Particle Cosmology after Planck

Report of Contributions

https://indico.desy.de/e/9791

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

Welcome

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

Closing

Friday 26 September 2014 12:50 (10 minutes)

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

Chiral Gravity Waves and Leptogenesis in Inflationary Models with non-Abelian Gauge Fields

Thursday 25 September 2014 16:10 (15 minutes)

We present a leptogenesis scenario associated with inflationary models involving non-Abelian gauge fields within the standard model of particle physics (SM). We show that this class of inflationary
models generates intrinsic birefringent gravitational waves that through the gravitational chiral anomaly in SM, can naturally create a net lepton number density. The CP violating interaction is produced by tensor fluctuations of the gauge field, while the efficiency of this process is determined by the effective background value of the gauge field. We demonstrate that this
mechanism can create the observed value of baryon to photon number density in a natural range of parameters of these models.

Primary author: Dr MALEKNEJAD, Azadeh (Institute for Research in Fundamental Sciences)

Presenter: Dr MALEKNEJAD, Azadeh (Institute for Research in Fundamental Sciences)

Session Classification: Cosmology & Astroparticle Physics A

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

Infrared physics of inflationary correlation functions

Wednesday 24 September 2014 17:10 (15 minutes)

A naive perturbation theory predicts that loop corrections generated during inflation suffer from various infrared (IR) divergences. We discuss the origin of the IR divergences and explore the regularity conditions, which will restrict the possible initial states of inflationary universe. This talk is based on our recent works, summarized in the review article, Class.Quant.Grav. 30 (2013) 233001 [arXiv:1306.4461].

Primary author: Dr URAKAWA, Yuko (Institute for Advanced Research, Nagoya University)

Co-author: Prof. TANAKA, Takahiro (Kyoto university)

Presenter: Dr URAKAWA, Yuko (Institute for Advanced Research, Nagoya University)

Session Classification: Cosmology & Astroparticle Physics B

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

New tetrads in Riemannian geometry and new ensuing results in group theory, gauge theory and fundamental physics in Einstein-Maxwell spacetimes.

A new technique is presented in order to build tetrads in a 4-dimensional Einstein-Maxwell spacetime. These tetrads have special useful properties in relativity and also particle physics. A new fundamental result is proved in group theory. The group SO(2) (spatial rotations) is isomorphic to the group SO(1,1) (boosts) plus two kinds of discrete transformations. That is, a compact group is isomorphic to a non-compact group plus two kinds of discrete transformations (A. Garat, J. Math. Phys. 46, 102502 (2005)). The electromagnetic local gauge group is proved to be isomorphic to the local group of transformations of these particular kind of tetrads. Therefore, establishing a concrete link between internal and spacetime local groups of transformations. These new tetrads also diagonalize the electromagnetic
stress-energy tensor for non-null electromagnetic fields, any stress-energy tensor, in a general, covariant and local way. These new tetrads also introduce maximum simplification in the Einstein-Maxwell differential equations and also introduce maximum simplification in the expression of the electromagnetic field itself, in any curved four-dimensional Lorentzian spacetime, allowing for the identification of its degrees of freedom in two
local scalars.

Primary author: Dr GARAT, Alcides (Former Professor at Universidad de la Republica-Facultad de Ciencias)

Presenter: Dr GARAT, Alcides (Former Professor at Universidad de la Republica-Facultad de Ciencias)

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

Natural Inflation and Universal Hypermultiplet

Thursday 25 September 2014 16:55 (15 minutes)

A novel framework is proposed for embedding the natural inflation into the type IIA superstrings compactified on a Calabi-Yau three-fold. Inflaton is identified with axion of the universal hypermultiplet (UH). The other UH scalars (including dilaton) are stabilized by the CY fluxes whose impact can be described by gauging of the abelian isometry associated with the axion, when the NS5-brane instanton contributions are suppressed. Then the stabilizing scalar potential is controlled by the integrable three-dimensional Toda equation, and leads to spontaneous N=2 SUSY breaking. The inflationary scalar potential of the UH axion is dynamically generated at a lower scale in the natural inflation via the non-perturbative quantum field effects such as gaugino condensation. The natural inflation has two scales that allow any values of the CMB observables (n_s,r).

Primary author: Prof. KETOV, Sergei (Tokyo Metropolitan University, Japan)

Presenter: Prof. KETOV, Sergei (Tokyo Metropolitan University, Japan)

Session Classification: Strings & Mathematical Physics

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

Single Superfield Inflation

Thursday 25 September 2014 16:40 (15 minutes)

We propose a framework for inflationary model building in supergravity which requires only one chiral superfiled in addition to the standard gravity supermultiplet. A stabilization mechanism for the non-inflaton field in the inflaton supermultiplet is required, for which we take a higher dimensional term in the Kahler potential. This framework allows one to construct a very wide range of inflationary potentials consistent with observations with a minimal set-up.

Primary author: Mr TERADA, Takahiro (The University of Tokyo)

Co-author: Prof. KETOV, Sergei (Tokyo Metropolitan University, Kavli IPMU (the University of Tokyo), Institute of Physics and Technology (Tomsk Polytechnic University))

Presenter: Mr TERADA, Takahiro (The University of Tokyo)

Session Classification: Strings & Mathematical Physics

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

The Cluster Soft X-ray Excess from a Cosmic Axion Background

Wednesday 24 September 2014 16:55 (15 minutes)

Observations have revealed diffuse excess emission in a large number of galaxy clusters in the ~200 eV soft X-ray band: the Cluster Soft X-ray Excess. In this talk I will discuss how a primordially generated background of relativistic axion-like particles can explain this puzzling feature of galaxy cluster observations. Such a background is generically predicted to be produced from the decays of string moduli fields in the early universe, and can form the Dark Radiation component of the universe, of which there a tentative hints. The conversion of these axion-like particles in the magnetic fields of galaxy clusters can give rise to the Cluster Soft Excess. Here I will discuss how simulations of cluster magnetic fields can be used to compare the predicted and observed morphology of soft X-rays across several clusters. The simulations can also be used to constrain the axion-photon coupling and the energy of the Cosmic Axion Background spectrum.

Primary author: Mr POWELL, Andrew J. (University of Oxford)

Co-authors: Dr MARSH, David (University of Oxford); Dr CONLON, Joseph P. (University of Oxford); Dr WITKOWSKI, Lukas (Heidelberg University); Mr ANGUS, Stephen (University of Oxford)

Presenter: Mr POWELL, Andrew J. (University of Oxford)

Session Classification: Cosmology & Astroparticle Physics A

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

Planck Overview: cosmological results so far and prospects

Tuesday 23 September 2014 14:10 (40 minutes)

Presenter: BOUCHET, F.R. (IAP Paris)

Session Classification: Plenary Session

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

Black body photosphere of the universe and inevitable spectral distortions of CMB due to energy release in the early universe

Tuesday 23 September 2014 14:50 (40 minutes)

Presenter: SUNYAEV, R. (MPA Garching)

Session Classification: Plenary Session

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

Cosmology at the largest scales - new opportunities with SKA and its pathfinders

Tuesday 23 September 2014 15:30 (40 minutes)

Presenter: SCHWARZ, D. (Bielefeld)

Session Classification: Plenary Session

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

Searching for the identity of the dark matter in the nearby universe

Tuesday 23 September 2014 16:40 (40 minutes)

Presenter: FRENK, C. (Durham)

Session Classification: Plenary Session

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

Observational consequences of false vacuum decay: prospects after Planck and BICEP2

Tuesday 23 September 2014 17:20 (40 minutes)

Presenter: HARLOW, D. (Princeton)

Session Classification: Plenary Session

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

Testing gravity with cosmology: a model-independent approach

Wednesday 24 September 2014 09:00 (40 minutes)

Presenter: AMENDOLA, L. (Heidelberg)

Session Classification: Plenary Session

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

Probing the early Universe with gravitational waves

Wednesday 24 September 2014 09:40 (40 minutes)

Presenter: BINETRUY, P. (APC Paris)

Session Classification: Plenary Session

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

Gravitational waves from phase transitions in the early universe

Wednesday 24 September 2014 10:20 (40 minutes)

Presenter: HINDMARSH, M. (Sussex/Helsinki)

Session Classification: Plenary Session

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

What is the distance to the CMB?

Wednesday 24 September 2014 11:30 (40 minutes)

Presenter: DURRER, R. (Geneva)

Session Classification: Plenary Session

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

Topological defects from the multiverse

Wednesday 24 September 2014 12:10 (40 minutes)

Presenter: GARRIGA, J. (Barcelona)

Session Classification: Plenary Session

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

Searching for Dark Forces at Accelerators

Thursday 25 September 2014 09:00 (40 minutes)

Presenter: TORO, N. (Perimeter Inst.)

Session Classification: Plenary Session

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

Current Status of Indirect Searches for Particle Dark Matter

Thursday 25 September 2014 09:40 (40 minutes)

Presenter: BRINGMANN, T. (Oslo)

Session Classification: Plenary Session

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

Towards a quantum treatment of leptogenesis

Thursday 25 September 2014 10:20 (40 minutes)

Presenter: GARNY, M. (CERN)

Session Classification: Plenary Session

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

Galaxy Clusters as tele-ALP-scopes

Thursday 25 September 2014 11:30 (40 minutes)

Presenter: CONLON, J. (Oxford)

Session Classification: Plenary Session

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

Searches for Particle Dark Matter at the LHC

Thursday 25 September 2014 12:10 (40 minutes)

Presenter: TAIT, T.M.P. (Irvine)

Session Classification: Plenary Session

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

Aligned Axionic Inflation

Friday 26 September 2014 10:20 (40 minutes)

Presenter: NILLES, H.P. (Bonn)

Session Classification: Plenary Session

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

Large Field Inflation in String Theory

Friday 26 September 2014 09:40 (40 minutes)

Presenter: SHIU, G. (IAS Hongkong)

Session Classification: Plenary Session

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

Inflation in String Theory: from small to large fields

Friday 26 September 2014 09:00 (40 minutes)

Presenter: WESTPHAL, A. (DESY)

Session Classification: Plenary Session

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

Inflation with uplifting in supergravity and string theory

Friday 26 September 2014 11:30 (40 minutes)

Presenter: KALLOSH, R. (Stanford)

Session Classification: Plenary Session

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

Why do we have shift symmetry?

Friday 26 September 2014 12:10 (40 minutes)

Presenter: Prof. YANAGIDA, T. (Kavli IPMU)

Session Classification: Plenary Session

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

Universe or Multiverse?

Thursday 25 September 2014 17:30 (1h 30m)

Presenter: LINDE, A. (Stanford)

Session Classification: HEINRICH HERTZ LECTURE

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

Dark Matter and Neutrino Masses in Gauge Theories for Baryon and Lepton Numbers

Thursday 25 September 2014 15:00 (20 minutes)

I present extensions of the Standard Model, where the global symmetries baryon and lepton number are gauged and subsequently spontaneously broken. These theories are consistent with collider bounds and cosmology, and have intriguing consequences due to the requirement of anomaly cancellation: lepto-baryon fields that have to be introduced can be a dark matter candidate and/or generate neutrino masses. I discuss symmetric and asymmetric dark matter, as well as the generation of neutrino masses in these extensions.

Primary author: DUERR, Michael (MPIK, Heidelberg)

Presenter: DUERR, Michael (MPIK, Heidelberg)

Session Classification: Cosmology & Astroparticle Physics A

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

Welcome

Tuesday 23 September 2014 14:00 (10 minutes)

Presenter: MNICH, J. (DESY)

Session Classification: Welcome

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

LHC prospects for minimal decaying Dark Matter

Wednesday 24 September 2014 14:00 (20 minutes)

We study the possible signals at LHC of minimal models of decaying dark matter. Those models are characterized by the fact that DM interacts with SM particles through renormalizable coupling with an additional heavier charged state. Such interaction allows to
produce a substantial abundance of DM in the early Universe via the decay of such charged heavy state, either in- or out-of-equilibrium. Moreover additional couplings of the charged particle open up decay channels for the DM, which can nevertheless be sufficiently long-lived to be a good DM candidate and within reach of future Indirect Detection observations. We compare the cosmologically favored parameter regions to the LHC discovery reach and discuss the possibility of simultaneous detection of DM decay in Indirect Detection.

Primary author: Mr DRADI, Federico (Goettingen University)

Co-authors: Dr ARCADI, Giorgio (Goettingen University); Prof. COVI, Laura (Goettingen University)

Presenter: Mr DRADI, Federico (Goettingen University)

Session Classification: Particle Phenomenology

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

Spacetime curvature and the Higgs stability during inflation

Thursday 25 September 2014 14:00 (20 minutes)

It is currently widely accepted that for a high scale of inflation the EW Higgs vacuum is unstable during inflation due to large fluctuations of order H. However, this conclusion is reached by neglecting potentially significant effects induced by the spacetime curvature. In this talk I review the derivation of a one-loop SM Higgs effective potential in curved space and discuss its implications. In particular I will show that generally a large curvature mass is generated which can stabilize the potential against fluctuations induced by inflation.

Primary author: MARKKANEN, Tommi (University of HelsinkiUniversity of Helsinki & Helsinki institute of Physics)

Co-authors: RAJANTIE, Arttu (Imperial College); HERRANEN, Matti (Niels Bohr International Academy and Discovery Center); NURMI, Sami (University of Helsinki & Helsinki institute of Physics)

Presenter: MARKKANEN, Tommi (University of HelsinkiUniversity of Helsinki & Helsinki institute of Physics)

Session Classification: Particle Phenomenology

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

Electroweak Phase Transition in the 2HDM

Thursday 25 September 2014 14:20 (20 minutes)

The nature of the electroweak phase transition in two-Higgs-doublet models is revisited in light of the recent LHC results. A scan over an extensive region of their parameter space is performed, showing that a strongly first-order phase transition favours a light neutral scalar with SM-like properties, together with a heavy pseudo-scalar and a mass hierarchy in the scalar sector. Altogether, the findings indicate that the exotic decay A^0 -> Z H^0 would be a 'smoking gun' signature of these scenarios at LHC. We analyse the LHC search prospects for this decay in the ℓℓbb and ℓℓW+W− final states, arguing that current data may be sensitive to this signature in the former channel as well as there being great potential for a discovery in either one at the very early stages of the 14 TeV run.

Primary authors: CARVALHO DORSCH, Glauber (University of Sussex); NO, Jose M. (University of Sussex); MIMASU, Ken (University of Sussex); HUBER, Stephan (University of Sussex)

Presenter: CARVALHO DORSCH, Glauber (University of Sussex)

Session Classification: Particle Phenomenology

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

Electromagnetic waves in an axion-active plasma

Wednesday 24 September 2014 17:25 (15 minutes)

In the framework of Einstein-Maxwell-Vlasov-axion model we analyzed the dispersion relations for the perturbations in an initially isotropic and homogeneous axionically active ultrarelativistic plasma, which expands in the de Sitter-type cosmological background, and classify the longitudinal and transversal electromagnetic modes. We show that for the special choice of the guiding model parameters the transversal electromagnetic waves in the axionically active plasma can propagate with the phase velocity less than speed of light in vacuum, thus displaying a possibility for a new type of resonant particle-wave interactions.

The presence of the pseudoscalar (axion) field ϕ provides the plasma to become a gyrotropic medium, which displays the phenomenon of optical activity. The frequencies of transversal electromagnetic waves are shown to depend not only on the wavelength, but also on the gyration coefficient $p = \dot{\phi}$, and this dependence has a critical character. To be more precise, when $p \neq 0$, the dispersion equations admit some new branches of solutions in addition to the standard ones. If to consider the transversal electromagnetic wave propagation in terms of left- and right-hand rotating components, one can state, that one of the waves (say, with left-hand rotation) can have arbitrary wavelength, while the second wave can possess the wave number less than critical one; in this sense we deal with some kind of mode suppression caused by the axion-photon interactions.

This work was supported by the Russian Foundation for Basic Research (Grant No. 14-02-00598) and by the Program of Competitive Growth of Kazan Federal University (Project No. 0615/006.15.02302.034)

Primary author: Dr ZAIATS, Aleksei (Department of General Relativity and Gravitation, Kazan Federal University)

Presenter: Dr ZAIATS, Aleksei (Department of General Relativity and Gravitation, Kazan Federal University)

Session Classification: Cosmology & Astroparticle Physics A

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

Resurrecting left-handed sneutrino dark matter in light of neutrino mass and LUX

Thursday 25 September 2014 16:55 (15 minutes)

In the minimal supersymmetric standard model (MSSM) the lightest superpartner of the left-handed neutrinos is ruled out of being a candidate of dark matter because of its large elastic cross-section with the nucleus mediated via Z-boson. We resurrect it by extending the MSSM with two triplets with opposite hypercharge. The addition
of the triplets not only play a role in generating small Majorana masses for the left-handed active neutrinos but also make the lightest sneutrino a viable candidate for dark matter. We then discuss the relevant parameter space in details which can give rise to the right amount of (thermal) relic abundance as well as satisfy the current direct detection constraints from Xenon-100 and LUX. We find that sneutrino dark matter with mass 370-550 GeV can give rise to right thermal relic abundance while co-annihilating with bino-like neutralino.

Primary author: Dr SAHU, Narendra (Indian Institute of Technology Hyderabad, India)

Presenter: Dr SAHU, Narendra (Indian Institute of Technology Hyderabad, India)

Session Classification: Cosmology & Astroparticle Physics A

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

The Lyth bound with a spectral tilt

Wednesday 24 September 2014 14:20 (20 minutes)

We investigate the nature of inflationary parameters at large values of the number of e-foldings N. We analyze the behaviour of the inflationary field range in such a limit and provide strong evidence for universality features of it. Finally, we use these results in order to derive a model-independent field range bound as a function even of the spectral index. We show that Planck's measurement of the tilt leads to a much more stringent bound than the usual estimate.

Primary authors: Dr ROEST, Diederik (University of Groningen); Dr ZAVALA, Ivonne (University of Groningen); Prof. GARCIA-BELLIDO, Juan (IFT-UAM-CSIC); Mr SCALISI, Marco (University of Groningen)

Presenter: Mr SCALISI, Marco (University of Groningen)

Session Classification: Cosmology & Astroparticle Physics B

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

Role of electroweak radiation in predictions for dark matter indirect detection

Wednesday 24 September 2014 14:20 (20 minutes)

A very exciting challenge in particle and astroparticle physics is the exploration of the nature of dark matter. The striking evidences of the existence of dark matter
are also the strongest phenomenological indications for physics beyond the Standard Model.
A huge experimental effort is currently made at colliders and via astrophysical experiments to shed light on the nature of dark matter.
More specifically dark matter may be produced at colliders or detected through direct and indirect detection experiments.
The interplay and complementarity between these different approaches and techniques offers extraordinary opportunities to improve our understanding of
the nature of dark matter or to set constraints on dark matter models.

In indirect detection, in particular, one searches for dark matter annihilation products, that produce secondary antimatter particles like positrons and antiprotons.
Such antimatter particles propagate through the Galaxy and can eventually be detected at Earth by astrophysical experiments.

A particularly interesting point is the importance of electroweak (EW) corrections to the predictions for the expected fluxes at Earth.
The inclusion of EW radiation from the primary dark matter
annihilation products can actually significantly affect the spectra of the secondary SM particles.
The EW radiation can be described using fragmentation functions, as done for instance in QCD.
We study the quality of this approximation in a simplified supersymmetric model and in a Universal Extra Dimension model.

Primary authors: ALI CAVASONZA, Leila (RWTH Aachen); PELLEN, Mathieu (RWTH Aachen); Prof. KRAEMER, Michael (RWTH Aachen)

Presenter: ALI CAVASONZA, Leila (RWTH Aachen)

Session Classification: Cosmology & Astroparticle Physics A

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

Bounds on the Transitions Scale in Asymptotically Safe Gravity from the Diphoton Channel at the LHC with Large Extra Dimensions

Wednesday 24 September 2014 14:20 (20 minutes)

The LHC allows to probe quantum gravity with large extra dimensions. Within the Asymptotic Safety scenario we present new constraints on the transition scale Λ_T for the diphoton channel. These bounds will be compared to existing bounds from other channels, including Drell-Yan and MET plus jet.

Primary author: Ms ZENGLEIN, Magdalena (TU Dortmund, Physik, TIV)

Presenter: Ms ZENGLEIN, Magdalena (TU Dortmund, Physik, TIV)

Session Classification: Particle Phenomenology

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

Non-singlet and pure-singlet heavy flavor contributions to deep-inelastic scattering

Wednesday 24 September 2014 16:10 (15 minutes)

Deep-inelastic ep scattering receives essential contributions from heavy flavors. The determination of the strong coupling constant α_s and the charm quark mass m_c are sensitive to NNLO corrections. In the asymptotic region where the momentum transfer Q^2 is large compared to the mass of the heavy quark m^2 the heavy flavor contributions factorize into massless Wilson coefficients and massive operator matrix elements (OMEs). For F_2 the formulae hold from $Q^2/m^2 > 10$ onward. We present results of the calculation of the non-singlet and pure-singlet heavy flavor Wilson coefficients and the corresponding OMEs to three loop order. Details on the calculation will be given as well as numerical predictions for the contribution in the non-singlet and pure singlet case to the structure function F_2, which are relevant for experiments.

Primary author: BEHRING, Arnd (DESY, Zeuthen)

Co-authors: DE FREITAS, Abilio (DESY, Zeuthen); VON MANTEUFFEL, Andreas (Johannes Gutenberg Universitaet, Mainz); SCHNEIDER, Carsten (RISC, Johannes Kepler Universitaet, Linz); ABLINGER, Jakob (RISC, Johannes Kepler Universitaet, Linz); BLUEMLEIN, Johannes (DESY, Zeuthen)

Presenter: BEHRING, Arnd (DESY, Zeuthen)

Session Classification: Particle Phenomenology

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

A fresh look on the limit on light ALPs from SN1987A

Wednesday 24 September 2014 17:10 (15 minutes)

We revisit the limit on very light axion-like particles from the absence of coincidental gamma rays with the neutrino burst from SN1987A. This is done using updated supernova simulations, updated models for the magnetic field inside the Galaxy, and taking into account the effects of proton degeneracy and mass reduction on the production of these particles in the supernova core.

Primary author: Dr PAYEZ, Alexandre (DESY)

Co-authors: Dr MIRIZZI, Alessandro (Hamburg U.); Dr RINGWALD, Andreas (DESY); Dr EVOLI, Carmelo (Hamburg U.); Dr GIANNOTTI, Maurizio (Barry U.); Dr FISCHER, Tobias (Wroclaw U.)

Presenter: Dr PAYEZ, Alexandre (DESY)

Session Classification: Cosmology & Astroparticle Physics A

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

Evolution of Dark Matter Halo Radio Emissions

Wednesday 24 September 2014 16:25 (15 minutes)

Dark matter remains a major gap in the understanding of modern physics with many proposed routes to direct and indirect detection. In this study we model the radio emission from neutralino annihilation in DM halos assuming various annihilation channels, a model of the magnetic field and an exploration of a range of redshifts. Using this model we provide estimates for the detectability of neutralino annihilation radio signatures via the SKA and derive upper bounds on the annihilation cross-section in the event of non-detection. We find that the strong constraints arise from dwarf galaxies, galaxies and galaxy clusters, all of these providing more stringent constraints than the relic abundance in the event of non-detection. We also determine the dependence of detectability on redshift and mass. Additionally we demonstrate that differing annihilation channels have distinct spectral signatures in the resulting radio emissions that could be observable with the future SKA.

Primary authors: Mr BECK, Geoff (University of the Witwatersrand); Prof. COLAFRANCESCO, Sergio (University of the Witwatersrand)

Presenter: Mr BECK, Geoff (University of the Witwatersrand)

Session Classification: Cosmology & Astroparticle Physics A

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

NNLL Threshold Resummation for Squark and Gluino Production Cross Sections at the LHC

Wednesday 24 September 2014 16:25 (15 minutes)

The search for supersymmetry is an ongoing quest during the future runs of the LHC. Coloured supersymmetric particles are expected to be produced in large quantities due to the high production cross sections, should supersymmetry be realised in nature. Precise theoretical predictions are therefore needed to improve the search for these yet undiscovered particles. A way to increase precision, and to deal with problematic terms occurring in fixed-order calculations, is to take into account threshold resummation corrections, which are known to have a significant impact on the predictions for total cross sections.
In this talk, the latest results on the inclusive squark and gluino production cross sections including threshold resummation corrections up to next-to-next-to-leading logarithmic (NNLL) precision, calculated in the Mellin-space formalism, are reported. Included are corrections due to hard-matching coefficients up to first and Coulomb coefficients up to second order. The corrections enhance the production cross sections by a substantial amount, and they lead to a reduction of the theoretical uncertainty for almost all processes of squark and gluino production. An outlook for future proton-proton colliders with higher center-of-mass energies is given.

Primary authors: Ms KULESZA, Anna (WWU Münster); Mr BORSCHENSKY, Christoph (Institute for Theoretical Physics, WWU Münster); Mr LAENEN, Eric (Nikhef Theory Group, Amsterdam); Mr KRÄMER, Michael (RWTH Aachen); Ms THEWES, Silja (DESY Theory Group, Hamburg); Mr THEEUWES, Vincent (WWU Münster); Mr BEENAKKER, Wim (Radboud University Nijmegen)

Presenter: Mr BORSCHENSKY, Christoph (Institute for Theoretical Physics, WWU Münster)

Session Classification: Particle Phenomenology

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

Torsion in extra dimensions and one-loop observables

Thursday 25 September 2014 16:10 (15 minutes)

We study gravity with torsion in extra dimensions and derive an effective four-dimensional theory containing four-fermion contact operators at the fundamental scale of quantum gravity in the TeV range. These operators may have an impact on the low-energy observables and can manifest themselves or can be constrained in precision measurements. We calculate possible contributions of these operators to some observables at the one-loop level. We show that the existing precision data on the lepton decay mode of Z boson set limits on the fundamental scale of the gravity and compactification radius, which are more stringent than the limits previously derived in the literature.

Primary author: CORRAL, Cristóbal (Universidad Técnica Federico Santa María)

Co-authors: Dr SCHMIDT, Iván (Universidad Técnica Federico Santa María, Centro Científico Tecnológico de Valparaíso); Dr KOVALENKO, Sergey (Universidad Técnica Federico Santa María, Centro Científico Tecnológico de Valparaíso); Dr CASTILLO-FELISOLA, Óscar (Universidad Técnica Federico Santa María, Centro Científico Tecnológico de Valparaíso)

Presenter: CORRAL, Cristóbal (Universidad Técnica Federico Santa María)

Session Classification: Particle Phenomenology

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

Just enough inflation: power spectrum modifications at large scales

Thursday 25 September 2014 14:20 (20 minutes)

We show that models of 'just enough' inflation, where the slow-roll evolution lasted only 50–60 e-foldings, feature modifications of the CMB power spectrum at large angular scales. We perform a systematic and model-independent analysis of any possible non-slow-roll background evolution prior to the final stage of slow-roll inflation, We find a high degree of degeneracy since all possible backgrounds give rise to just two distinct classes of primordial spectra.

Primary author: PEDRO, Francisco (DESY)

Co-authors: WESTPHAL, Alexander (DESY); DUTTA, Bashkar (Texas A&M); CICOLI, Michele (Bologna Univ.); DOWNES, Sean (National Taiwan University)

Presenter: PEDRO, Francisco (DESY)

Session Classification: Cosmology & Astroparticle Physics B

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

Sizable tensor modes and the gravitino problem

Wednesday 24 September 2014 14:40 (20 minutes)

The measurement of primordial tensor modes in the CMB allows for a determination of the energy scale at the beginning of the 'observable' part of inflation. We show in how far such a measurement provides implications for the subsequent phase of inflation and the post-inflationary phase of reheating. Further, we will revise the gravitino problem and show the implications for a supersymmetric scenario where the gravitino is the Dark Matter candidate.

Primary authors: Dr HEISIG, Jan (RWTH Aachen University); Dr DOMCKE, Valerie (SISSA/INFN)

Presenter: Dr HEISIG, Jan (RWTH Aachen University)

Session Classification: Cosmology & Astroparticle Physics B

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

Light sterile neutrinos in cosmology: current bounds and new physics scenarios

Thursday 25 September 2014 14:00 (20 minutes)

In the last recent years different anomalies observed in short-baseline neutrino
oscillation experiments seem to point towards the existence of light sterile neutrinos.
These sterile neutrinos can also be produced in the early universe by oscillations of the
active neutrinos and can affect different cosmological observables. In particular,
their properties can be constrained by their contribution to the extra-radiation,
parameterized in terms of the effective number of neutrino species N_ eff,
and to the universe energy density today \Omega_\nu h^2.
We present updated cosmological bounds on sterile neutrinos based on the Planck data, and on the
combination with the recent BICEP-2 measurements of CMB polarization.
We find a tension between the cosmological data
and the short-baseline hints of light sterile neutrinos.
Finally, we discuss two mechanisms proposed to relieve this tension, suppressing the relic sterile neutrino
abundance, namely large primordial neutrino asymmetries and secret interactions in the sterile neutrino
sector. We will also present the possible signatures of these mechanisms on BBN.

Primary author: Dr NINETTA, Saviano (IPPP, Durham University)

Presenter: Dr NINETTA, Saviano (IPPP, Durham University)

Session Classification: Cosmology & Astroparticle Physics A

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

Integrability in planar N=2 gauge theories

Wednesday 24 September 2014 14:40 (20 minutes)

Any N=2 gauge theory in four dimensions contains a set of local operators made only out of fields in the N=2 vector multiplet that is closed under renormalization to all loops, namely the SU(2,1|2) sector. We present a diagrammatic argument that for any planar N=2 theory the SU(2,1|2) Hamiltonian acting on infinite spin chains is identical to all loops to that of N=4 SYM, up to a redefinition of the coupling constant g^2 ⟶ f(g^2). Thus, this sector is integrable and anomalous dimensions can be read off from the N=4 ones up to this redefinition. For each N=2 theory the universal function f(g) can be obtained by computing the circular Wilson loop using localization and comparing it to the N = 4 one.

Primary author: Dr POMONI, Elli (DESY)

Presenter: Dr POMONI, Elli (DESY)

Session Classification: Strings & Mathematical Physics

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

CP Violation from Finite Groups

Thursday 25 September 2014 16:25 (15 minutes)

The difficulties one faces when implementing CP transformations in the presence of finite non-abelian symmetries are reviewed. It is then shown that physical CP transformations in such settings always correspond to class-inverting automorphisms of the finite group and their connection to the existence of bases with real Clebsch-Gordan coefficients is explored. Furthermore, the finite groups are categorised into three classes according to their possible CP transformations. In particular, it is shown that there are groups which do not admit physical CP transformations in generic settings and, therefore, necessarily break CP.

Primary authors: Mr TRAUTNER, Andreas (Technische Universität München, Physik-Department T30e); Prof. MAHANTHAPPA, K. T. (University of Colorado, Boulder); Mr FALLBACHER, Maximilian (Technische Universität München, Physik-Department T30e); Prof. RATZ, Michael (Technische Universität München, Physik-Department T30e); Prof. CHEN, Mu-Chun (University of California, Irvine)

Presenter: Mr FALLBACHER, Maximilian (Technische Universität München, Physik-Department T30e)

Session Classification: Particle Phenomenology

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

A Tale of Two Candidates: the WIMPlaton and the condensate

Thursday 25 September 2014 14:40 (20 minutes)

We show that the decay of the inflaton field may be incomplete, while nevertheless successfully reheating the universe and leaving a stable remnant that accounts for the present dark matter abundance. We note, in particular, that the inflaton field alternately increases and reduces the mass of its decay products as it oscillates about the minimum of its potential. By considering an appropriate discrete symmetry, the inflaton may then be restricted to decay into moderately heavy particles, such that decay is only possible while the amplitude of field oscillations is sufficiently large and the inflaton becomes stable at late times. The oscillating inflaton condensate may also parametrically evaporate into a thermal bath of stable inflaton particles, which eventually decouple and freeze-out, yielding a thermal dark matter relic. We discuss possible embeddings of this generic mechanism within consistent cosmological scenarios, for both single-field and hybrid inflation

Primary authors: Dr ROSA, Joao (University of Aveiro); Dr BASTERO-GIL, Mar (University of Granada); Mr CEREZO, Rafael (University of Granada)

Presenter: Mr CEREZO, Rafael (University of Granada)

Session Classification: Particle Phenomenology

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

String theoretic QCD axions and cosmological constraints

Thursday 25 September 2014 14:20 (20 minutes)

The QCD axion solving the strong CP problem may originate from antisymmetric tensor gauge fields in compactified string theory, with a decay constant around the GUT scale. Such possibility is in tension with high scale inflation because too large isocurvature perturbations would be generated. A more interesting and still viable possibility is that the string theoretic QCD axion is charged under an anomalous U(1)_A gauge symmetry. In such case, the axion decay constant can be much lower than the GUT scale if moduli are stabilized near the point of vanishing Fayet-Illiopoulos term, and U(1)_A-charged matter fields get a vacuum value far below the GUT scale due to a tachyonic SUSY breaking scalar mass. We examine the symmetry breaking pattern of such models during the inflationary epoch with the Hubble expansion rate 10^{14} GeV, and identify the range of the QCD axion decay constant, as well as the corresponding relic axion abundance, consistent with known cosmological constraints. In addition to the case that the PQ symmetry is restored during inflation, there are other viable scenarios, including that the PQ symmetry is broken during inflation at high scales around 10^{16}-10^{17} GeV due to a large Hubble-induced tachyonic scalar mass from the U(1)_A D-term, while the present axion scale is in the range 10^{9}-5\times 10^{13} GeV, where the present value larger than 10^{12} GeV requires a fine-tuning of the axion misalignment angle. We also discuss the implications of our results for the size of SUSY breaking soft masses.

Primary author: Dr JEONG, Kwang Sik (CTPU, IBS)

Presenter: Dr JEONG, Kwang Sik (CTPU, IBS)

Session Classification: Strings & Mathematical Physics

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

Inflation with Fayet-Iliopoulos Terms

Thursday 25 September 2014 16:25 (15 minutes)

We analyze the feasibility of inflation driven by field-dependent FI terms in the presence of an anomalous U(1) symmetry. We consider a heavy Kähler modulus whose axionic component cancels the gauge anomaly via the Green-Schwarz mechanism, i.e., it shifts under the anomalous U(1). The D-term of the modulus may play the role of a field-dependent FI term which can, in principle, drive inflation. However, due to the non-trivial gauge transformation of the modulus, moduli stabilization is problematic in the simplest setups. We analyze D-term inflation in connection with gauge invariant versions of KKLT and KL moduli stabilization and conclude that both are not viable whenever the FI term is not canceled. As possible alternative, we propose a model of chaotic inflation in a specific parameter regime of D-term inflation. In this case, inflation can be made consistent with the field-dependent FI term and modulus stabilization quite naturally.

Primary authors: Mr WIECK, Clemens (DESY Hamburg); Dr WINKLER, Martin (DESY Hamburg)

Presenter: Mr WIECK, Clemens (DESY Hamburg)

Session Classification: Strings & Mathematical Physics

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

On the consistency relations describing the three-point functions involving tensors

Wednesday 24 September 2014 17:25 (15 minutes)

The detection of the imprints of the primordial tensor perturbations by BICEP2 and its indication of a rather high tensor-to-scalar ratio, if confirmed, can open up a new window for understanding the tensor perturbations, not only at the level of the power spectrum, but also in the realm of non-Gaussianities. In this work, we consider the consistency relations associated with the three-point cross-correlations involving scalars and tensors as well as the tensor bi-spectrum in inflationary models driven by a single, canonical, scalar field. Characterizing the cross-correlations in terms of the dimensionless non-Gaussianity parameters that we had introduced earlier, we express the consistency relations governing the cross-correlations as relations between these non-Gaussianity parameters and the scalar or tensor spectral indices, in a fashion similar to that of the purely scalar case. We also discuss the corresponding relation for the non-Gaussianity parameter used to describe the tensor bi-spectrum. We analytically and numerically establish these consistency relations explicitly in a variety of inflationary models, including those that permit deviations from slow roll and lead to features in the scalar power spectrum.

Primary author: Mr VIJAYAKUMAR, Sreenath (Indian Institute of Technology Madras)

Co-author: Prof. LAKSHMANAN, Sriramkumar (Indian Institute of Technology Madras)

Presenter: Mr VIJAYAKUMAR, Sreenath (Indian Institute of Technology Madras)

Session Classification: Cosmology & Astroparticle Physics B

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

Building a social network of elliptic fibrations for F-Theory

Wednesday 24 September 2014 17:10 (15 minutes)

We discuss the minimal gauge group and matter content for all 16 2D reflexive polytopes, where some of these were already discussed in the literature. The polyhedrons are connected by geometric transitions on the geometry side which translates into a toric Higgs branch on the field theory side. This network structure is symmetric and reflects the mirror symmetry of the polytopes.

Primary author: REUTER, Jonas (University of Bonn)

Presenter: REUTER, Jonas (University of Bonn)

Session Classification: Strings & Mathematical Physics

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

Enhanced line signals from annihilating Kaluza-Klein dark matter

Wednesday 24 September 2014 16:10 (15 minutes)

Monochromatic gamma ray lines have long been known to provide potential smoking gun signals for annihilating dark matter. Here, we demonstrate that the situation is particularly interesting for Kaluza-Klein dark matter because resonant annihilation is generically expected for small, but not necessarily vanishing relative velocities of the annihilating particles. We calculate the contribution from those hitherto neglected resonances and show that the annihilation rate into monochromatic photons can be signicantly enhanced, in a way that is much more pronounced than for the associated production of continuum photons. For favorable astrophysical conditions, this leads to promising prospects for the detection of TeV-scale Kaluza-Klein dark matter. We also point out that the situation may be even more interesting in the vicinity of black holes, like the supermassive black hole at the center of our Galaxy, where in principle center-of-mass energies much larger than the rest mass are available. In this case, annihilating Kaluza-Klein dark matter may show the striking and unique signature of several gamma ray lines, with an equidistant spacing corresponding to twice the compactication radius of the extra dimension.

Primary author: Mr VOLLMANN, Martin (Uni Hamburg)

Co-authors: Dr ARINA, Chiara (IAP Paris / GRAPPA Inst. Amsterdam); Prof. SILK, Joseph (IAP Paris / Oxford Univ. / J Hopkins Univ.); Prof. BRINGMANN, Torsten (Oslo University)

Presenter: Mr VOLLMANN, Martin (Uni Hamburg)

Session Classification: Cosmology & Astroparticle Physics A

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

Relic density computations at NLO: infrared finiteness and thermal correction

Wednesday 24 September 2014 14:40 (20 minutes)

There is an increasing interest in accurate dark matter relic density predictions, which requires next-to-leading order (NLO) calculations. The method applied up to now uses zero-temperature NLO calculations of annihilation cross sections in the standard Boltzmann equation for freeze-out, and is conceptually problematic, since it ignores the finite-temperature infrared (IR) divergences from soft and collinear radiation and virtual effects. I address this problem systematically by starting from non-equilibrium quantum field theory, and demonstrate on a realistic model that soft and collinear temperature-dependent divergences cancel in the collision term. This analysis provides justification for the use of the freeze-out equation in its conventional form and determines the leading finite-temperature correction to the annihilation cross section. This turns out to have a remarkably simple structure.

Primary authors: Dr HRYCZUK, Andrzej (Technische Universitaet Muenchen); Mr DIGHERA, Francesco (Technische Universitaet Muenchen); Prof. BENEKE, Martin (Technische Universitaet Muenchen)

Presenter: Mr DIGHERA, Francesco (Technische Universitaet Muenchen)

Session Classification: Cosmology & Astroparticle Physics A

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

Predictions for a 3.55 keV photon line from dark matter decay to axions in the Milky Way

Wednesday 24 September 2014 15:00 (20 minutes)

I describe a scenario in which the 3.55 keV photon line recently observed in galaxy clusters and Andromeda is caused by dark matter decay to axion like particles (ALPS), which then mix with the photon in astrophysical magnetic fields. This model is particularly well motivated by the observed morphology of the 3.55 keV flux. In particular, I describe predictions for Milky Way halo dark matter decay to ALPs followed by ALP to photon conversion in the Milky Way's magnetic field. The 3.55 keV flux morphology in the ALP scenario differs significantly from that expected if the dark matter decays directly to photons. I also examine this phenomenon in Andromeda, and give predictions for future observations of the 3.55 keV line flux in the ALP scenario.

Primary authors: Ms DAY, Francesca (University of Oxford); Mr CONLON, Joseph (University of Oxford)

Presenter: Ms DAY, Francesca (University of Oxford)

Session Classification: Cosmology & Astroparticle Physics A

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

Einstein & Music

Wednesday 24 September 2014 18:15 (30 minutes)

Presenter: FOSTER, Brian

Session Classification: Concert: Physics and Music

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

Flavor Covariant Formalism for Transport Phenomena

Thursday 25 September 2014 15:00 (20 minutes)

Flavor effects play an important role in the time-evolution of particle number densities in a statistical ensemble with arbitrary flavor content. We present a fully flavor covariant formalism for transport phenomena, which captures consistently all flavor effects. As an application, we study flavor effects in a Minimal Resonant Leptogenesis scenario. In particular, we show that our flavor covariant formalism provides a unified description of three distinct physical phenomena, namely, resonant mixing and coherent oscillations between the heavy-neutrino flavors, and quantum decoherence in the charged-lepton sector. An interplay between these effects could enhance the final lepton asymmetry, thereby enhancing the testability of the leptogenesis mechanism in laboratory experiments.

Primary author: Dr DEV, Bhupal (University of Manchester)

Presenter: Dr DEV, Bhupal (University of Manchester)

Session Classification: Particle Phenomenology

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

Concert

Wednesday 24 September 2014 19:30 (2 hours)

Rachmaninow: Prélude Op.3 No.2;
Tschaikowski: Dumka Op.59;
Skrjabin: Fantaisie Op.28;
Borodin: Au convent, Nocturne (Petite Suite);
Balarikew: Islamey - Fantaisie orientale;
Mussorgski: Pictures at an Exhibition.

Presenter: FUKUMA, Kotaro (http://www.kotarofukuma.com/)

Session Classification: Concert: Physics and Music

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

Cosmological constraints on the Higgs portal

Thursday 25 September 2014 15:20 (20 minutes)

The new data from LHC, Planck and BICEP2 provide unseen possibilities for probing the early universe, its particle content and interactions between them. We study the cosmological constraints on a Standard Model extension with a real singlet scalar. I briefly introduce some of the main constraints on formation and decay of the scalar condensates in the early universe in order to consider the generation of dark matter abundance, both through freeze-out and freeze-in mechanism, and the generation of baryon asymmetry.

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

Co-authors: Prof. ENQVIST, Kari (University of Helsinki and Helsinki Institute of Physics); Dr TUOMINEN, Kimmo (University of Helsinki and Helsinki Institute of Physics); Dr NURMI, Sami (University of Helsinki and Helsinki Institute of Physics)

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

Session Classification: Particle Phenomenology

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

Probing primordial statistical anisotropy with WMAP and Planck data.

Thursday 25 September 2014 14:40 (20 minutes)

We constrain several models of the early Universe that predict statistical anisotropy of the cosmic microwave background (CMB) sky. We make use of WMAP9 and Planck maps deconvolved with beam asymmetries. As compared to previous releases of CMB data, they do not exhibit the anomalously large quadrupole of statistical anisotropy. This allows to strengthen the limits on the parameters of models established earlier in the literature. Among the others, we discuss constraints on the class of models with the Maxwellian term non-minimally coupled to the inflaton and a row of alternatives to inflation, i.e., Galilean genesis and conformal rolling scenario.

Primary authors: Dr RUBTSOV, Grigory (Institute for Nuclear Research (INR), Moscow); Dr RAMAZANOV, Sabir (Universite Libre de Bruxelles)

Presenter: Dr RAMAZANOV, Sabir (Universite Libre de Bruxelles)

Session Classification: Cosmology & Astroparticle Physics B

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

On the impact of the Higgs boson on the production of exotic particles at the LHC

Wednesday 24 September 2014 16:40 (15 minutes)

Many new physics models contain new particles that interact with the Higgs boson. These particles could be produced at the LHC via gluon-gluon fusion with an off-shell Higgs, as well as via the Drell-Yan process if charged under a gauge group. We consider simplified scenarios where the Standard Model is extended by one scalar or fermionic field that interacts with the Higgs boson and we evaluate the impact of the Higgs interaction on the production of the exotic particles at the LHC. This analysis applies in particular to TeV scale seesaw scenarios of neutrino mass generation.

Primary authors: Prof. IBARRA, Alejandro (Technische Universität München); Mr HESSLER, Andre (Technische Universität München); Dr MOLINARO, Emiliano (Technische Universität München); Dr VOGL, Stefan (Technische Universität München)

Presenter: Mr HESSLER, Andre (Technische Universität München)

Session Classification: Particle Phenomenology

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

Full Treatment of Electroweak Corrections to Neutralino Annihilation

Wednesday 24 September 2014 16:40 (15 minutes)

Models which have a dark matter candidate that is a Majorana fermion in most cases contain helicity suppressed annihilation processes. Notable examples of such a scenario are models for supersymmetric neutralino dark matter, in which annihilation into a fermion anti-fermion pair is p-wave suppressed. It is well known that the radiation of a gauge boson can lift helicity suppression, enhancing the total annihilation cross section for certain supersymmetric models. We fully investigate the effect of electroweak corrections to neutralino annihilation, including Higgstrahlung contributions. These processes can have a significant effect on both total annihilation rate and final state particle spectra, and are therefore potentially of great importance in determining expected indirect detection rates.

Primary authors: Dr GALEA, Ahmad (University of Oslo); Dr CALORE, Francesca (GRAPPA); Dr GARNY, Mathias (CERN); Dr BRINGMANN, Torsten (University of Oslo)

Presenter: Dr GALEA, Ahmad (University of Oslo)

Session Classification: Cosmology & Astroparticle Physics A

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

The Chaotic Regime of D-Term Inflation

Wednesday 24 September 2014 15:20 (20 minutes)

In this talk, I discuss how a period of 'chaotic inflation' with a sizeable tensor-to-scalar ratio naturally arises from the decay of a false vacuum of GUT-scale energy. We consider D-term inflation for small couplings of the inflaton to matter fields. Standard hybrid inflation then ends at a critical value of the inflaton field that exceeds the Planck mass. During the subsequent waterfall transition the inflaton continues its slow-roll motion, whereas the waterfall field rapidly grows by quantum fluctuations. Beyond the decoherence time, the waterfall field becomes classical and approaches a time-dependent minimum, which is determined by the value of the inflaton field and the self-interaction of the waterfall field. During this final stage of inflation, the effective inflaton potential is essentially quadratic, which leads to the standard predictions of chaotic inflation.

Primary authors: SCHMITZ, Kai (IPMU Tokio); DOMCKE, Valerie (SISSA/INFN); BUCHMUELLER, Wilfried (DESY Hamburg)

Presenter: DOMCKE, Valerie (SISSA/INFN)

Session Classification: Cosmology & Astroparticle Physics B

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

From Boltzmann equations to steady wall velocities

Thursday 25 September 2014 16:25 (15 minutes)

By means of a relativistic microscopic approach we calculate the expansion velocity of bubbles generated during a first-order electroweak phase transition. In particular, we use the gradient expansion of the Kadanoff-Baym equations to set up the fluid system. This turns out to be equivalent to the one found in the semi-classical approach in the non-relativistic limit. Finally, by including hydrodynamic deflagration effects and solving the Higgs equations of motion in the fluid, we determine velocity and thickness of the bubble walls. Our findings are compared with phenomenological models of wall velocities. As illustrative examples, we apply these results to three theories providing first-order phase transitions with a particle content in the thermal plasma that resembles the Standard Model.

Primary authors: NARDINI, Germano (DESY); RUES, Ingo (DESY); KONSTANDIN, Thomas (DESY)

Presenter: RUES, Ingo (DESY)

Session Classification: Cosmology & Astroparticle Physics A

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

Symplectic Supermanifolds and the Gauge Algebra of Double Field Theory

Wednesday 24 September 2014 15:00 (20 minutes)

Double field theory is a proposal to incorporate T-duality as a symmetry of a field theory defined on a formally doubled configuration space. Its gauge transformations are governed by the so-called C-bracket which reduces to the Courant bracket of Hitchin and Gualtieri's generalized geometry by solving the "strong constraint", i.e. projecting to a physical configuration space.
By giving an interpretation of double fields as functions on the Drinfel'd double of a suitable Lie bialgebroid, we give a representation of the C-bracket in terms of Poisson brackets and identify the strong constraint as the defining condition of the Drinfel'd double.

Primary authors: Dr DESER, Andreas (Leibniz University Hannover); Prof. STASHEFF, Jim (University of Pennsylvania)

Presenter: Dr DESER, Andreas (Leibniz University Hannover)

Session Classification: Strings & Mathematical Physics

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

Inflation and Dark Matter Primordial Black Holes

Wednesday 24 September 2014 16:25 (15 minutes)

Primordial Black Holes (PBHs) are gravitationally collapsed objects that may have been created by density fluctuations caused by Inflation in the early universe. A broad range of single field models of inflation are analyzed in light of all relevant recent cosmological data, checking whether they can lead to the formation of longlived PBHs as candidate for dark matter. To that end we calculate the spectral index of the power spectrum of primordial perturbations as well as its first and second derivatives. PBH formation is possible only if the spectral index n_s(k_0) increases significantly at small scales. Since current data indicate that the first derivative α_s of the spectral index is negative at the pivot scale, PBH formation is only possible in the presence of a sizable and positive second derivative (running of the running) β_s. Among the studied models, only the running-mass model allows PBH formation. As a by-product, we also show that the nonproduction of (long-lived) PBHs puts a stronger upper bound on β_s .

Primary author: Dr ERFANI, Encieh (IPM, Iran)

Presenter: Dr ERFANI, Encieh (IPM, Iran)

Session Classification: Cosmology & Astroparticle Physics B

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

Higgs → $\mu\tau$ as an indication for S_4 flavor symmetry

Wednesday 24 September 2014 14:40 (20 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 a minimal S_4 Three-Higgs-Doublet-Model with Lepton Flavor Triality. This model can explain the $2.5\,\sigma$ excess of Higgs decay final states with a $\mu\tau$ topology reported recently by CMS if the Standard Model like Higgs and the new neutral Higgs bosons are almost degenerate in mass. The model predicts sizable rates for lepton flavor violating Higgs decays also in the $e\tau$ and $e\mu$ channels, while flavor violating lepton decays are suppressed as a consequence of Lepton Flavor Triality.

Primary author: Mr SCHUMACHER, Erik (TU Dortmund)

Co-authors: Dr CÁRCAMO HERNÁNDEZ, Antonio Enrique (Universidad Técnica Federico Santa María); Prof. PÄS, Heinrich (TU Dortmund); Mr CAMPOS, Miguel (Universidad Técnica Federico Santa María)

Presenter: Mr SCHUMACHER, Erik (TU Dortmund)

Session Classification: Particle Phenomenology

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

Scalar Singlets in Particle Physics & Cosmology

Wednesday 24 September 2014 15:00 (20 minutes)

We study the phenomenology of the Standard Model (SM) Higgs sector extended by two singlet scalars. The model has two CP-even scalars h_{1,2} where one of them corresponds to the observed 125 GeV scalar
resonance; in addition to a scalar singlet that can be stable and plays the role of a dark matter candidate. We discuss the effect of the extra scalars on the Higgs triple couplings and show that it can
receive up to 150% correction at one-loop, which leads enhanced
production at the future International Linear Collider. Finally, we discuss a special case where the two CP-even scalars are degenerate around the 125 GeV mass value, and we show that the triple Higgs coupling can play an important role to distinguish this scenario from other popular extensions of the SM.

Primary author: Dr AHRICHE, Amine (Jijel U.)

Co-authors: Prof. ARHRIB, Abdessalam (Tanger U.); Prof. NASRI, Salah (UAE U.)

Presenter: Dr AHRICHE, Amine (Jijel U.)

Session Classification: Particle Phenomenology

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

Collider and astrophysical bounds on light dark matter

Wednesday 24 September 2014 14:00 (20 minutes)

To illustrate the complementarity of the collider and astrophysics bounds on the light (MeV-scale mass) dark matter (DM), the constraints on the dipole DM from the ILC and supernova will be discussed, along with those from the LHC and solar data (helioseismology).

Primary author: Dr KADOTA, kenji (Institute for Basic Science)

Presenter: Dr KADOTA, kenji (Institute for Basic Science)

Session Classification: Cosmology & Astroparticle Physics A

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

Non-gaussian imprints of primordial magnetic fields from inflation

Thursday 25 September 2014 16:10 (15 minutes)

If cosmic magnetic fields are produced during inflation, they are likely to be correlated with the primordial curvature perturbations that are responsible for the Cosmic Microwave Background anisotropies and Large Scale Structure. We compute the three-point cross-correlation function of the curvature perturbation with two powers of the electromagnetic field in a typical model of inflationary magnetogenesis. Such a correlation turns out to be non-Gaussian in nature and serves as a new contribution to the non-Gaussian signatures induced by primordial magnetic fields. We show that there exists a new simple consistency relation for such a cross-correlation in the squeezed limit. On the other hand, the signal is maximized for the flattened configuration where the magnetic non-linear parameter becomes as large as O(10^3). Detectability of such a correlation can both provide a new observational window to the underlying theory of cosmic inflation, and also shed light on the origin of cosmic magnetic fields.

Primary author: Dr JAIN, Rajeev Kumar (CP3-Origins, University of Southern Denmark)

Presenter: Dr JAIN, Rajeev Kumar (CP3-Origins, University of Southern Denmark)

Session Classification: Cosmology & Astroparticle Physics B

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

False vacuum energy dominated inflation with large r and the importance of κs

Wednesday 24 September 2014 15:00 (20 minutes)

We investigate to which extent and under which circumstances false vacuum energy (V0) dominated slow-roll inflation is compatible with a large tensor-to-scalar ratio r=O(0.1), as indicated by the recent BICEP2 measurement. With V0 we refer to a constant contribution to the inflaton potential, present before a phase transition takes place and absent in the true vacuum of the theory, like e.g. in hybrid inflation. Based on model-independent considerations, we derive an upper bound on the possible amount of V0 domination and highlight the importance of higher-order runnings of the scalar spectral index (beyond αs) in order to realise scenarios of V0 dominated inflation. We study the conditions for V0 domination explicitly with an inflaton potential reconstruction around the inflaton field value 50 e-folds before the end of inflation, taking into account the present observational data. To this end, we provide the up-to-date parameter constraints within ΛCDM + r + αs + κs using the cosmological parameter estimation code Monte Python together with the Boltzmann code CLASS.

Primary authors: Mr NOLDE, David (Basel University); Mr CEFALA, Francesco (Basel University); Prof. ANTUSCH, Stefan (Basel University); Dr ORANI, Stefano (Basel University)

Presenter: Dr ORANI, Stefano (Basel University)

Session Classification: Cosmology & Astroparticle Physics B

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

BICEP2 implications for small-field models of slow-roll inflation

Wednesday 24 September 2014 14:00 (20 minutes)

With the indications for r > 0.1 by BICEP2, there have been discussions about whether all small-field models of inflation could be ruled out due to the Lyth bound, or if the Lyth bound can be evaded by specific choices of the inflaton potential. We show that in single-field slow-roll inflation, it is impossible to reconcile r > 0.1 with field excursions \Delta \phi « M_pl, independently of the form of the potential. We also briefly discuss how this bound can be generalized to multi-field slow-roll models, and mention two ways in which multi-field models can dodge this bound.

Primary authors: NOLDE, David (University of Basel); ANTUSCH, Stefan (University of Basel)

Presenter: NOLDE, David (University of Basel)

Session Classification: Cosmology & Astroparticle Physics B

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

RK and future b→sℓℓ BSM opportunities

Thursday 25 September 2014 16:40 (15 minutes)

Flavor changing neutral current |\Delta B|=|\Delta S|=1 processes are sensitive to possible new physics at the electroweak scale and beyond, providing detailed information about flavor, chirality and Lorentz structure. Recently the LHCb collaboration announced a 2.6 \sigma deviation in the measurement of R_K={\cal{B}}(\bar B \to \bar K \mu \mu)/{\cal{B}}(\bar B \to \bar K ee) from the standard model's prediction of lepton universality. We identify dimension six operators which could explain this deviation and study constraints from other measurements. Vector and axial-vector four-fermion operators with flavor structure \bar s b \bar \ell \ell can provide a good description of the data. Tensor operators cannot describe the data. Pseudo-scalar and scalar operators only fit the data with some fine-tuning; they can be further probed with the \bar B \to \bar K ee angular distribution. The data appears to point towards C_9^{\rm NP \mu} = -C_{10}^{\rm NP \mu }<0, an SU(2)_{L} invariant direction in parameter space supported by R_K, the \bar B \to \bar K^* \mu \mu forward-backward asymmetry and the \bar B_s \to \mu \mu branching ratio, which is currently allowed to be smaller than the standard model prediction. We present two leptoquark models which can explain the FCNC data and give predictions for the LHC and rare decays. This work is in recent preprint arXiv:1408.1627 [hep-ph].

Primary author: Prof. HILLER, Gudrun (TU Dortmund)

Presenter: Prof. HILLER, Gudrun (TU Dortmund)

Session Classification: Particle Phenomenology

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

Mirror dual string sigma models

Integrability plays an important role in understanding AdS/CFT. On the string side exact results are typically found through so-called mirror models, which arise by doubly Wick rotating the light cone world sheet theory of a string, as I will briefly review. I will give a direct physical interpretation to such mirror models, coming about naturally when considering a one parameter integrable deformation of the superstring on AdS5xS5. Among the many interesting features of this family of models, I will focus on its 'mirror duality', whereby a double Wick rotation simply maps one theory to a particular cousin. In the undeformed limit this gives us an interesting space we can call the mirror version of AdS5xS5. This space can be completed to a non-supersymmetric solution of IIB supergravity, which nonetheless results in a string with some supersymmetry.

Primary authors: Prof. ARUTYUNOV, Gleb (Hamburg/Utrecht); Dr VAN TONGEREN, Stijn (Humboldt University Berlin)

Co-author: Dr DE LEEUW, Marius (ETH/NBI)

Presenter: Dr VAN TONGEREN, Stijn (Humboldt University Berlin)

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

Testing Effective Interactions of Dark Matter at Colliders and Direct Detection Experiments

Wednesday 24 September 2014 15:20 (20 minutes)

We discuss effective operators describing interactions between dark matter and Standard Model particles. We are particularly interested in higher-dimensional operators, since they are typically suppressed compared to the leading order effective operators. This can explain why no conclusive direct dark matter detection has been made so far. The ultraviolet completions of the effective operators, which we systematically study, require new particles, which can have masses at the TeV scale and are therefore phenomenologically interesting for LHC physics. We investigate possible tree-level completions with extra fermions and scalars, and we discuss the LHC phenomenology of a specific example with extra heavy fermion doublets in the context of the so-called Higgs-portal.

Primary author: Dr KRAUSS, Martin (NFN, Laboratori Nazionali di Frascati, Via Enrico Fermi 40, 00044 Frascati, Italy)

Presenter: Dr KRAUSS, Martin (NFN, Laboratori Nazionali di Frascati, Via Enrico Fermi 40, 00044 Frascati, Italy)

Session Classification: Particle Phenomenology

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

Change of neutrino-flavor-ratios via adiabatic conversion in asymmetrically warped extra dimensions

Thursday 25 September 2014 16:55 (15 minutes)

Current Ice-Cube analyses show hints for an unexpected neutrino flavor ratio (1:0:0) at high energies. This may point to non-standard
neutrino properties like LSND, MiniBooNE, ractor and Gallium anomalies do, e.g. sterile neutrinos.
Here we discuss the 1+1 active-sterile neutrino mixing resulting from the altered dispersion relations of sterile neutrinos oscillating
around a 3+1 brane in an asymmetrically warped extra dimension.
In the adiabatic limit an MSW-like effect arises which drives the active neutrinos to be converted back and forth into sterile ones
resulting in an baseline dependent conversion probability and superluminal shortcuts. The change of flavorratios is caused
by a conversion of muon and tau neutrinos into the sterile neutrino which can not be detected. Neutrinos at lower energies will not be affected.
The conditions for this effect is calculated in dependence of vacuum-mixing-angle, mass squared difference, energy and warp factor.
Also bounds for the warp factor are shown for different considerable sterile neutrino properties to reproduce the (1:0:0) flavorratio.

Primary authors: Prof. PÄS, Heinrich (TU Dortmund); Mr SICKING, Philipp (TU Dortmund)

Presenter: Mr SICKING, Philipp (TU Dortmund)

Session Classification: Particle Phenomenology

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

Higher-order massive neutrino perturbations in large-scale structure

Thursday 25 September 2014 17:10 (15 minutes)

I will present a new firsrt principle approach for higher order perturbation theory for massive neutrinos in large scale structure. The approach is based on a non-linear generalization of Gilbert's equation.
Combined with standard perturbation theory, it allows to calculate N-point statistics of density perturbations in mixed cold+hot dark matter cosmologies.
I apply the theory to compute the leading order bispectrum and use it as benchmark to test the validity of some simple approximations schemes.

Primary author: Mr FÜHRER, Florian (ITP University Heidelberg)

Co-author: WONG, Yvonne (School of Physics The University of New South Wales Sydney)

Presenter: Mr FÜHRER, Florian (ITP University Heidelberg)

Session Classification: Cosmology & Astroparticle Physics A

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

NLO accuracy for production and decay of squarks matched with parton shower

Wednesday 24 September 2014 16:55 (15 minutes)

The search for supersymmetry is a central task of the Large Hadron Collider. The interpretation of the experimental data requires accurate and flexible theoretical predictions. We present a new calculation of the next-to-leading order supersymmetric-QCD corrections to the production and the decay of squarks. In particular, we provide fully differential cross sections matched to parton showers. We will focus our discussion on the production of squarks which then directly decay into the lightest supersymmetric particle and jets. The methods used and some exemplary results will be presented.

Primary author: PELLEN, Mathieu (RWTH Aachen)

Co-authors: HANGST, Christian (KIT); POPENDA, Eva (PSI); MÜHLLEITNER, Margarete (KIT); KRÄMER, Michael (RWTH Aachen); SPIRA, Michael (PSI); GAVIN, Ryan (PSI)

Presenter: PELLEN, Mathieu (RWTH Aachen)

Session Classification: Particle Phenomenology

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

Disformal transformation of cosmological perturbations

Thursday 25 September 2014 16:55 (15 minutes)

We investigate the gauge-invariant cosmological perturbations in the gravity and matter frames in the general scalar-tensor theory where two frames are related by the disformal transformation. The gravity and matter frames are the extensions of the Einstein and Jordan frames in the scalar-tensor theory where two frames are related by the conformal transformation, respectively. First, it is shown that the curvature perturbation in the comoving gauge to the scalar field is disformally invariant as well as conformally invariant, which gives the predictions from the cosmological model where the scalar field is responsible both for inflation and cosmological perturbations. Second, in case that the disformally coupled matter sector also contributes to curvature perturbations, we derive the evolution equations of the curvature perturbation in the uniform matter energy density gauge from the energy (non)conservation in the matter sector, which are independent of the choice of the gravity sector. While in the matter frame the curvature perturbation in the uniform matter energy density gauge is conserved on superhorizon scales for the vanishing nonadiabatic pressure, in the gravity frame it is not conserved even if the nonadiabatic pressure vanishes. The formula relating two frames gives the amplitude of the curvature perturbation in the matter frame, once it is evaluated in the gravity frame.

Primary author: Dr MINAMITSUJI, Masato (CENTRA, Instituto Superior Tecnico)

Presenter: Dr MINAMITSUJI, Masato (CENTRA, Instituto Superior Tecnico)

Session Classification: Cosmology & Astroparticle Physics B

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

High-energy astrophysical neutrinos as tests of Lorentz symmetry

Thursday 25 September 2014 15:20 (20 minutes)

Lorentz invariance is a cornerstone of modern physics. Deviations from exact symmetry would radically change our view of the universe and current experiments allow us to test the validity of this assumption. In this talk, I will describe how the recent observation of high-energy astrophysical neutrinos can be used to constrain violations of Lorentz invariance.

Primary author: Dr JORGE S., Diaz (Karlsruhe Institute of Technology)

Presenter: Dr JORGE S., Diaz (Karlsruhe Institute of Technology)

Session Classification: Cosmology & Astroparticle Physics A

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

The Cosmic Ray Antiproton Background for AMS-02

Thursday 25 September 2014 16:40 (15 minutes)

The AMS-02 experiment is measuring the cosmic ray antiproton flux with high precision. The interpretation of the upcoming data requires a thorough understanding of the secondary antiproton background. Newly available data of the NA49 experiment at CERN will be discussed in order to recalculate the antiproton source term arising from cosmic ray spallations on the interstellar matter. A detailed comparison of our calculation with the existing literature as well as with Monte Carlo based evaluations of the antiproton source term is provided. An updated prediction for the secondary antiproton flux will be given.

Primary author: KAPPL, Rolf (bctp)

Presenter: KAPPL, Rolf (bctp)

Session Classification: Cosmology & Astroparticle Physics B

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

Two-loop cusp anomaly in ABJM at strong coupling

Thursday 25 September 2014 14:00 (20 minutes)

We compute the null cusp anomalous dimension of ABJM theory at strong coupling up to two-loop order. This is done by evaluating corrections to the corresponding superstring partition function, weighted by the AdS4×CP3 action in AdS light-cone gauge. We compare our result, where we use an anomalous shift in the AdS4 radius, with the cusp anomaly of N=4 SYM, and extract the two-loop contribution to the non-trivial integrable coupling h(λ) of ABJM theory. It coincides with the strong coupling expansion of the exact expression for h(λ) recently conjectured by Gromov and Sizov. Our work provides thus a non-trivial perturbative check for the latter, as well as evidence for two-loop UV-finiteness and quantum integrability of the Type IIA AdS4×CP3 superstring in this gauge.
Based on the paper arXiv:1407.4788.

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

Co-authors: Mr BRES, Alexis (Ecole Normale Superieure); Mr BIANCHI, Lorenzo (Humboldt-Universität zu Berlin); Dr BIANCHI, Marco S. (Humboldt-Universität zu Berlin); Dr FORINI, Valentina (Humboldt-Universität zu Berlin)

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

Session Classification: Strings & Mathematical Physics

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

Unitarity techniques for worldsheet scattering

Wednesday 24 September 2014 15:20 (20 minutes)

Unitarity techniques have proven to be a powerful tool for the computation of scattering amplitudes in three and four dimensions. Here the same method is applied to several massive two-dimensional models, including new results for the world-sheet AdS3×S3xM4 superstring, to compute 2⟶2 scattering S-matrices at one loop from tree level amplitudes. Evidence is found for a hidden relation with the integrability of the model.

Primary author: Mr BIANCHI, Lorenzo (Humboldt Universität zu Berlin)

Presenter: Mr BIANCHI, Lorenzo (Humboldt Universität zu Berlin)

Session Classification: Strings & Mathematical Physics

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

Delayed scaling scenario of cosmic strings and its effect on the CMB anisotropies

Thursday 25 September 2014 16:25 (15 minutes)

Cosmic strings are line-like topological defects associated with symmetry breaking. Though it is often assumed that they are formed after inflation and enters so-called scaling regime at very early Universe, it is possible to let them enter scaling regime at a later time if phase transition takes place during inflation. Here we study its effect on the cosmological observables, in particular cosmic microwave background radiation, and show how it changes the predictions of the usual scenario.

Primary author: Dr KAMADA, Kohei (EPFL)

Presenter: Dr KAMADA, Kohei (EPFL)

Session Classification: Cosmology & Astroparticle Physics B

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

Neutrino parameters and N_2-dominated leptogenesis

Thursday 25 September 2014 16:40 (15 minutes)

I will concentrate on the link between leptogenesis and low-energy neutrino data, showing how the baryon asymmetry of the Universe can constrain a type- I seesaw model and yield interesting predictions on the neutrino parameters. To this aim, I will consider the conditions required by strong thermal leptogenesis, where the final asymmetry is fully independent of the initial conditions. In this framework, barring strong cancellations in the seesaw formula and in the flavoured decay parameters, a lightest neutrino mass $m_1 > 10$ meV for normal ordering and $m_1 > 3$ meV for inverted ordering are favoured. Finally, I will briefly comment on the even richer predictions of SO(10)-inspired leptogenesis models and on the present experimental evidences.
This talk is based on arXiv:1401.6185 [hep-ph].

Primary author: RE FIORENTIN, Michele (University of Southampton)

Presenter: RE FIORENTIN, Michele (University of Southampton)

Session Classification: Cosmology & Astroparticle Physics A

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

Q-ball dark matter and baryogenesis in high-scale inflation

Wednesday 24 September 2014 16:40 (15 minutes)

We investigate the variant of the Affleck-Dine mechanism in high-scale inflation. The scenario utilizes multiple flat directions, which is generally present in the MSSM. One flat direction creates baryon asymmetry of the universe, while Q balls from another direction can be the dark matter in the gauge-mediated supersymmetry breaking. Isocurvature fluctuations are suppressed by the fact that the Affleck-Dine field stays at around the Planck scale during inflation. We find that the dark matter Q balls can be detected in IceCube-like experiments in the future, which is the smoking gun of the Affleck-Dine mechanism.

Primary author: Dr KASUYA, Shinta (Kanagawa University)

Presenter: Dr KASUYA, Shinta (Kanagawa University)

Session Classification: Cosmology & Astroparticle Physics B

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

On the relation between $f(R)$ and non minimally coupled scalar field theories.

Thursday 25 September 2014 16:10 (15 minutes)

It is well known that the scalar degrees of freedom of a generic $f(R)$ theory could be recast in a field theory dual using a Weyl scaling of the metric. In this work, we explore how the RG-improved Higgs Inflation model could be seen as a corrected Starobinsky model, showing that the relation between this two models correspond not only to a tree level matching, but at least to a 1-loop level. We consider the running of λ, the Higgs coupling, and ξ, the non minimal coupling, and also we pay special attention to the corrections to the kinetic term, that at the end are shown to be exponentially damped at the inflationary regime.

Primary authors: Prof. ROEST, Diederik (Rijksuniversiteit Groningen); Prof. GARCÍA-BELLIDO, Juan (Universidad Autónoma de Madrid); Mr GALANTE, Mario (Rijksuniversiteit Groningen)

Presenter: Mr GALANTE, Mario (Rijksuniversiteit Groningen)

Session Classification: Strings & Mathematical Physics

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

Lepton Flavour Violation in the Randall-Sundrum Model

Thursday 25 September 2014 17:10 (15 minutes)

We consider lepton flavour observables in the Randall-Sundrum (RS)
model with and without custodial protection.To this end, we apply a fully five dimensional (5D) framework to calculate the matching
coefficients of the effective field theory at the electroweak scale.
This enables us to obtain predictions for the radiative decay $\mu \to e\gamma$ as well as the decay $\mu \to 3\,e$, the anomalous magnetic moment and the electric dipole
moment of the muon.

Primary authors: Dr ROHRWILD, Juergen (Rudolf Peierls Centre for Theoretical Physics, University of Oxford); Prof. BENEKE, Martin (Physik-Department T31 Technische Universität München); Mr MOCH, Paul (Physik-Department T31 Technische Universität München)

Presenter: Mr MOCH, Paul (Physik-Department T31 Technische Universität München)

Session Classification: Particle Phenomenology

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

The Power Spectrum of Inflationary Attractors

Thursday 25 September 2014 14:00 (20 minutes)

Inflationary attractors predict the spectral index and tensor-to-scalar ratio to take specific values that are consistent with Planck. Moreover, in this letter we demonstrate that they also give rise to a specific relation between the amplitude of the power spectrum and the number of e-folds. We investigate this relation in the context of the universal attractor for models with a generalised non-minimal coupling, leading to Starobinsky inflation. The length and height of the inflationary plateau are related via the non-minimal coupling: in a wide variety of examples, the observed power
normalisation leads to at least 55 flat e-foldings. Prior to this phase, the inflationary predictions vary and can account for the observational indications for power loss at large angular scales.

Primary authors: Dr WESTPHAL, Alexander (Deutsches Elektron Synchrotron DESY); Mr BROY, Benedict (Deutsches Elektron Synchrotron DESY); Dr ROEST, Diederik (University of Groningen)

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

Session Classification: Cosmology & Astroparticle Physics B

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

Dilaton domination in the MSSM and its singlet extensions

Wednesday 24 September 2014 16:25 (15 minutes)

We study the phenomenological implications of a string-motivated scenario in which supersymmetry breaking is triggered by the Dilaton field. We show that for the MSSM there is a tension between the expected Higgs mass and the dark matter relic abundance. This constrains the parameter space and thus leads to testable predictions for LHC-14. We also present examples within the general singlet extension of the MSSM where the aforementioned tension is relaxed and all constraints can be easily accommodated.

Primary authors: Dr LOUIS, Jan (Hämburg University); Dr SCHMIDT-HOBERG, Kai Ronald (CERN); Mrs ZÁRATE, Lucila (Hämburg University)

Presenter: Mrs ZÁRATE, Lucila (Hämburg University)

Session Classification: Strings & Mathematical Physics

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

Quantum Loops in Nonlocal Gravity

Wednesday 24 September 2014 16:40 (15 minutes)

Inspired by asymptotically free quantum gravity, we consider a nonlocal scalar field theory toy model that is ghost-free. We consider one-loop and two-loop Feynman diagrams and assess the divergence structure of those diagrams. We discuss the renormalizability of the theory, in contrast with General Relativity (GR). Finally, we indicate how our work will contribute to the establishment of a unitary, renormalizable theory of quantum gravity.

Primary authors: Dr MAZUMDAR, Anupam (Lancaster University); Mr TALAGANIS, Spyridon (Lancaster University); Prof. BISWAS, Tirthabir (Loyola University New Orleans)

Presenter: Mr TALAGANIS, Spyridon (Lancaster University)

Session Classification: Strings & Mathematical Physics

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

Higher Derivative Supergravity and Implications for Moduli Stabilization and Inflation

Wednesday 24 September 2014 16:10 (15 minutes)

We investigate a particular class of scalar field theories with higher-derivative corrections in the context of N=1 supergravity. Special attention is paid to the proper understanding of such theories within the language of effective field theory. Finally the relevance to moduli stabilization as well as inflation is discussed. Specifically the sensitivity of the inflaton potential to the presence of the higher-derivative operator is assessed.

Primary authors: WESTPHAL, Alexander (DESY); CIUPKE, David (DESY); LOUIS, Jan (Uni Hamburg)

Presenter: CIUPKE, David (DESY)

Session Classification: Strings & Mathematical Physics

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

De Sitter Vacua from a D-term Generated Racetrack Uplift

Thursday 25 September 2014 15:00 (20 minutes)

We propose an uplift mechanism using a structure of multi-K\"ahler moduli dependence in the F-term potential of type IIB string theory compactifications. This mechanism requires a D-term condition that fixes one modulus to be proportional to another modulus, resulting in a trivial D-term potential. De Sitter minima are realized along with an enhancement of the volume in the Large Volume Scenario and no additional suppression of the uplift term such as warping is required. We further show the possibility to realize the uplift mechanism in the presence of more K\"ahler moduli such that we expect the uplift mechanism to work in many other compactifications.

Primary author: Dr RUMMEL, Markus (University of Oxford)

Co-author: Dr SUMITOMO, Yoske (KEK)

Presenter: Dr RUMMEL, Markus (University of Oxford)

Session Classification: Strings & Mathematical Physics

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

The bottom quark mass from non-relativistic sum rules at NNNLO

Wednesday 24 September 2014 17:10 (15 minutes)

We determine the mass of the bottom quark from moments of the $b\bar{b}$ production cross section near threshold. On the theory side we use NNNLO predictions both for the resonances and the continuum cross section. We compare our result to other recent precision determinations.

Primary authors: Dr MAIER, Andreas (TU Munich); Dr PICLUM, Jan (TU Munich); Prof. BENEKE, Martin (TU Munich); Mr RAUH, Thomas (TU Munich)

Presenter: Mr RAUH, Thomas (TU Munich)

Session Classification: Particle Phenomenology

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

The effects of thermal inflation on small scale density perturbations

Wednesday 24 September 2014 16:55 (15 minutes)

Thermal inflation is a compelling solution to the cosmological moduli problem. In the cosmological scenario with thermal inflation, while the perturbations on large scales are preserved but slightly red shifted, the perturbations on small scales would be altered. The largest characteristic scale of thermal inflation is found at the comving scale of the horizon size when thermal inflation changes the phase of the expansion of the universe. We focus on the evolution of density perturbations around the characteristic scale and present the small effects of thermal inflation as a transfer function. We expect thermal inflation could cause the oscillation with the amplitude of 0.09 ~ 6 on the power spectrum around the characteristic scale, and hence small scale observations may give the signatures of thermal inflation or the constraints on thermal inflation.

Primary author: Dr ZOE, Heeseung (UNIST)

Presenter: Dr ZOE, Heeseung (UNIST)

Session Classification: Cosmology & Astroparticle Physics B

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

Sequestered de Sitter string scenarios

Wednesday 24 September 2014 14:00 (20 minutes)

We present soft supersymmetry breaking terms in type IIB de Sitter string vacua after moduli stabilisation. We focus on models in which the Standard Model is sequestered from the supersymmetry breaking sources and the spectrum of soft-terms is hierarchically smaller than the gravitino mass.

Primary author: Dr KRIPPENDORF, Sven (Physikalisches Institut, University of Bonn)

Presenter: Dr KRIPPENDORF, Sven (Physikalisches Institut, University of Bonn)

Session Classification: Strings & Mathematical Physics

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

The Time-Flow Approach as a Tool for Large-Scale Structure

Thursday 25 September 2014 15:00 (20 minutes)

We discuss how the time-flow approach of cosmological perturbation theory can be used as a tool for large-scale structure. In particular, we show that the flow equations allow to derive straightforwardly consistency relations for equal-time correlators involving both density and velocity fields and underlying different background cosmologies. Furthermore, we use the time-flow approach to proof the intricate cancellation of soft loop momenta in the power spectrum of standard perturbation theory at any loop order.

Primary author: SAGUNSKI, Laura (DESY Hamburg)

Presenter: SAGUNSKI, Laura (DESY Hamburg)

Session Classification: Cosmology & Astroparticle Physics B

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

Cosmological neutrinos out of equilibrium

Thursday 25 September 2014 14:20 (20 minutes)

In this talk will be presented how different processes may produce distortions in the Fermi-Dirac distribution of cosmological neutrinos and their effects on cosmological observables and parameters. Will be given attention to the standard model and minimum extensions.

Primary author: BORIERO, Daniel (Bielefeld University)

Co-authors: SCHWARZ, Dominik (Bielefeld University); VELTEN, Hermano (UFES)

Presenter: BORIERO, Daniel (Bielefeld University)

Session Classification: Cosmology & Astroparticle Physics A

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

Boltzmann hierarchy for interacting neutrinos

Thursday 25 September 2014 15:20 (20 minutes)

Starting from the collisional Boltzmann equation, we derive for the first time and from first principles a Boltzmann hierarchy for neutrinos including neutrino-neutrino interactions mediated by a scalar particle. Such interactions appear, for example, in majoron-like models of neutrino mass generation. In contrast to, e.g., the first-order Boltzmann hierarchy for Thomson-scattering photons, our interacting neutrino Boltzmann hierarchy contains additional momentum-dependent collision terms arising from a non-negligible energy transfer in the neutrino-neutrino scattering process. Lastly, although we have invoked majoron-like models as a motivation for our study, our treatment is in fact generally applicable to all scenarios in which the neutrino and/or other pre-thermalised relativistic fermions interact with scalar particles.

Primary authors: RAMPF, Cornelius (University of Portsmouth); OLDENGOTT, Isabel Mira (Universität Bielefeld); WONG, Yvonne Y. Y. (University of New South Wales)

Presenter: OLDENGOTT, Isabel Mira (Universität Bielefeld)

Session Classification: Cosmology & Astroparticle Physics B

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

Curvature singularities in f(R) modified gravity

Thursday 25 September 2014 17:10 (15 minutes)

Even though f(R) modifications of late time cosmology is very successful in explaining the cosmic acceleration, it is very difficult to simultaneously satisfy the fifth-force constraint. Even in this case, the effective scalar degree of freedom may move to a point (close to its minima) in the field space where the Ricci scalar diverges. We elucidate this point further with a specific example of f(R) gravity that incorporates all viable f(R) gravity models in the literature. In particular, we show that the nonlinear evolution of the field in pressureless contracting dust can easily lead to the curvature singularity, making these theories nonviable.

Primary author: DUTTA, Koushik (Associate Professor)

Presenter: DUTTA, Koushik (Associate Professor)

Session Classification: Cosmology & Astroparticle Physics B

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

Dark Radiation predictions from general Large Volume Scenarios

Thursday 25 September 2014 14:40 (20 minutes)

The existence of Dark Radiation is a generic prediction of the Large Volume Scenario (LVS), a popular scheme of moduli stabilisation in type IIB string theory. In this talk I will quantify predictions for Dark Radiation for a wide range of LVS models. In particular, I will show that some of the most natural LVS settings with natural values of model parameters lead to Dark Radiation predictions just below the present observational bounds. Barring a discovery, rather modest improvements of present Dark Radiation limits can rule out many of these most simple and generic variants of the LVS.

Primary author: Dr WITKOWSKI, Lukas (Heidelberg University)

Presenter: Dr WITKOWSKI, Lukas (Heidelberg University)

Session Classification: Strings & Mathematical Physics

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

On the Spectrum of Superspheres

Wednesday 24 September 2014 16:55 (15 minutes)

Non-linear sigma-models play an important role in physics and mathematics. In String Theory they are extensively used to describe compactifications. Homogeneous target spaces are particularly relevant. In the context of the AdS/CFT correspondence, sigma-models based on supergroups play an important role.
Understanding sigma-models at small radius of the target space is of central importance. To this end, we will analyse one of the simplest cases, that of the supersphere S^(3|2), on which the sigma-model is conformal. We will give an explicit analysis of the spectrum and use previously obtained results to compare with a deformed WZNW model, which has been conjectured to provide a free field description of the sigma-model at strong coupling.

Primary authors: Dr CAGNAZZO, Alessandra (DESY); Prof. SCHOMERUS, Volker (DESY); Mr TLAPÁK, Václav (DESY)

Presenter: Mr TLAPÁK, Václav (DESY)

Session Classification: Strings & Mathematical Physics

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

Diffusion of UHECRs in extragalactic magnetic fields

Wednesday 24 September 2014 15:20 (20 minutes)

The origin and nature of the ultra-high energy cosmic rays (UHECRs) are still unresolved issues. Ultra-high energy cosmic rays can propagate diffusively in cosmic magnetic fields. When their propagation time is comparable to the age of the universe a suppression of the flux compared to the case without magnetic fields is expected. In this work we parametrize this suppression for different cosmological simulations of the magnetized cosmic web. We also derive upper limits for this suppression to occur for some models of extragalactic magnetic fields, and discuss the consequences of this to the UHECR spectrum and composition.

Primary author: ALVES BATISTA, Rafael (II. Institut für Theoretische Physik, Universität Hamburg)

Co-author: Prof. SIGL, Günter (II. Institut für Theoretische Physik, Universität Hamburg)

Presenter: ALVES BATISTA, Rafael (II. Institut für Theoretische Physik, Universität Hamburg)

Session Classification: Cosmology & Astroparticle Physics A

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

Light Stop Decays with Flavour-Violation

Wednesday 24 September 2014 17:25 (15 minutes)

The search for Supersymmetry at the LHC is an ongoing task. Despite the LHC searches push the limits on coloured sparticles of the first two generations above the 1 – 1.5 TeV range, the lightest stop can still be rather light. The relevant stop search channels in the low-mass region are the flavour-changing neutral current (FCNC) decay of the lightest stop into a charm quark and the lightest neutralino and its four-body decay into the lightest neutralino, a down-type quark and a fermion pair. For the first time, the SUSY-QCD corrections to the two-body decay have been calculated and in the four-body decay both the contributions from diagrams with FCNC couplings and the mass effects of final state bottom quarks and tau leptons have been taken into account. The resulting branching ratios and the implications for LHC searches are investigated in detail.

Primary authors: WLOTZKA, Alexander (KIT); POPENDA, Eva (PSI); MÜHLLEITNER, Margarete (KIT); GRÖBER, Ramona (KIT)

Presenter: POPENDA, Eva (PSI)

Session Classification: Particle Phenomenology

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

Tight bonds between sterile neutrinos and dark matter

Thursday 25 September 2014 14:40 (20 minutes)

Despite the astonishing success of standard ΛCDM cosmology, there is mounting evidence for a tension with observations at small and intermediate scales. We introduce a simple model where both, cold dark matter (DM) and sterile neutrinos, are charged under a new U(1)_X gauge interaction. The resulting DM self-interactions resolve the tension with the observed abundances and internal density structures of dwarf galaxies. At the same time, the sterile neutrinos can account for both the small hot DM component favored by cosmological observations and the neutrino anomalies found in short-baseline experiments.

Primary author: HASENKAMP, Jasper (New York University)

Presenter: HASENKAMP, Jasper (New York University)

Session Classification: Cosmology & Astroparticle Physics A

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

Effects of primordial magnetism on warm inflation scenarios

Wednesday 24 September 2014 16:10 (15 minutes)

Magnetic fields are ubiquitous in the Universe and their generation mechanism is an open problem in cosmology. Their presence on all scales strengthens the idea of a primordial origin. If this is the case, a magnetic cosmological model has to be built. Here, we discuss the possible effects that primordial magnetic fields can have on a warm inflation scenario, in particular on the inflaton effective potential.

Primary author: Dr PICCINELLI, Gabriella (Universidad Nacional Autónoma de México)

Presenter: Dr PICCINELLI, Gabriella (Universidad Nacional Autónoma de México)

Session Classification: Cosmology & Astroparticle Physics B

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

Partial Supergravity Breaking and the Effective Action of Consistent Truncations

Wednesday 24 September 2014 14:20 (20 minutes)

We study partial supersymmetry breaking of five-dimensional N=4 gauged supergravity in consistent truncations ofsupergravity and string theory. Evaluating one-loop Chern-Simons terms we address necessary conditions for consistent truncations to yield also proper effective field theories. As examples we consider SU(2)-structure reduction of M-theory on Calabi-Yau threefolds with vanishing Euler number as well as type IIB supergravity on squashed Sasaki-Einstein manifolds.

Primary author: Mr KAPFER, Andreas (MPI Munich)

Presenter: Mr KAPFER, Andreas (MPI Munich)

Session Classification: Strings & Mathematical Physics

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

Modular Inflation in F/M-Theory: Insights from Studies of the Holomorphic Sectional Curvature

Thursday 25 September 2014 15:20 (20 minutes)

We present preliminary results regarding the validity of inflation being driven by Kahler moduli fields in Calabi-Yau compactifications of arbitrary dimension. By studying the moduli space geometry in the supergravity limit of F-theory constructions, we are able to test the viability of modular inflation in the context of Type IIA/B and M-theory. We end by commenting on a mathematical inconsistency realized within the context of the G2-MSSM which suggests the presence of non-trivial quantum corrections to the Kahler potential in these models.

Primary author: Mr GALVEZ, Richard (Syracuse University)

Presenter: Mr GALVEZ, Richard (Syracuse University)

Session Classification: Strings & Mathematical Physics