stand-alone C++ program which calculates the supersymmetric contributions to the anomalous magnetic moment of the muon in the Minimal Supersymmetric Standard Model. Besides the one-loop contributions, two-loop corrections coming from SUSY one-loop diagrams with an additional photon exchange or a fermion/sfermion loop insertion as well as two-loop corrections to SM-like one-loop diagrams are taken into account. Furthermore tan(beta)-enhanced terms are resummed to all orders, which allows the limit tan(beta) -> infinity. The input can be given either as SLHA file or via a custom interface which uses on-shell parameters.

Primary author: Mr BACH, Markus (TU Dresden)

Co-authors: Dr VOIGT, Alexander (DESY Hamburg); Mr GNENDIGER, Christoph (TU Dresden); Prof. STÖCKINGER, Dominik (TU Dresden); Dr FARGNOLI, Helvecio (Universidade Federal de Lavras); Dr STÖCKINGER-KIM, Hyejung (TU Dresden); Dr PARK, Jae-hyeon (Universitat de Valencia-CSIC); Dr ATHRON, Peter (Monash University); Mr GREIFENHAGEN, Robert (TU Dresden); Dr PASSEHR, Sebastian (DESY Hamburg)

Presenter: Mr BACH, Markus (TU Dresden)

Session Classification: Particle Phenomenology

Contribution ID: **85** Type: **not specified**

Classification of Shift-Symmetric No-Scale Supergravities

Wednesday, 30 September 2015 17:35 (15 minutes)

Models of 4D $\mathcal{N} = 1$ supergravity coupled to chiral multiplets with vanishing scalar potential have been denoted as no-scale. Of particular interest in the context of string theory are models which additionally possess a shift-symmetry. In this case there exists a dual description of chiral models in terms of real linear multiplets. We classify all shift-symmetric no-scale supergravities in both formulations and verify that they match upon dualization. Additionally, we comment on the implications for stringy effective supergravities.

Primary author: CIUPKE, David (DESY)

Co-author: Mrs ZARATE, Lucila (Uni Hamburg)

Presenter: CIUPKE, David (DESY)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **86** Type: **not specified**

Hiding the little hierarchy problem in the NMSSM

Thursday, 1 October 2015 16:35 (15 minutes)

In this work we consider a set of soft supersymmetry breaking terms within the NMSSM which leads to a small hierarchy between the supersymmetry breaking scale and the electroweak scale. Specifically only the gaugino masses and the soft term in the Higgs sector are non-vanishing at the GUT scale. This pattern can be found in gaugino mediated models and in higher-dimensional orbifold GUTs.
We also study the phenomenological implications of this scenario.

Primary authors: Prof. LOUIS, Jan (Hamburg University); Mrs ZÁRATE, Lucila (Hamburg University)

Presenter: Mrs ZÁRATE, Lucila (Hamburg University)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **87** Type: **not specified**

Improved Estimates for the Parameters of the Heavy Quark Expansion

Thursday, 1 October 2015 17:05 (15 minutes)

As the number of non-perturbative parameters appearing in the heavy quark expansion for inclusive decays proliferates at higher orders, one cannot extract all of these from data, but needs to rely on theoretical estimates. I will explain a systematic method to estimate these parameters.

Primary author: Dr HEINONEN, Johannes (Universität Siegen)

Co-authors: Prof. PIVOVAROV, Alexei (Universität Siegen); Prof. MANNELL, Thomas (Universität Siegen)

Presenter: Dr HEINONEN, Johannes (Universität Siegen)

Session Classification: Particle Phenomenology

Contribution ID: **88** Type: **not specified**

WW + jet: compact analytic results

Wednesday, 30 September 2015 15:15 (15 minutes)

In this work we report on a next-to-leading order calculation of WW + jet production at hadron colliders, with subsequent leptonic decays of the W-bosons included. The calculation of the one-loop contributions is performed using generalized unitarity methods in order to derive analytic expressions for the relevant amplitudes. These amplitudes have been implemented in the parton-level Monte Carlo generator MCFM, which we use to provide a complete next-to leading order calculation. Predictions for total cross-sections, as well as differential distributions for several key observables, are computed both for the LHC operating at 14 TeV as well as for a possible future 100 TeV proton-proton collider.

Primary author: Dr ROBENS, Tania (IKTP, TU Dresden)

Presenter: Dr ROBENS, Tania (IKTP, TU Dresden)

Session Classification: Particle Phenomenology

Contribution ID: **89** Type: **not specified**

Dark matter from the 10 of SO(10)

Wednesday, 30 September 2015 16:35 (15 minutes)

I will present a new model of dark matter where the candidate arises from a fermionic 10 representation of SO(10) Grand unified theory. Stability follows from the gauge structure itself, and the low energy dark matter phenomenology is that of a TeV-scale left-right model augmented by a fermion bi-doublet.

Primary author: Mr BOUCENNA, Sofiane (LNF-INFN)

Co-authors: NARDI, Enrico (LNF-INFN); KRAUSS, Martin (LNF-INFN)

Presenter: Mr BOUCENNA, Sofiane (LNF-INFN)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **90** Type: **not specified**

Interplay between dark matter models and LHC data

Wednesday, 30 September 2015 16:20 (15 minutes)

We present a variety of dark matter models with mediator particles, ranging from simplified setups to elaborated models with definite predictions. We explore the parameter space regions not excluded by cosmological observations. We show that there is an important complementarity between these bounds and LHC searches for the mediators themselves. These include monojet and dijet searches, as well as searches of long-lived charged particles, ttbar and dilepton final states.

Primary author: Dr CHALA, Mikael (DESY)

Presenter: Dr CHALA, Mikael (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **91** Type: **not specified**

Higher-order corrections to (double) Higgs production

Wednesday, 30 September 2015 16:50 (15 minutes)

I will talk about the more technical aspects of calculations of higher-order corrections to single and double Higgs boson production.

Primary author: Dr HOFF, Jens (DESY)

Presenter: Dr HOFF, Jens (DESY)

Session Classification: Particle Phenomenology

Contribution ID: **92** Type: **not specified**

Light from Dark Matter

Wednesday, 30 September 2015 17:20 (15 minutes)

The detection of gamma lines from dark matter annihilation has been seen as a "smoking gun" signature for the existence of dark matter.
However, it turns out that this signature if far from being a generic feature of dark matter models. In fact in most models tree level annihilation to Standard Model particles and Final State Radiation off them leads to a gamma ray continuum which makes the line invisible to a realistic experiment. I will present a novel mechanism which allows to have suppressed tree level annihilation and a dominant gamma ray signal in the late universe. At the same time the interactions with the Standard Model lead to the correct relic abundance via a thermal freeze in.

Primary author: Dr SMIRNOV, Juri (Max Planck Institute fuer Kernphysik)

Co-authors: Dr DUERR, Michael (DESY); Dr FILEVIEZ PEREZ, Pavel (MPIK)

Presenter: Dr SMIRNOV, Juri (Max Planck Institute fuer Kernphysik)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

Contribution ID: **93** Type: **not specified**

Dark matter decays from a non-minimal coupling to gravity

Wednesday, 30 September 2015 17:35 (15 minutes)

We consider scenarios where the dark matter becomes unstable due to a non-minimal coupling to gravity. We show that the dark matter can decay into Standard Model particles with a lifetime which is potentially accessible to gamma-ray or neutrino telescopes. We determine the decay branching fractions in some simple scenarios and we set limits on the size of the dark matter non-minimal coupling parameter from observations.

Primary authors: IBARRA, Alejandro (Technische Universität München); CATA, Oscar (Ludwig-Maximilians-Universität München); INGENHÜTT, Sebastian (Technische Universität München)

Presenter: INGENHÜTT, Sebastian (Technische Universität München)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **94** Type: **not specified**

Quark isospin asymmetry at small and large x

Thursday, 1 October 2015 16:05 (15 minutes)

We discuss an improved determination of the up- and down-quark distributions in the proton using recent data on charged lepton asymmetries from $W^{\pm}$ gauge-boson production at the LHC and Tevatron. The analysis is performed in the framework of a global fit of parton distribution functions. The results are consistent with a non-zero iso-spin asymmetry of the sea, $x(\bar{d}-\bar{u})$, at small values of Bjorken $x \sim 10^{-3}$ indicating a delayed onset of the Regge asymptotics of a vanishing $(\bar{d}-\bar{u})$-asymmetry at small-x.

Primary author: ALEKHIN, Sergey (Hamburg University)

Co-authors: BLUEMLEIN, Johannes (DESY-Zeuthen); PLACAKYTE, Ringaile (DESY); MOCH, Sven-Olaf (Hamburg University)

Presenter: ALEKHIN, Sergey (Hamburg University)

Session Classification: Particle Phenomenology

Contribution ID: **95** Type: **not specified**

Dark Matter Mono-Z Production at the LHC beyond Leading Order in the Simplified Models

Wednesday, 30 September 2015 17:20 (15 minutes)

We present theoretical predictions for the mono-Z production
in the search for dark matter at the LHC with next-to-leading order QCD corrections
and parton-shower effects.
The calculation is performed in the framework of {\tt MadGraph5_aMC@NLO}.
We find that the high order QCD corrections are sizable, and can reduce the theoretical uncertainties.
We also investigate the discovery potential of this signal at the 13 TeV LHC.

Primary author: Dr WANG, Jian (Johannes Gutenberg University)

Co-authors: Dr ZHANG, Cen (Brookhaven National Laboratory); Prof. NEUBERT, Matthias (Johannes Gutenberg University)

Presenter: Dr WANG, Jian (Johannes Gutenberg University)

Session Classification: Particle Phenomenology

Contribution ID: **96** Type: **not specified**

Full two-loop fermionic contributions for (g-2) in the Two-Higgs-Doublet Model

Thursday, 1 October 2015 14:15 (15 minutes)

The anomalous magnetic moment of the muon is, by today, one of the most appealing signs for Physics Beyond the Standard Model. In this work, we study the Two-Higgs-Doublet Model and compute, up to two-loop order, the complete set of fermionic contributions for the anomaly. We are able to fully reproduce some recent results found in the literature and we show that, for a large region of the parameter space, the discrepancy between the experimental value and theoretical prediction for the anomaly can be significantly reduced.

Primary authors: Dr LANA CHERCHIGLIA, Adriano (IKTP - TU Dresden); STÖCKINGER, Dominik (IKTP - TU Dresden); STÖCKINGER-KIM, Hyejung (IKTP - TU Dresden); KNESCHKE, Patrick (IKTP - TU Dresden)

Presenter: Dr LANA CHERCHIGLIA, Adriano (IKTP - TU Dresden)

Session Classification: Particle Phenomenology

Contribution ID: **97** Type: **not specified**

Testability of Heavy Neutral Leptons as origin of the Baryon Asymmetry of the Universe

Thursday, 1 October 2015 15:30 (15 minutes)

The nuMSM is the Standard Model extended by three right-handed neutrinos with Majorana masses below the electroweak scale. The lightest of them is a candidate of dark matter, which is known as sterile neutrino dark matter. Other two heavier particles with quasi-degenerate masses of O(1) GeV are responsible to explain the masses of ordinary neutrinos and baryon asymmetry of the universe (BAU). In order to produce the observed abundance of dark matter without contradiction to bounds from X-ray observations and structure formation, the dark matter candidate has to be produced resonantly with a large lepton asymmetry, and only the heavier particles can be the source of lepton asymmetry in this extended model. We discuss the lepton asymmetry production via right-handed neutrino oscillation, which is same mechanism to explain the BAU, and the evolution in plasma with cosmological magnetic field.

Primary author: Dr EIJIMA, Shintaro (EPFL)

Co-author: Prof. SHAPOSHNIKOV, Mikhail (EPFL)

Presenter: Dr EIJIMA, Shintaro (EPFL)

Session Classification: Cosmology & Astroparticle Physics

Contribution ID: **98** Type: **not specified**

Quantum structure of the minimal calculable unified model

Wednesday, 30 September 2015 14:45 (15 minutes)

Despite of its tremendous success various theoretical and experimental issues seem to indicate the need to go beyond the Standard Model framework. One of the most promising ways to address the open questions is offered by the Grand Unification paradigm. Its main experimental signature is the prediction of proton decay and with the new generation of experiments under way (Hyper-K, DUNE, \ldots) an order of magnitude increase in the sensitivity of such searches is expected. To take advantage of these huge experimental efforts one would on the theory side need to improve the accuracy of proton lifetime predictions. That means going to the next-to-leading order calculation that has never been done in this context before. But first one needs to find a way to overcome some large uncertainties involved.

The unknown flavour structure of the theory (Yukawa sector) is only part of the reason for that - the other difficulty lies in determination of the scale of gauge coupling unification due to the Planck scale effects.
Proton lifetime depends strongly on the masses of the heavy fields which mediate its decay. In the non-supersymmetric case those mediators are predominantly the heavy gauge bosons, whose masses can be identified with M_{GUT}. But how accurately we are really able to determine it without the access to the high energy physics?
At next-to-leading order one should consider the 2-loop running
of all the couplings and use the 1-loop threshold effects to account for the splitting of particles' masses around the matching scales of different effective theories. However, at this level of accuracy one typically can not avoid the Planck suppressed operators, particularly dangerous being the gauge kinetic form terms $\kappa/M_P F^{\mu\nu}\langle\phi\rangle F_{\mu\nu}$ which through inhomogeneous and uncontrolled shifts in the matching condition inflict a theoretical uncertainty of a several orders of magnitude on our prediction of M_{GUT}.
With this operator present there is no point of ever trying to compute proton decay better than at the leading order.

One of the rare exceptions where this issue can be overcome is the minimal renormalizable non-supersymmetric SO(10) model with the 45 Higgs.
There such a term is exactly zero due to the antisymmetry of the adjoint representation.
The model consists of two irreducible representations in the Higgs sector - besides 45 needed to spontaneously break the unification group one needs either 16 or 126 to break the rank as well. Having neutrino masses in the right ball park discards the option with 16 that doesn't give us enough freedom in the Yukawa sector. But even the model with 126 has long been considered excluded due to tachyonicity of the tree-level masses or otherwise admitting only the phenomenologically not viable breaking to SU(5). But at the quantum level the masses receive substantial corrections and can become non-tachyonic. %They are especially interesting because they are exactly the particles which mediate proton decay.
That's the reason why the masses entering the 1-loop threshold corrections can not be the tree level masses as one would naively expect but must be computed at the 1-loop as well.
Our goal is then to use the effective potential approach to compute the spectrum, show that it's realistic, the vacuum state is long-lived and provide the first ever NLO computation of the corresponding proton lifetime.

Primary author: MEDE, Timon (IPNP Charles University in Prague)

Presenter: MEDE, Timon (IPNP Charles University in Prague)

Session Classification: Particle Phenomenology

Contribution ID: **99** Type: **not specified**

$h \to \mu\tau$ as an indication for S_4 flavor symmetry

Wednesday, 30 September 2015 14:15 (15 minutes)

Lepton flavor violating Higgs decays can arise in flavor symmetry models where the Higgs sector is responsible for both the electroweak and the flavor symmetry breaking. Here we advocate an S_4 three-Higgs-doublet model where tightly constrained flavor changing neutral currents are suppressed by a remnant Z_3 symmetry. A small breaking of this Z_3 symmetry can explain the $2.4\,\sigma$ excess of Higgs decay final states with a $\mu\tau$ topology reported recently by CMS if the new neutral scalars are light. The model also predicts sizable rates for lepton flavor violating Higgs decays in the $e\tau$ and $e\mu$ channels because of the unifying S_4 flavor symmetry.

Primary author: Mr SCHUMACHER, Erik (TU Dortmund)

Co-authors: Mr CARCAMO, Antonio (UTFSM Valparaíso, Chile); Prof. PÄS, Heinrich (TU Dortmund); Mr CAMPOS, Miguel (MPIK Heidelberg)

Presenter: Mr SCHUMACHER, Erik (TU Dortmund)

Session Classification: Particle Phenomenology

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

A class of 2D non-Abelian gauged linear sigma models

Wednesday, 30 September 2015 16:20 (15 minutes)

Two-dimensional gauged linear sigma models with N=(2,2) supersymmetry are a powerful tool for studying the worldsheet theories of type II string compactifications. We construct a certain class of non-Abelian gauged linear sigma models that exhibit an interesting phase structure emerging from non-Abelian strong coupling dynamics. The observed phase structure leads to a duality proposal amongst these models, for which we provide further evidence by matching the respective two sphere partition functions. As some of the models at low energies flow to non-linear sigma models with Calabi-Yau target spaces, the duality proposal results in a correspondence of non-complete intersection Calabi-Yau varieties.

Primary author: Mr GERHARDUS, Andreas (Bethe Center for Theoretical Physics)

Presenter: Mr GERHARDUS, Andreas (Bethe Center for Theoretical Physics)

Session Classification: Strings & Mathematical Physics

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

Beyond NNLL' qT resummation with CuTe

Wednesday, 30 September 2015 16:35 (15 minutes)

Transverse momentum spectra of massive bosons at hadron colliders provide important tests of the Standard Model. In the crucial region, where the boson's invariant mass M is much smaller than its transverse momentum qT, the spectra are very sensitive to initial state radiation.
Applying soft-collinear effective theory, a universal framework for its description has been established and the relevant perturbative operators have been extracted up to next-to-next-to leading order (NNLO).

For any heavy color neutral final state, these results enable us to resum logarithms of qT/M beyond next-to-next-to leading logarithmic (NNLL) accuracy and to consistently match to the corresponding NNLO fixed order result. For Drell-Yan, Z, W and H production we implemented this in the program CuTe. As two important examples, we present the qT spectra of Z and H production to NNLO+NN(N)LL accuracy and confront these results with LHC data.

Primary author: Dr LÜBBERT, Thomas (Universität Hamburg)

Presenter: Dr LÜBBERT, Thomas (Universität Hamburg)

Session Classification: Particle Phenomenology

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

1/4 BPS Wilson loops in AdS5xS5: does sigma-model perturbation theory meet localization?

Thursday, 1 October 2015 16:05 (15 minutes)

We study the strong coupling behaviour of 1/4 BPS latitude Wilson loops in N=4 SYM theory, computing the one-loop corrections to the relevant classical string solution in AdS5xS5 in sigma-model perturbation theory.
The approach is based on the application of the Gel'fand-Yaglom method to compute the relevant functional determinants for the fluctuations of the type IIB Green-Schwarz action expanded around the minimal-area surface. We normalize the vev of the Wilson loops with respect to the 1/2 BPS circular case to circumvent the problem of determining the correct overall constant contribution from the normalization of ghost zero modes. We find a discrepancy with the result obtained via supersymmetric localization in the gauge theory and discuss some issues that might be responsible for this outcome.

Primary author: Mr VESCOVI, Edoardo (Humboldt-Universität zu Berlin)

Co-authors: Prof. SEMINARA, Domenico (University of Florence); Prof. GRIGUOLO, Luca (University of Parma); Dr FORINI, Valentina (Humboldt-Universität zu Berlin); Dr GIANGRECO MAROTTA PULETTI, Valentina (University of Iceland, Science Institute)

Presenter: Mr VESCOVI, Edoardo (Humboldt-Universität zu Berlin)

Session Classification: Strings & Mathematical Physics

Contribution ID: **103** Type: **not specified**

Topological strings and Siegel modular forms

Wednesday, 30 September 2015 16:35 (15 minutes)

The topological string theory partition function captures non-trivial invariants of Calabi-Yau threefolds. In general, target space symmetries acting on the cohomology induce an automorphic structure on the free energies. For non-compact geometries with spectral curve of genus one this allowed to re-express the physical constraints in terms of modular forms. The construction, however, relied on a certain quasi modular object, the second Eisenstein series. We generalise this procedure to spectral curves of genus two and show that the appropriate automorphic objects are Siegel modular forms. In particular, we propose an analogue for the second Eisenstein series and a generalised Ramanujan identity both of which have not previously been described in the mathematical literature.
On this class of geometries we provide a straightforward recipe for solving the topological string.

Primary authors: Prof. KLEMM, Albrecht (University of Bonn); Mr WESTERHOLT-RAUM, Martin (Chalmers Technical University); Dr PORETSCHKIN, Maximilian (University of Pennsylvania); Mr SCHIMANNEK, Thorsten (University of Bonn)

Presenter: Mr SCHIMANNEK, Thorsten (University of Bonn)

Session Classification: Strings & Mathematical Physics

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

Natural Inflation and Low Scale Supersymmetry

Thursday, 1 October 2015 14:50 (25 minutes)

Natural (axionic) inflation provides a well-motivated and predictive scheme for the description of the early universe. It leads to sizeable primordial tensor modes and thus a high mass scale of the inflationary potential. Naively this seems to be at odds with low (TeV) scale supersymmetry, especially when embedded in string theory. I will outline in the talk that low scale supersymmetry is compatible with natural (high scale) inflation in a string inspired setup. The mechanism requires the presence of two axions that are provided through the moduli of string theory.

Primary author: KAPPL, Rolf (Bethe Center for Theoretical Physics)

Presenter: KAPPL, Rolf (Bethe Center for Theoretical Physics)

Session Classification: Strings & Mathematical Physics

Contribution ID: **105** Type: **not specified**

Renormalization freedom in de Sitter spacetime

Thursday, 1 October 2015 17:20 (15 minutes)

By considering a Quantum Field Theory with time-dependent backgrounds the time-translational symmetry of the Lagrangian may be broken. In my talk I would like to discuss renormalization in curved spacetime using the CTP formalism. In particular, I will show the results for simple diagrams, where explicit calculations are still possible. Connections with the renormalization as an extension of distributions will be pointed out.

Primary author: Mr DRESTI, Simone (Georg-August University Göttingen)

Presenter: Mr DRESTI, Simone (Georg-August University Göttingen)

Session Classification: Cosmology & Astroparticle Physics

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

Cosmic Inflation as a probe to Dark Matter properties

Thursday, 1 October 2015 17:35 (15 minutes)

We show that dark matter abundance and the inflationary scale could be intimately related. Standard Model extensions with Higgs mediated couplings to new physics typically contain extra scalars whose excursions at the end of inflation can be very large.

If their coupling to the Standard Model is weak, they will not thermalize and may easily constitute too much dark matter reminiscent to the moduli problem. As an example we consider Standard Model extended by real singlet scalar, and also by a singlet fermion. We discuss the field dynamics during inflation together with the post-inflationary dark matter production mechanisms and derive stringent constraints on viable mass scales and coupling values.

The found connection between primordial tensor perturbations and observed dark matter abundance may therefore provide an interesting new probe on dark matter properties in the near future.

Primary author: Mr TENKANEN, Tommi (University of Helsinki and Helsinki Institute of Physics)

Co-authors: Prof. KAINULAINEN, Kimmo (University of Jyväskylä and Helsinki Institute of Physics); Dr TUOMINEN, Kimmo (University of Helsinki and Helsinki Institute of Physics); Dr NURMI, Sami (University of Helsinki, University of Jyväskylä and Helsinki Institute of Physics); Mr VASKONEN, Ville (University of Jyväskylä and Helsinki Institute of Physics)

Presenter: Mr TENKANEN, Tommi (University of Helsinki and Helsinki Institute of Physics)

Session Classification: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Scanning the Heterotic String Landscape

Wednesday, 30 September 2015 14:25 (25 minutes)

Two approaches to heterotic string model building are discussed and compared: first toroidal orbifolds and secondly Calabi-Yau manifolds with line bundle gauge backgrounds.

Primary author: Dr VAUDREVANGE, Patrick (TUM Munich)

Presenter: Dr VAUDREVANGE, Patrick (TUM Munich)

Session Classification: Strings & Mathematical Physics

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

Higgs mass in R-symmetric SUSY at one-loop level and beyond

Thursday, 1 October 2015 15:00 (15 minutes)

I present recent calculation of 2-loop corrections to the lightest Higgs boson mass in the minimal R-symmetric supersymmetric Standard Model using the effective potential approximation.

Primary authors: Prof. STOECKINGER, Domink (TU-Dresden); Prof. KALINOWSKI, Jan (University of Warsaw); Mr DIESSNER, Philip (TU-Dresden); Mr KOTLARSKI, Wojciech (University of Warsaw)

Presenter: Mr KOTLARSKI, Wojciech (University of Warsaw)

Session Classification: Particle Phenomenology

Contribution ID: **109** Type: **not specified**

The Dynamics of Electroweak Relaxation

Thursday, 1 October 2015 15:15 (25 minutes)

We explore a recent proposal of Cosmological Relaxation, by Graham, Kaplan and Rajendran, for generating a hierarchically small Higgs vacuum expectation value. In particular, we discuss its capacity for solving the electroweak hierarchy problem. To do so, we study the dynamics of the model and determine the relation between the fundamental input parameters and the electroweak vacuum expectation value. Depending on the input parameters the model exhibits three qualitatively different regimes, two of which allow for a hierarchically small Higgs vacuum expectation value. In one case we obtain standard electroweak symmetry breaking whereas in the other electroweak symmetry is mainly broken by a Higgs source term. While the latter is not acceptable in a model based on the QCD axion, in non-QCD models this may lead to new and interesting signatures in Higgs observables.

Primary author: Dr WITKOWSKI, Lukas (Heidelberg University)

Co-authors: Prof. JAECKEL, Joerg (Heidelberg University); Dr MEHTA, Viraf (Heidelberg University)

Presenter: Dr WITKOWSKI, Lukas (Heidelberg University)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **110** Type: **not specified**

Electroweak Corrections to Higgs-strahlung Processes at the LHC in THDM

Wednesday, 30 September 2015 14:00 (15 minutes)

We calculate the electroweak corrections to the Higgs-Strahlung processes at the LHC, pp -> Vh, within the Two Higgs Doublet Model(THDM). The freedom in triple-Higgs couplings would give strong elevation to the cross section. Even for fairly heavy Higgs bosons, the relative corrections could also reach -20%.

Primary author: CHENG, Taoli (Max-Planck-Institute for Physics)

Co-author: HOLLIK, Wolfgang (Max-Planck-Institute for Physics)

Presenter: CHENG, Taoli (Max-Planck-Institute for Physics)

Session Classification: Particle Phenomenology

Contribution ID: **111** Type: **not specified**

Functional equations for SOS models with domain walls and a reflecting end

Wednesday, 30 September 2015 17:05 (15 minutes)

Solid-on-solid (SOS) models in statistical physics describe the
(two-dimensional) interface between two media. To model the shape of the interface we assign a (discrete) height variable to each vertex of a square lattice. The surface tension is taken into account by interactions between these height variables. In case the nearest-neighbouring heights differ by one unit, and the interactions occur between the four vertices around the faces of the lattice, these models have a rich underlying algebraic structure that renders them exactly solvable. We consider specific boundary conditions that preserve this solvability: domain-wall boundaries and one
reflecting end.

After introducing these models we explain how the underlying algebraic
structure – the so-called dynamical reflection algebra – can be used as a source of functional equations characterizing the partition function of that model, and what can be learned from this approach.

Primary author: LAMERS, Jules (Utrecht University)

Presenter: LAMERS, Jules (Utrecht University)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **112** Type: **not specified**

F-theory at order \alpha'^3

Wednesday, 30 September 2015 15:15 (25 minutes)

I will discuss the effective action of F-theory at order \alpha'^3 from a 12 dimensional perspective. Upon compactification on elliptic Calabi-Yau fourfolds, I will show how the non-trivial vacuum profile for the axio-dilaton leads to a new, genuinely N=1 correction to the 4-dimensional effective action.

Primary author: SAVELLI, Raffaele (Saclay)

Presenter: SAVELLI, Raffaele (Saclay)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **113** Type: **not specified**

The network of toric hypersurface fibrations and their phenomenological applications

Wednesday, 30 September 2015 16:05 (15 minutes)

We give an overview on all F-theory fibrations with the 16 classical 2D polytopes as the fiber. These models include Abelian, discrete and quotient symmetries as well as the exact standard model of particle physics that we construct explicitly in four dimensions.

Primary author: OEHLMANN, Paul (Univ. Bonn)

Presenter: OEHLMANN, Paul (Univ. Bonn)

Session Classification: Strings & Mathematical Physics

Contribution ID: **114** Type: **not specified**

F-Theory Compactifications with Discrete Selection Rules

Wednesday, 30 September 2015 14:50 (25 minutes)

TBA

Primary author: MAYRHOFER, Christoph (LMU Munich)

Presenter: MAYRHOFER, Christoph (LMU Munich)

Session Classification: Strings & Mathematical Physics

Contribution ID: **115** Type: **not specified**

Correlation functions in N=4 super-Yang-Mills theory

Thursday, 1 October 2015 16:20 (15 minutes)

Correlation functions of local gauge-invariant operators are natural observables inany conformal quantum field theory.
In N=4 SYM a particular role is played by the multipoint supercorrelators of thestress-tensor multiplet.
Their chiral truncation in the light-cone limit coincides with the scattering superamplitudes.
We propose a novel approach to calculating such correlators based on the Lorentz-harmonic superspace.
This technique enables us to obtain the integrands of all such supercorrelators,including the non-chiral sector, at any loop order.

Primary author: CHICHERIN, Dmitry (LAPTh, Annecy)

Presenter: CHICHERIN, Dmitry (LAPTh, Annecy)

Session Classification: Strings & Mathematical Physics

Track Classification: Strings & Mathematical Physics

Contribution ID: **116** Type: **not specified**

Automated NLO QCD+EW corrections for the LHC

Wednesday, 30 September 2015 14:45 (15 minutes)

Run-II of the LHC is probing the Standard Model of particle physics at unprecedented energies and precision. At such large energy scales higher-order electroweak (EW) corrections are strongly enhanced due to the presence of large Sudakov logarithms. In my talk I will present a fully automated implementation of next-to-leading order (NLO) EW corrections in the OpenLoops matrix-element generator combined with the Sherpa and Munich Monte Carlo frameworks. The process-independent character of the implemented algorithms opens the door to NLO QCD+EW simulations for a vast range of Standard Model processes, up to high particle multiplicity. As a first application, I will present NLO QCD+EW predictions for vector boson production in association with up to three jets.

Primary author: LINDERT, Jonas (Univ. Zurich)

Presenter: LINDERT, Jonas (Univ. Zurich)

Session Classification: Particle Phenomenology

Track Classification: Particle Phenomenology

Contribution ID: **117** Type: **not specified**

Higgs Production at N3LO

Wednesday, 30 September 2015 17:20 (15 minutes)

I will present the calculation of the N3LO QCD correction to the production of a Higgs boson via gluon fusion at the LHC in the limit of infinite top mass. In particular I will give an overview of computational methods used and discuss the reduction of theoretical uncertainties.

Primary author: HERZOG, Franz (Nikhef)

Presenter: HERZOG, Franz (Nikhef)

Session Classification: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Test

Test

Track Classification: Cosmology & Astroparticle Physics

Contribution ID: **119** Type: **not specified**

Einstein & Music

Thursday, 1 October 2015 18:15 (30 minutes)

Session Classification: Lecture and Concert: Einstein and Music

Contribution ID: **120** Type: **not specified**

Concert

Thursday, 1 October 2015 19:45 (1h 45m)

Session Classification: Lecture and Concert: Einstein and Music

Contribution ID: **121** Type: **not specified**

Welcome

Tuesday, 29 September 2015 14:00 (10 minutes)

Presenter: WEIGLEIN, Georg

Session Classification: Welcome

Contribution ID: **122** Type: **not specified**

Higgs pair production at the LHC: SM and beyond

Wednesday, 30 September 2015 17:05 (15 minutes)

Higgs pair production is key to extract information on the Higgs potential as it consists the simplest process which is sensitive to the trilinear Higgs coupling. A considerable amount of work has been devoted recently towards providing accurate SM predictions and investigating the prospects of observing the process at the LHC. While the SM rates are small (35 fb) at 14 TeV, the process can receive significant enhancements from Beyond the SM physics, with a wide range of scenarios studied phenomenologically. In this talk, I will review recent progress in the computation of the SM Higgs pair production cross section at the LHC. Moreover I will discuss possible new physics effects in the process, presenting results in the 2HDM and within the EFT framework, as representative BSM scenarios.

Primary author: VRYONIDOU, Eleni

Presenter: VRYONIDOU, Eleni

Session Classification: Particle Phenomenology

Track Classification: Particle Phenomenology

Contribution ID: **123** Type: **not specified**

The Matrix Element Method at next-to-leading order accuracy

Thursday, 1 October 2015 16:50 (15 minutes)

The Matrix Element Method (MEM) has proven beneficial to make maximal use of the information available in experimental data. However, so far it has been formulated only in Born approximation. In this talk we discuss the extension to NLO accuracy. As a prerequisite we present an efficient method to calculate event weights for jet events at NLO accuracy.
As illustration and proof of concept we apply the method to the measurement of the top-quark mass in e+e- annihilation.
We observe significant differences when moving from LO to NLO which may be relevant for the interpretation of top-quark mass measurements at hadron colliders relying on the MEM.

Primary author: MARTINI, Till

Presenter: MARTINI, Till

Session Classification: Particle Phenomenology

Track Classification: Particle Phenomenology

Contribution ID: **124** Type: **not specified**

Closing

Friday, 2 October 2015 12:58 (2 minutes)

Session Classification: Plenary Session