Quantum field theory meets gravity

Report of Contributions

https://indico.desy.de/e/22536

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

Magnetic Quivers, Higgs Branches, and 6d N=(1,0) Theories

Wednesday 25 September 2019 16:30 (20 minutes)

The physics of M5 branes placed near an M9 plane on an A-type ALE singularity exhibits a variety of phenomena that introduce additional massless degrees of freedom. There are tensionless strings whenever two M5 branes coincide or whenever an M5 brane approaches the M9 plane. These systems do not admit a low-energy Lagrangian description so new techniques are desirable to shed light on the physics of these phenomena. The 6-dimensional N=(1,0) world-volume theory on the M5 branes is composed of massless vector, tensor, and hyper multiplets, and has two branches of the vacuum moduli space where either the scalar fields in the tensor or hyper multiplets receive vacuum expectation values. Focusing on the Higgs branch of the low-energy theory, previous works suggest the conjecture that a new Higgs branch arises whenever a BPS-string becomes tensionless. Consequently, a single theory admits a multitude of Higgs branches depending on the types of tensionless strings in the spectrum. The two main phenomena discrete gauging and small E8 instanton transition can be treated in a concise and effective manner by means of Coulomb branches of 3-dimensional N=4 gauge theories.

After a brief reminder of the set-up, a formalism is introduced that allows to derive a novel object from a brane configuration, called the magnetic quiver. Focusing one the two main phenomena, I will demonstrate the derivation of the magnetic quiver for 6d N=(1,0) theories from multiple M5 branes transverse to an A-type singularity. Thereafter, equipped with the necessary derivation rules, I will discuss magnetic quivers for M5 branes near an M9 plane.

The main features of this formalism are as follows: (i) the 3d Coulomb branch of the magnetic quiver yields the Higgs branch of the 6d system, (ii) all discrete gauging and E8 instanton transitions have an explicit brane realisation, and (iii) exceptional symmetries arise directly from brane configurations. The formalism facilitates the description of Higgs branches at finite and infinite gauge coupling as spaces of dressed monopole operators.

Primary authors: Prof. HANANY, Amihay (Imperial College London); Dr SPERLING, Marcus (Yau Mathematical Sciences Center, Tsinghua University); Mr CABRERA, Santiago (Imperial College London)

Presenter: Dr SPERLING, Marcus (Yau Mathematical Sciences Center, Tsinghua University)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

Walls of Marginal Stability and the Swampland Distance Conjecture

Wednesday 25 September 2019 15:00 (20 minutes)

In this talk we will investigate the Swampland Distance Conjecture in type IIB string theory compactified on K3 x T2. As conjectured one indeed finds a tower of exponentially light states using the Hodge-Deligne splitting of the middle homology in the degeneration limit. This tower, however, consists of quarter-BPS states, which can potentially decay into a pair of half-BPS states at walls of marginal stability. We investigate the presence of these walls in the context of the degenerations.

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Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Quantum Gravity from Timelike Liouville

Thursday 26 September 2019 14:00 (20 minutes)

The Euclidean path integral of quantum gravity requires a proper definition because the kinetic term for the conformal factor of the metric comes with an additional minus sign. We propose a definition of two-dimensional quantum gravity with a cosmological constant based on the conformal bootstrap results of timelike Liouville theory coupled to matter. For the spectrum, we prove a no-ghost theorem for the states in the BRST cohomology. We then show that the crossing symmetric 4-point function constructed by gluing the timelike 3-point function with the Ribault-Santachiara contour for internal momenta, is well-defined when the external momenta are analytically continued to correspond to the physical states in the BRST cohomology.

Primary authors: Prof. DABHOLKAR, Atish (ICTP); Dr ERBIN, Harold (LMU); Dr BAUTISTA, Teresa (Max Planck Institute for Gravitational Physics)

Presenter: Dr BAUTISTA, Teresa (Max Planck Institute for Gravitational Physics)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Three-dimensional bosonization duality from Higher Spin Gravity

Wednesday 25 September 2019 14:00 (20 minutes)

Three-dimensional bosonization duality is one of the remarkable dualities discovered recently in three-dimensional conformal field theories. At least in the large-N limit the duality is tightly linked to higher spin symmetries and, therefore, to Higher Spin Gravities that are AdS/CFT dual to these CFT's.

We propose a new approach to solve conformal field theories and apply it to the three-dimensional bosonization duality. All three-point correlation functions of single-trace operators are obtained in the large-N as a simple application. The idea is to construct, as an effective theory, a nonlinear realization of the conformal algebra in terms of physical, gauge-invariant, operators. The efficiency of the method is also in the use of an analog of the light-cone gauge and of the momentum-space on the CFT side. The uniqueness of the nonlinear realization manifests the three-dimensional bosonization duality at this order.

We also find two more non-unitary solutions which should be analogous to the recently discovered fishnet theories. The gravitational dual description of these non-unitary CFT's is explicitly constructed - chiral Higher Spin Gravities. The latter theories are UV complete and give the first example of quantum consistent Higher Spin Gravities.

Primary author: Dr SKVORTSOV, Evgeny (AEI, Potsdam)

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Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Primordial Gravitational Waves in Standard and Non-standard Cosmologies

Thursday 26 September 2019 16:30 (15 minutes)

Using the quantum chromodynamics (QCD) equation of state (EoS) from lattice calculations we investigate effects from QCD on primordial gravitational waves (PGWs) produced during the inflationary era. We also consider different cases for vanishing and nonvanishing lepton asymmetry where the latter one is constrained by cosmic microwave background experiments.
Also, we investigate scenarios that inflation is succeeded by a phase where the energy density of the Universe was dominated by a component with a general equation of state, we evaluate the spectrum of primordial gravitational waves induced in the post-inflationary Universe.
We show that if the energy density of the Universe was dominated by some specific fluid ☒ before Big Bang Nucleosynthesis (BBN), its equation of state could be constrained by gravitational wave experiments.

Primary author: Dr HAJKARIM, Fazlollah (Goethe University Frankfurt)

Presenter: Dr HAJKARIM, Fazlollah (Goethe University Frankfurt)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Entanglement in CFTs with Discrete Gauge Symmetry and Bulk Reconstruction in AdS3

Wednesday 25 September 2019 17:55 (20 minutes)

Due to the non-factorization of the Hilbert space into tensor products, the definition of entanglement entropy in gauge theories is subtle. It can be defined either by resorting to an algebraic approach or by embedding the state into an enlarged factorizing Hilbert space. The equivalence of these two approaches will be shown for entanglement between spatial degrees of freedom in 2d CFTs with $\mathbb{Z}_N$ gauge symmetry. Furthermore, the generalization to entanglement between non-spatially organized degrees of freedom (entwinement) will be considered. Lastly, holographic duals to both types of entanglement entropies will be constructed and the implications for the reconstruction of the bulk AdS_3 geometry will be explained.

Primary author: GERBERSHAGEN, Marius (Universität Würzburg)

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Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

Interface Flows in D1/D5 Holography

Wednesday 25 September 2019 18:20 (20 minutes)

We construct Kondo-like flows in the D1/D5 system. Within CFT, the
Kondo effect is described via branes which acquire additional dimensions. Starting from the D1/D5 system, we have found the BPS solutions to the DBI system describing Kondo-like RG flows between D1- and D3-brane solutions. Using a class of half BPS solutions we find corresponding backreacted supergravity interface solutions for at both fixed points and confirm the g-theorem. Our approach provides an explicit example of a Kondo-like CFT defect, with an explicit gravitational dual.

Primary authors: Dr MELBY-THOMPSON, Charles (Universitaet Wuerzburg); Mr NORTHE, Christian (Universität Würzburg); Prof. ERDMENGER, Johanna (Universitaet Wuerzburg)

Presenter: Mr NORTHE, Christian (Universität Würzburg)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

d=4 as the critical dimensionality of asymptotically safe interactions

Thursday 26 September 2019 14:20 (20 minutes)

After a short introduction to asymptotically safe quantum gravity, I explore the question why our universe is four dimensional from an asymptotically safe vantage point.
I present indications that asymptotically safe quantum fluctuations of gravity could only solve the $U(1)$ Landau-pole problem in the Standard Model in four dimensions. This could single out the observed dimensionality of the universe, once the requirement of a minimalistic description of the microscopic building blocks of our universe in terms of Standard Model fields together with a quantum-field theoretic description of quantum gravity is made.
Based on **Phys.Lett. B793 (2019) 383-389**.

Primary authors: EICHHORN, Astrid (CP3-Origins, University of Southern Denmark); SCHIFFER, Marc (Heidelberg University)

Presenter: SCHIFFER, Marc (Heidelberg University)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Unraveling conformal gravity amplitudes

Thursday 26 September 2019 16:30 (20 minutes)

Conformal supergravities are an intriguing class of theories; although they contain ghost-like states suggesting non-unitary behavior, they may have exceptionally good behavior in the ultraviolet regime. In this talk I will describe aspects of their tree-level scattering amplitudes, showing how they can be understood from double copy, Lagrangian, and string theory perspectives.

Primary author: Dr MOGULL, Gustav (Uppsala University)

Presenter: Dr MOGULL, Gustav (Uppsala University)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Time-dependence of primordial power spectrum

Thursday 26 September 2019 14:00 (15 minutes)

Inflationary models based on particle physics naturally involve multiple fields in addition to the inflaton field. Consequently these multiple fields may contribute to inflaton correlation functions via loop corrections. We study the quantum corrections to the inflaton two-point correlation functions due to massive scalar and fermion fields, employing the Schwinger-Keldysh formalism. We shall first describe the model and the generic framework. We then discuss time-dependent features of the primordial power spectrum.

Primary author: Dr KIM, Jinsu (Georg-August University Goettingen)

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Presenter: Dr KIM, Jinsu (Georg-August University Goettingen)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

BPS and non-BPS supergravity solutions through bi-spinors

Wednesday 25 September 2019 17:35 (20 minutes)

Spinor bilinears have played an important role in classification of supergravity vacuum solutions. In this talk I will present a novel reformulation of supersymmetry conditions for type II theories in terms of spinor bilinears without assuming any factorization of space-time. These bispinors can be used to define brane calibrations, namely differential forms whose integrals measure minimal energies, and I will show how supersymmetry can be rephrased in terms of calibration conditions. I will continue by presenting an application of these techniques to the classification of $\text{Mink}_4 \times S^2$ solution in type II and M-theory, which is a preliminary step to find new compact solutions which overcame Maldacena-Nunez no-go theorem. In the end I will discuss how the bispinors reformulation can be used in the classification of non supersymmetric solutions.

Primary author: Mr LEGRAMANDI, Andrea (University of Milano-Bicocca)

Co-authors: Prof. TOMASIELLO, Alessandro (Universitá di Milano-Bicocca); Dr MARTUCCI, Luca (University of Padova); Dr MACPHERSON, Niall (SISSA)

Presenter: Mr LEGRAMANDI, Andrea (University of Milano-Bicocca)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

High precision Higgs Phenomenology at the LHC

Wednesday 25 September 2019 17:00 (30 minutes)

Fiducial differential cross sections are reliable observables at the LHC. Precision measurements are providing unprecedented data which reveals the detailed structure of the Standard Model. From the theory point of view, event generators could simulate the underlying scattering processes and apply the same experimental selection criterions to reduce systematical errors when comparing with data. I will introduce some of the implementations and simulations in NNLOJET package with the-state-of-the-art theory precisions at NNLO QCD and above then illustrate their applications when comparing with LHC measurements of the Higgs boson.

Primary author: Dr CHEN, Xuan (University of Zurich)

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Presenter: Dr CHEN, Xuan (University of Zurich)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

CP violating effects in coherent elastic neutrino-nucleus scattering processes

Wednesday 25 September 2019 15:20 (20 minutes)

Assuming light vector mediators, we discuss the effects of CP violation on the coherent elastic neutrino-nucleus scattering (CEvNS) process in the COHERENT sodium-iodine, liquid argon and germanium detectors. We show that in some regions of the parameter space, the presence of a dip in the event rate spectrum can be used to constraint CP violating effects. In other regions, we find that CP violating parameters can mimic the Standard Model CEvNS spectra induced by real parameters. We point out that the interpretation of CEvNS data in terms of a light vector mediator should take into account possible CP violating effects.

Primary author: DE ROMERI, Valentina (IFIC (CSIC-Univ. Valencia))

Presenter: DE ROMERI, Valentina (IFIC (CSIC-Univ. Valencia))

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Measuring the Helicity of Intergalactic Magnetic Fields with Numerical Simulations in Astroparticle Physics

Thursday 26 September 2019 16:15 (15 minutes)

The origin of the first magnetic fields in the Universe is a standing problem in cosmology. Intergalactic Magnetic Fields (IGMFs) may be an untapped window to the primeval Universe, providing further constrains on magnetogenesis. We demonstrate the feasibility of using gamma rays from electromagnetic cascades originating from TeV blazars and Ultra-High-Energy Cosmic Rays (UHECRs) to constrain the helicity of IGMFs by performing simulations of their propagation in simple magnetic field and source configurations. We show that the arrival directions of the respective particles may be used to measure the absolute value of the helicity and its sign.

Primary author: Dr SAVELIEV, Andrey (Immanuel Kant Baltic Federal University)

Presenter: Dr SAVELIEV, Andrey (Immanuel Kant Baltic Federal University)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Asymptotically Safe Extensions of the MSSM

Wednesday 25 September 2019 14:25 (25 minutes)

Despite its many successes the Standard Model can at best be viewed as a low energy approximation to a more fundamental theory of nature. Supersymmetry provides a theoretically attractive extension of the Standard Model while the idea of asymptotic safety leads to field theories which can be regarded as being fundamental.
In this talk I investigate whether and how the minimal supersymmetric version of the Standard model can be extended in a way such that it becomes asymptotically safe without including gravity.
Implications for the field content and on the scale of susy breaking are discussed.

Summary

Recent model building has provided ways to extend the SM into one which features asymptotic safety.
Here we pursued the question whether the MSSM can also be extended in such a way.
After providing guiding rules regarding the existence of weakly interacting non-gaussian fixed points in supersymmetric models in general and in the MSSM in particular, we discuss the phenomenology of such fixed points. The guiding rules set an upper limit to additional colored particles beyond the MSSM in order to obtain non-gaussian fixed points of the RG flow.
We present searches for AS MSSM extensions which yield some candidates. All of them have in common a matching scale onto the SM of order ~ 1 GeV which makes them phenomenologically not viable.
Using non-perturbative exact relations of superconformal field theories we conclude that the AS candidates may exist beyond perturbation theory.
More work can be done in the search for extensions of the MSSM having UV attractive fixed points. Investigating extensions at higher loop order, extending the gauge group and the possibility of strongly interacting fixed points could all lead to a variety of new asymptotically safe extensions of the MSSM.

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Presenter: Mr MOCH, Kevin (TU Dortmund)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Complexity for Quantum Fields: Quenches, Gaussian States and Purifications

Wednesday 25 September 2019 18:40 (20 minutes)

We apply the recently developed notion of complexity for field theory to a quantum quench through a critical point in 1+1 dimensions. We begin with a toy model consisting of a quantum harmonic oscillator, and show that complexity exhibits universal scalings in both the slow and fast quench regimes. We then generalize our results to a one-dimensional harmonic chain, and show that preservation of these scaling behaviors in free field theory depends on the choice of norm. Applying our setup to the case of two oscillators, we quantify the complexity of purification associated with a subregion. We find that the complexity of subregions is subadditive, and comment on potential implications for holography.

Primary author: Mr CAMARGO, Hugo (Max Planck Institute for Gravitational Physics)

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Presenter: Mr CAMARGO, Hugo (Max Planck Institute for Gravitational Physics)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

A closer look to the global shape of the scalar potential with gravitational waves

Thursday 26 September 2019 16:45 (20 minutes)

I will discuss the dependence of the parameters describing the gravitational waves produced in a first order phase transition (Tn, alpha, beta/H) on
the global properties
(e.g. height of the barrier) of the scalar that spontaneously tunnels
between two
vacua. Particularizing on the Higgs field, I will show the potential
of gravitational wave observatories to unravel its global shape even when collider experiments are
completely insensitive. Other aspects of the complementarity between
colliders and
gravitational wave experiments as well as connections to fundamental
theories will be
also discussed.

Primary author: Dr CHALA, Mikael (UGR & IPPP)

Presenter: Dr CHALA, Mikael (UGR & IPPP)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Axion Gauge Field Inflation

Thursday 26 September 2019 15:20 (10 minutes)

I will talk about early Universe inflation driven by an axion-like particle interacting with (non-) Abelian gauge fields. In the case of a non-Abelian gauge group, this can lead to the formation of a stable, homogeneous and isotropic gauge field background. However this only happens significantly after the relevant CMB scales left the horizon. This makes the model practically indistinguishable to Abelian axion inflation – bringing non-Abelian axion inflation back as a viable inflation candidate.

I will also discuss UV completions of the setup. This leads to significant parameter space restrictions. The remaining parameter space can be divided into three regimes. (i) For small gauge couplings we recover natural inflation. For large gauge couplings the non-Abelian gauge theory either (ii) mimics the Abelian theory over the whole inflationary dynamics or (iii) nonlinear interactions prohibit a linear analysis of the gauge field perturbations.

Primary authors: Mr SANDNER, Stefan (IFIC / CSIC); Ms DOMCKE, Valerie (DESY)

Presenter: Mr SANDNER, Stefan (IFIC / CSIC)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Conversion driven freeze-out

Wednesday 25 September 2019 17:35 (20 minutes)

Chemical equilibrium is a commonly made assumption in the freeze-out calculation of coannihilating dark matter. We explore the possible failure of this assumption and find a new conversion-driven freeze-out mechanism. Considering a representative simplified model inspired by supersymmetry with a neutralino- and sbottom-like particle we find regions in parameter space with very small couplings accommodating the measured relic density. In this region freeze-out takes place out of chemical equilibrium and dark matter self-annihilation is thoroughly inefficient. The relic density is governed primarily by the size of the conversion terms in the Boltzmann equations. Due to the small dark matter coupling the parameter region is immune to direct detection but predicts an interesting signature of disappearing tracks or displaced vertices at the LHC. Unlike freeze-in or superWIMP scenarios, conversion-driven freeze-out is not sensitive to the initial conditions at the end of reheating.

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Presenter: Dr VOGL, Stefan (Max-Planck-Institut für Kernphysik)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Searches for right-handed neutrinos at accelerators

Wednesday 25 September 2019 14:00 (20 minutes)

Extensions to the SM featuring a low-scale seesaw can be used to to explain the observation of neutrino oscillations, baryogenesis and dark matter. I present the potential to search for right-handed neutrinos using current experiments. I compare the reach of the main detectors at the LHC when a displaced vertex signature in proton collisions is used. Additionally, I show the potential to improve on that using heavy ion collisions. Finally, I present the reach of the fixed target experiment NA62.

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Presenter: Dr HAJER, Jan (UCLouvain)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

The Λ-BMS4 group of dS4 and new boundary conditions for AdS4

Wednesday 25 September 2019 17:10 (20 minutes)

In this talk, I will discuss the solution space of general relativity in Bondi gauge, with non-vanishing cosmological constant. Using the dictionary between Bondi and Fefferman-Graham gauges, the analogues of the Bondi news, Bondi mass and Bondi angular momentum aspects at the boundary of generic asymptotically locally dS4 spacetimes will be identified. Then, I will introduce the Λ-BMS4 group as the residual symmetry group of Bondi gauge after boundary gauge fixing. This group consists in infinite dimensional non-abelian supertranslations and superrotations and it reduces in the asymptotically flat limit to the extended BMS4 group. Furthermore, I will present new boundary conditions for asymptotically locally AdS4 spacetimes which admit R times the group of area-preserving diffeomorphisms as the asymptotic symmetry group.

Primary authors: Mr FIORUCCI, Adrien (ULB); Prof. COMPÈRE, Geoffrey (ULB); Mr RUZZICONI, Romain (ULB and International Solvay Institutes)

Presenter: Mr RUZZICONI, Romain (ULB and International Solvay Institutes)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

Seiberg-like dualities for gauge theories with a boundary

Wednesday 25 September 2019 15:40 (20 minutes)

We analyse certain 2d supersymmetric gauge theories (GLSMs) with a boundary which in the IR flow to SCFTs that are relevant for string compactifications with D-branes. Certain non-abelian GLSMs exhibit Seiberg-like dualities which relate seemingly different UV gauge theories with the same IR physics. We extend the analysis of such dualities to theories with boundaries and propose the action of the duality on the boundary degrees of freedom. We further support our proposal by performing non-trivial checks using a mathematical formulation of D-branes.

Primary authors: Dr JOCKERS, Hans (Bethe Center for Theoretical Physics (BCTP), University of Bonn); Dr ROMO, Mauricio (Yau Mathematical Sciences Center Tsinghua University Beijing, 100084, China); Ms NINAD, Urmi (Doctoral student)

Presenter: Ms NINAD, Urmi (Doctoral student)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

The Grand Slam of IIB Supergravity: 4pt @ 1-Loop.

Thursday 26 September 2019 17:10 (20 minutes)

We explore the structure of supergravity on AdS5xS5 at one loop, by constructing multi-channel four-point correlators for Kaluza Klein modes on the five-sphere.
We do so by insisting on the consistency of the OPE of N=4 SYM, and using analytical bootstrap techniques. In particular, the presence of 1/N^4 contributions from protected double trace operators at the unitarity bound is a novel effect, and requires a careful multiplet recombination, unlike the tree level case. Since both the double discontinuity and (partially) the single discontinuity are predicted independently, the bootstrap problem is overconstrained. Will supergravity be able to find the solution? We show indeed that for a number of KK correlators there exists a unique solution, up to contact terms, such that all 1/N^4 predictions are correctly reproduced.

This is work done in collaboration with James Drummond and Paul Heslop.

Primary author: Mr APRILE, Francesco (Milano Bicocca University)

Presenter: Mr APRILE, Francesco (Milano Bicocca University)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Localization of N=1 Theories on D2 x T2

Wednesday 25 September 2019 16:50 (20 minutes)

We consider 4d N=1 gauge theories with R-symmetry on a hemisphere times a torus. We apply localization techniques to evaluate the exact partition function through a cohomological reformulation of the supersymmetry transformations. Our results represent the natural elliptic lifts of the lower dimensional analogs as well as a field theoretic derivation of the conjectured 4d holomorphic blocks, from which partition functions of compact spaces with diverse topology can be recovered through gluing. We also analyze the different boundary conditions which can naturally be imposed on the chiral multiplets, which turn out to be either Dirichlet or Robin-like. We show that different boundary conditions are related to each other by coupling the bulk to 3d N=1 degrees of freedom on the boundary three-torus, for which we derive explicit 1-loop determinants.
The talk is based on arXiv 1906.02051 .

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Co-authors: Dr NIERI, Fabrizio (DESY); Mr LONGHI, Pietro (Uppsala University)

Presenter: Dr PITTELLI, Antonio (Uppsala University)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: Cosmology & Astroparticle Physics

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

Using number theory to go from open- to closed string amplitudes at one-loop

Thursday 26 September 2019 16:50 (20 minutes)

When tree-level scattering amplitudes in open string theory are expanded in α', the coefficients are multiple zeta values (MZVs). These are mapped to a subset by the single-valued map from analytic number theory. As was proven recently, the corresponding MZVs in closed string amplitudes are just the single-valued image of the open string MZVs, therefore removing the need to calculate tree-level closed string amplitudes entirely.
At one-loop, the expansion coefficients are functions of the modular parameters of the genus-one worldsheets associated to open or closed strings. Currently, several groups are working on finding an elliptic generalization of the single-valued projection to these objects which would make also the one-loop closed string calculation unnecessary. In particular, first promising results were obtained for four-point scattering in type-IIB. I will outline steps towards a generalization of these results which reveal more of the structure of the elliptic single-valued map.

Primary authors: Dr KLEINSCHMIDT, Axel (AEI Potsdam); Dr MAFRA, Carlos (University of Southampton); Mr GERKEN, Jan (Max Planck Institute for Gravitational Physics); Prof. SCHLOTTERER, Oliver (University of Uppsala)

Presenter: Mr GERKEN, Jan (Max Planck Institute for Gravitational Physics)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Exact structure constants of determinant operators

Thursday 26 September 2019 14:40 (20 minutes)

In this talk, based on [1906.07733] with Y. Jiang and S. Komatsu, we derive the first non-perturbative result for the structure constants of two determinant operators and a non-BPS single-trace operator of finite length in planar $\mathcal{N} = 4$ SYM. First, we introduce a new method based on large-N collective fields, which efficiently computes correlators of such non-single-trace operators in free theory and also realizes an example of Gopakumar's "open-closed-open" string triality. The form of the result supports the interpretation of the three-point function as an overlap between an integrable boundary state, which we determine using symmetry and integrability, and the state describing the single-trace operator. Second, we use thermodynamic Bethe ansatz to derive a non-perturbative expression for such overlap with an excited state in the SL(2) sector. Finally, we briefly discuss some interesting applications that could be addressed with the present methods.

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Presenter: Dr VESCOVI, Edoardo (Imperial College London)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Large radiative effects on dark matter annihilation resummed

Wednesday 25 September 2019 16:45 (20 minutes)

A particularly promising prediction of several wimp DM models is the quasi-monochromatic emission of gamma rays due to their pair-annihilation in e.g. the innermost part of the Milky Way. High energy gamma-ray fluxes due to such annihilation processes are naively suppressed by the inverse-squared dependence on the heavy DM mass and by the fact that the cross section is loop-suppressed. However, non-perturbative effects (Sommerfeld) can play the opposite role of enhancing the signal by several orders of magnitude.

Relatedly, the different scale hierarchies present in the problem pose an additional technical difficulty. Namely, the appearance of large (Sudakov) logarithms that -on top of the Sommerfeld effect- break the validity of the perturbative expansion. In order to resum these, we employ soft-collinear effective-field-theory (SCET) methods.

By means of process-specific factorization theorems, we are able to make very precise (Next-to-Leading Log prime) predictions for the relevant annihilation cross sections. Focusing, for concreteness, on the pure-wino model I will give in this talk a short overview of these methods and their application to indirect DM detection with gamma-ray telescopes.

Primary author: Dr VOLLMANN, Martin (TUM)

Presenter: Dr VOLLMANN, Martin (TUM)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Dynamical Emergence of Scalaron in Higgs Inflation

Thursday 26 September 2019 14:30 (15 minutes)

We point out that a light scalaron dynamically emerges if scalar fields have a sizable non-minimal coupling to the Ricci scalar as in the Higgs inflation model. We support this claim in two ways. One is based on the renormalization group equation; the non-minimal coupling inevitably induces a Ricci scalar quadratic term due to the renormalization group running. The other is based on scattering amplitudes; a scalar four-point amplitude develops a pole after summing over a certain class of diagrams, which we identify as the scalaron. Our result implies that the Higgs inflation is actually a two-field inflationary model. Another implication is that the Higgs inflation does not suffer from the unitarity issue since the scalaron pushes up the cut-off scale to the Planck scale.

Primary author: EMA, Yohei (DESY)

Presenter: EMA, Yohei (DESY)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Neutrino Portal Dark Matter via Freeze-In

Wednesday 25 September 2019 14:20 (15 minutes)

We investigate a model of neutrino portal dark matter where a right-handed neutrino both generates the observed neutrino masses and mediates between the SM and a dark sector, consisting of a fermion and a boson.
We explore the parametrics and different constraints on the neutrino portal to dark matter. In contrast to earlier work, we focus on regions of the parameter space where DM is generated via freeze-in instead of freeze-out.

Summary

We investigate a model of neutrino portal dark matter where a right-handed neutrino both generates the observed neutrino masses and mediates between the SM and a dark sector, consisting of a fermion and a boson.
We explore the parametrics and different constraints on the neutrino portal to dark matter. In contrast to earlier work, we focus on regions of the parameter space where DM is generated via freeze-in instead of freeze-out.

Primary author: Mr BECKER, Mathias (TU Dortmund)

Co-author: HORMIGOS FELIU, Clara (TU Dortmund)

Presenter: Mr BECKER, Mathias (TU Dortmund)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Common origin of baryon asymmetry, dark matter and neutrino mass

Wednesday 25 September 2019 14:35 (15 minutes)

In this work, we explain three beyond standard model (BSM) phenomena, namely neutrino masses, the baryon asymmetry
of the Universe and Dark Matter, within a single model and in each explanation the right handed (RH) neutrinos play the
prime role. Indeed by just introducing two RH neutrinos we can generate the neutrino masses by the Type-I seesaw
mechanism. The baryon asymmetry of the Universe can arise from thermal leptogenesis from the decay of lightest RH
neutrino before the decoupling of the electroweak sphaleron transitions, which redistribute the $B - L$ number into a
baryon number. At the same time, the decay of the RH neutrino can produce the Dark Matter (DM) as an
asymmetric Dark Matter component. The source of CP violation in the two sectors is exactly the same,
related to the complex couplings of the neutrinos.
By determining the comoving number density for different values of the CP violation in the DM sector, we obtain
a particular value of the DM mass after satisfying the relic density bound. We also give prediction for the
DM direct detection (DD) in the near future by different ongoing DD experiments.

Summary

In this work we have tried to solve three major puzzles of cosmology by the presence of two RH neutrinos
and a Dark Sector charged under an $SU(2)_D$. The hidden sector of the model is chosen to resemble the SM electroweak sector, but with just two non mixing families, so that the mass of the DM particles could be similar to the SM fermions and the presence of the $SU(2)_D$ interaction is crucial for annihilating away all the symmetric Dark Matter components.

Primary author: Mr KHAN, Sarif (Goettingen University)

Co-authors: Dr BISWAS, Anirban (IACS, Kolkata); Prof. COVI, Laura (Goettingen University); Prof. CHOUBEY, Sandhya (Harish-Chandra Research Institute, Allahabad)

Presenter: Mr KHAN, Sarif (Goettingen University)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Baryogenesis from axion inflation

Thursday 26 September 2019 16:00 (15 minutes)

The coupling of an axion-like particle driving inflation to the Standard Model particle content through a Chern-Simons term generically sources a dual production of massless helical gauge fields and chiral fermions. We demonstrate that the interplay of these two components results in a highly predictive baryogenesis model, which requires no further ingredients beyond the Standard Model. If the helicity stored in the hyper magnetic field and the effective chemical potential induced by the chiral fermion production are large enough to avoid magnetic diffusion from the thermal plasma but small enough to sufficiently delay the chiral plasma instability, then the non-vanishing helicity survives until the electroweak phase transition and sources a net baryon asymmetry which is in excellent agreement with the observed value. If any of these two conditions is violated, the final baryon asymmetry vanishes. The observed baryon asymmetry can be reproduced if the energy scale of inflation is around Hinf $\sim$ 10^{10} - 10^{12} GeV with a moderate dependence on inflation model parameters.

Primary author: MUKAIDA, Kyohei (DESY)

Co-authors: VON HARLING, Benedict (IFAE); MORGANTE, Enrico (DESY); DOMCKE, Valerie (DESY)

Presenter: MUKAIDA, Kyohei (DESY)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

The Effective Field Theory of Large Scale Structureat Three Loops

Wednesday 25 September 2019 15:50 (10 minutes)

We study the power spectrum of dark matter density fluctuations in the framework of the Effective Field Theory of Large Scale Structures (EFTofLSS) up to three loop orders. In principle, several counter-terms may be needed to handle the short-distance sensitivity in perturbation theory. However, we show that a small number of extra coefficients are sufficient to match numerical simulations with percent accuracy when a generic renormalization prescription is implemented (allowing for running of the individual counter-terms). We show that the level of accuracy increases with respect to the two loop results, up to $k \simeq 0.4\,h$~Mpc^{-1} at redshift $z = 0$, although the overall improvement is somewhat marginal. At the same time, we argue there is evidence that the behavior of the loop expansion in the EFTofLSS is typical of an asymptotic series, already on the brink of its maximum predictive power (at $z = 0$). Hence, the inclusion of higher orders will likely deteriorate the matching to data, even at moderate values of k. Part of the reason for this behavior is due to large contributions to the (renormalized) power spectrum at three loop order from mildly non-linear scales, even after the UV counter-terms are included. In conclusion, the EFTofLSS to three loop orders provides the best approximation to the (deterministic part of the) power spectrum in the weakly non-linear~regime at $z = 0$, and higher loops are not expected to improve our level of accuracy.

Primary authors: Mr RUBIRA, Henrique (DESY); KONSTANDIN, Thomas (DESY)

Presenter: Mr RUBIRA, Henrique (DESY)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Relativistic and spectator effects in leptogenesis with heavy sterile neutrinos

Wednesday 25 September 2019 15:10 (10 minutes)

For leptogenesis with heavy sterile neutrinos above the Casus-Ibarra bound, asymmetries produced by relativistic sterile neutrinos at early times can be relevant in the case of weak washout or if the asymmetry is partly protected from washout by being transferred to partially equilibrated spectator fields. We thus study the relevance of relativistic effects for leptogenesis in a minimal seesaw model with two strongly hierarchical sterile neutrinos. Starting from first principles, we derive a set of relativistic momentum averaged boltzman equations to compute the final B-L asymmetry at order one accuracy for various initial conditions. Assuming fully equilibrated spectator fields, we find that relativistic corrections lead to a sign flip and an enhancement of the final asymmetry for weak washouts and a vanishing initial abundance of sterile neutrinos. As an example for the effect of partially equilibrated spectators, we consider b-Yukawa and weak sphaleron interactions for sterile neutrinos with masses 5 * 10^12 GeV. For strong washouts and a vanishing initial abundance of sterile neutrinos, this can give another sign flip and an absolute enhancement of the final asymmetry by up to two orders of magnitude relative to the cases with either negligible or fully equilibrated spectator interactions.

Primary author: Mr KLOSE, Philipp (Université Catholique de Louvain)

Co-authors: Prof. GARBRECHT, Björn (Technische Universität München); Dr TAMARIT, Carlos (Technische Universität München)

Presenter: Mr KLOSE, Philipp (Université Catholique de Louvain)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Constraints on effective dark matter-nucleon interactions from 3-year IceCube observations of the Sun

Wednesday 25 September 2019 15:40 (10 minutes)

Dark matter particles from the galactic halo can be captured by the sun and can then annihilate into Standard Model particles which makes the sun a source of GeV neutrinos. One goal of the IceCube Neutrino Observatory (IceCube) is to detect these neutrinos. In this work, we present the constraints on the DM-nucleon interactions which we obtain from 3-year IceCube observations of the Sun.

Primary author: Ms BRENNER, Anja (Technische Universität München)

Presenter: Ms BRENNER, Anja (Technische Universität München)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Self-consistent gradient corrections to false vacuum decay for a U(1) gauge theory

Thursday 26 September 2019 17:05 (15 minutes)

Following previous work on self-consistent methods geared towards dealing with false vacuum decay in quantum field theory; a $U(1)$-gauge theory with a complex scalar is considered together with a polynomial potential which presents a metastable vacuum at tree level. Fluctuations around an inhomogeneous bounce-type background interpolating between vacua are studied and computed within a 1-PI effective action treatment and through a self-consistent prescription in order to incorporate gradients of the background. The self-consistent methodology also includes renormalization of the theory: coupling counterterms in a MS-like scheme and the wave-function renormalization obtained through a gradient expansion methodology. Corrections to the life-time of the metastable vacuum comprise: leading order contribution from the action at the tree-level bounce, plus self-energy corrections, counterterm contributions and corrections to the bounce background.

Primary author: Mr CRUZ, Juan S. (TUM)

Co-authors: Prof. GARBRECHT, Björn (Technical Univerisity Munich); Dr TAMARIT, Carlos (Technische Universität München); Dr AI, Wen-Yuan (Technical University Munich)

Presenter: Mr CRUZ, Juan S. (TUM)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Finding hints of New Physics in Tritium molecular spectra

Thursday 26 September 2019 15:30 (30 minutes)

We are studying the effects of light New Physics that can materialise in deviations from the Coulomb potential on the length scale of molecules. Precision molecular spectroscopy thus sets complementary constraints on parameters that are not accessible in other type of experiments. We compare an estimate of the theoretical uncertainties to the available experimental precision in order to constrain classes of New Physics (light /pseudo/scalar, dark photon, neutrino force) and discuss how competitive this method is.

Primary author: Dr HOLLIK, Wolfgang Gregor (KIT)

Presenter: Dr HOLLIK, Wolfgang Gregor (KIT)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Modularity from Monodromy

Wednesday 25 September 2019 15:20 (20 minutes)

We discuss the relation between certain auto-equivalences of the category of B-branes on elliptic Calabi-Yau threefolds and modular properties of the corresponding topological string partition function.
This suggests a geometric explanation and generalization of recent conjectures on the appearance of lattice Jacobi forms.
In particular, we will shed light on the special case where the fibration does not have a section but only multi-sections.

Primary author: Dr SCHIMANNEK, Thorsten (University of Vienna)

Presenter: Dr SCHIMANNEK, Thorsten (University of Vienna)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Asymptotic safety and phenomenology in extensions of the Standard Model

Wednesday 25 September 2019 14:50 (25 minutes)

I will discuss asymptotically safe extensions of the Standard Model with new matter fields at the TeV scale. The BSM sector contains singlet scalars and vector-like fermions in representations which permit Yukawa interactions with the Standard Model leptons and a Higgs portal coupling. UV safety is explored up to the Planck regime in dependence of the BSM couplings. Moreover, phenomenological implications are investigated including production and decay mechanisms, charged lepton flavour violation, electric dipole moments, Drell-Yan processes and lepton anomalous magnetic moments. Scenarios are highlighted which avoid Landau poles, stabilise the Higgs sector and accommodate for the muon and electron anomalous magnetic moments.

Primary authors: Ms HORMIGOS-FELIU, Clara (TU Dortmund); Prof. LITIM, Daniel Farid (U Sussex); Prof. HILLER, Gudrun (TU Dortmund); Mr STEUDTNER, Tom (U Sussex)

Presenter: Mr STEUDTNER, Tom (U Sussex)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Yangian Symmetry and Box Integrals

Thursday 26 September 2019 15:00 (20 minutes)

We report on progress in exploring the constraining power of the conformal Yangian symmetry that was recently found to be a feature of fishnet Feynman integrals. In particular, we explicitly investigate the four-point box and the six-point double-box integrals.

Primary author: Dr LOEBBERT, Florian (Humboldt University Berlin)

Co-authors: Dr MÜLLER, Dennis (NBI Copenhagen); Dr MÜNKLER, Hagen (ETH Zurich)

Presenter: Dr LOEBBERT, Florian (Humboldt University Berlin)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Stellar Constraints on Dark matter

Due to their extreme density and low temperature, neutron stars (NS) are efficient probes to unveil interactions between standard model and dark matter (DM) particles. From elastic scatterings on NS material, DM can get gravitationally trapped by the star.

The in-falling DM unavoidably transfers heat to the NS and can increase the temperature of old NS up to $\sim$ 1700 K. Moreover, if DM is symmetric, its annihilations inside the NS also heat up old NS to $\sim$ 2400 K, leading to an infrared blackbody spectrum that is in principle within range of future telescopes. In the first half of the talk I will discuss the implications for a model with DM charged under a local $U(1)_{L_\mu - L_\tau}$.

Furthermore, if DM is asymmetric, the thermal DM cloud formed inside the NS could collapse into a black hole, thus destroying the whole NS. From the observation of old NS, such a scenario leads to very stringent constraints on the parameter space of asymmetric DM. In the final part of the talk I will revisit this possibility in a model with asymmetric DM with significant attractive self interactions.

Summary

The talk will be based on arXiv:1906.10145, arXiv:1812.08773
and a work in preparation.

Primary author: Dr GARANI, Raghuveer (Universite Libre De Bruxelles)

Presenter: Dr GARANI, Raghuveer (Universite Libre De Bruxelles)

Track Classification: Cosmology & Astroparticle Physics

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

Can high-scale axion models have a viable cosmological history?

Wednesday 25 September 2019 16:30 (15 minutes)

High-scale axion models are sensitive to CMB isocurvature bounds, which are thought to rule out scenarios with an axion decay constant fA above 10^14 GeV. This would be incompatible with grand unification scenarios featuring an axion with fA related to the unification scale, which could otherwise be primary targets for future experiments like CASPER and ABRACADABRA. In view of the above, we re-examine the cosmological history of axion perturbations during inflation and reheating in high-scale axion models in which the axion is mostly aligned with the phase of the field which drives inflation.

Primary authors: RINGWALD, Andreas (DESY); Dr TAMARIT, Carlos (Technische Universität München); Dr BALLESTEROS, Guillermo (IFT Madrid); Dr WELLING, Yvette (DESY)

Presenter: Dr TAMARIT, Carlos (Technische Universität München)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

BBN constraints on MeV-scale dark sectors

Wednesday 25 September 2019 18:10 (15 minutes)

Meta-stable dark sector particles decaying into electrons or photons may non-trivially change the Hubble rate, lead to entropy injection into the thermal bath of Standard Model particles and may also photodisintegrate light nuclei formed in the early universe. We study generic constraints from Big Bang Nucleosynthesis on such a setup, with a particular emphasis on MeV-scale particles which are neither fully relativistic nor non-relativistic during all times relevant for Big Bang Nucleosynthesis. These constraints turn out to be very relevant for a number of well-studied models, e.g. in the context of self-interacting dark matter with light mediators. We then further apply our calculations to the case of MeV-scale dark matter annihilating into electromagnetic radiation. We show that, for p-wave suppressed annihilations, these constraints turn out to be significantly stronger than the ones from CMB observations, and are even competitive with the strongest bounds from other indirect searches.

Primary author: Mr HUFNAGEL, Marco (DESY Hamburg)

Presenter: Mr HUFNAGEL, Marco (DESY Hamburg)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Leptogenesis in the model with modular symmetry

Wednesday 25 September 2019 15:40 (20 minutes)

We discuss the model with the modular A_4 invariance. It has been shown that this model can explain neutrino masses and mixing angles observed by oscillation experiments. We investigate the leptogenesis in this model. It is found that the leptogenesis by decay of right-handed neutrinos works well. Especially, we show that the Dirac and Majorana CP-phases in the PMNS matrix and right-handed neutrino masses are predicted in a restricted region in order to explain the baryon asymmetry of the universe.

Primary authors: Mr YOSHIDA, Takahiro (Niigata University); Prof. ASAKA, Takehiko (Niigata University); Dr TATSUISHI, Takuya (Hokkaido University); Mr HEO, Yongtae (Niigata University)

Presenter: Mr YOSHIDA, Takahiro (Niigata University)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Generalized Wilson lines and next-to-soft emissions

Wednesday 25 September 2019 17:30 (30 minutes)

Recently, several groups have investigated the possibility to extend the traditional soft gluon factorization and resummation framework at subleading power. In particular, for processes with colourless final state particles, resummation has been achieved at the leading-log accuracy. In this talk, after introducing the general set up, I focus on a particular ingredient for such factorization known as generalized Wilson line, that takes into account next-to-soft emissions at all orders.

Primary author: BONOCORE, Domenico (Universität Münster)

Presenter: BONOCORE, Domenico (Universität Münster)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Shift Symmetric Orbital Inflation

Recent swampland conjectures highlight again the importance of finding viable scenarios for inflation that are not strictly single-field. In particular, one may wonder whether there are multi-field inflationary scenarios that have a similar phenomenology to single field inflation. We present a family of exact models of inflation - dubbed Orbital Inflation - in which the multi-field effects are significant, but the phenomenology remains similar to single field inflation. This simple predictions have a dynamic origin, and are non-trivial, as the isocurvature perturbations are exactly massless. The effective action of perturbations inherits a symmetry from an equivalence between background solutions. We comment on how our results could be connected to symmetries of the UV theory.

Primary author: WELLING, Yvette (DESY)

Presenter: WELLING, Yvette (DESY)

Track Classification: Cosmology & Astroparticle Physics

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

Five-point functions of N=4 SYM at strong coupling

Thursday 26 September 2019 15:20 (20 minutes)

In this talk I consider five-point functions of N=4 SYM, which at strong coupling become AdS amplitudes in type IIB supergravity. I will show how to exploit symmetries and self-consistency conditions to bootstrap these amplitudes, which are naturally written in Mellin space. Finally, I will highlight the new data obtained and comment on generalizations of this work.

Primary author: Dr PEREIRA, Raul (Trinity College Dublin)

Presenter: Dr PEREIRA, Raul (Trinity College Dublin)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

G2 manifolds and String Dualities

Wednesday 25 September 2019 14:20 (20 minutes)

I will review recent progress in the role of G2 manifolds in various string dualities. This includes the dualities between heterotic strings, type IIA and M-Theory, as well as mirror symmetries for type II strings.

Primary author: Dr BRAUN, Andreas (University of Oxford)

Presenter: Dr BRAUN, Andreas (University of Oxford)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Rapid bound-state formation of Dark Matter via inelastic Standard Model particle scattering

Wednesday 25 September 2019 17:20 (15 minutes)

The thermal decoupling description of multi-TeV scale dark matter (and co-annihilating partners) is reconsidered. In several works it has been pointed out that the inclusion of quantum mechanical effects in the computation of the thermal relic abundance is in certain cases required in order to make a precise determination of the upper bound on the DM mass. One of these quantum mechanical effects is the existence of meta-stable bound-state solutions in the two-particle spectrum of the WIMPs, caused by attractive (SM) force-carriers. The formation of these bound states and their subsequent decay into SM particles gives a significant effect in the relic density computation on top of the Sommerfeld enhancement, typically allowing for heavier DM masses. So far, only the single mediator emission (W, Z, H, g, photon or exotic) was considered as the formation process of the bound states. In this talk, I show that bound-state formation via inelastic bath particle scattering, i.e. the mediator instead in the t-channel and connected to the SM plasma particles, can be the dominant conversion process. For a vector mediator we find that bound-state formation via bath particle scattering at the freeze-out temperature exceeds the single mediator bound-state formation cross-section by several orders of magnitude. More generally, bound-state formation via inelastic bath particle scattering has obviously no kinematical block if the mediator is massive (e.g. W, Z, H), whereas the single mediator emission is highly suppressed for temperature smaller than the mediator mass. The implications of these findings are that bound-state effects become more pronounced and consequently dark matter could be even more heavier than expected.

Primary author: Mr BINDER, Tobias (Kavli IPMU)

Co-authors: Dr HARZ, Julia (Technical University of Munich (TUM)); PETRAKI, Kalliopi (Sorbonne Université, CNRS, Laboratoire de Physique Théorique et Hautes Energies, LPTHE,F-75252 Paris, France); Dr MUKAIDA, Kyohei (Kavli IPMU)

Presenter: Mr BINDER, Tobias (Kavli IPMU)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Vacuum stability of Froggatt-Nielsen models

Thursday 26 September 2019 17:20 (10 minutes)

We discuss vacuum stability in Froggatt-Nielsen (FN) models. One concern in FN models is that for large flavon VEVs the running of the quartic Higgs coupling is enhanced what might lead to a more severe instability compared to the Standard Model (SM). We study this issue using the renormalization-group improved scalar potential. Another issue is that the
mixing between the Higgs and the flavon can potentially destabilize the potential. However, taking current bounds on the flavon phenomenology, we find that both effects do not lead to an instability that is more severe than in the SM.

Primary author: Mr GIESE, Felix (DESY/Hamburg U.)

Co-author: KONSTANDIN, Thomas (DESY)

Presenter: Mr GIESE, Felix (DESY/Hamburg U.)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Accurate relativistic treatment of cosmological Evolution of real scalar DM

Wednesday 25 September 2019 17:55 (15 minutes)

We ilustrate an accurate numerical Analysis of the scenario of real scalar dark matter with negligible coupling with the SM states. Assuming that the DM is produced during inflation and can reach at least kinetic Equilibrium due to its self-coupling, we illustrate a fully relativistic analysis of dark matter evolution, thermalization conditions and different freeze–out regimes, including the chemical potential effects.

Primary author: Dr ARCADI, Giorgio (University of Rome 3)

Co-authors: Prof. LEBEDEV, Oleg (University of Helsinki); Prof. POKORSKI, Stefan (University of Warsow); Dr TAKASHI, Toma (McGill University)

Presenter: Dr ARCADI, Giorgio (University of Rome 3)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Hidden exceptional symmetry in the pure spinor superstring

Wednesday 25 September 2019 14:40 (20 minutes)

In the pure spinor formulation of the superstring, in addition to the spacetime bosons and fermions the string worldsheet theory includes a ghost sector described by pure spinor fields. I will discuss the existence of a hidden action of an affine E6 Lie algebra on this sector, which arises from enhancement of SO(10) spacetime rotations together with a U(1) ghost symmetry, and whose representations encode the ghost spectrum.

Primary author: Dr LOCKHART, Guglielmo (University of Amsterdam)

Presenter: Dr LOCKHART, Guglielmo (University of Amsterdam)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Scattering Amplitudes: Spinning Black Holes vs Soft Theorems

Thursday 26 September 2019 16:10 (20 minutes)

Motivated by the advent of LIGO and Virgo measurements, it has been observed that scattering amplitudes can be used to derive perturbative observables appearing in the collision of two black holes. In this talk we will cover recent progress in obtaining such quantities for the phenomenologically relevant setup of spinning black holes, focusing on radiation and the spin multipole expansion. These can be constructed via an exponentiated version of the Soft Theorem appearing in the classical limit of minimally coupled amplitudes. Time permitting, we will elaborate on the so-called classical double copy as an output of this construction.

Primary author: Mr GUEVARA, Alfredo (Perimeter)

Presenter: Mr GUEVARA, Alfredo (Perimeter)

Session Classification: Parallel Session: String & Mathematical Physics

Track Classification: String & Mathematical Physics

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

Constraining the MSSM Higgs sector in the low tanb region

Thursday 26 September 2019 16:30 (25 minutes)

We review recent progress in the calculation of the MSSM Higgs boson masses for low M_A and $\tan\beta$ using the THDM as low-energy EFT. As an application of this calculation, we present two new Higgs benchmark scenarios valid in the region of low $\tan\beta$. While all SUSY masses are chosen relatively heavy in the first scenario, the second scenario features light neutralinos and charginos. Both scenarios are largely compatible with recent LHC results. We also discuss their main phenomenological features relevant for future LHC searches.

Primary author: Mr BAHL, Henning (DESY Hamburg)

Presenter: Mr BAHL, Henning (DESY Hamburg)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Quantum Effects of Axion Dark Matter Structure Beyond the de Broglie Scale

To what extent do axions as the dark matter form structure distinguishable from cold dark matter? This question has generated much debate in axion cosmology for decades, due largely to uncertainty in modeling the axion's highly-degenerate state. The standard approach thus far has been to treat the degenerate Bose fluid of axions as a classical field, limiting its distinguishable dynamics to the de Broglie scale. Such a description also removes the possibility of inter-particle correlations, which are known in condensed matter systems to generate additional dynamics. Here I present a model of axion structure formation that includes the influence of inter-axion correlations on an axion condensate, showing that a highly-correlated Bose fluid contains extra-classical physics. N-body simulations of galactic infall show novel exchange-correlation-induced structures in even the most violent collapses. A number of these unique structures may be visible to current observation and axion-search efforts.

Summary

This talk is based on the papers given by the arXiv IDs below:

arXiv:1808.06378

arXiv:1810.09226

arXiv:1904.06948

Primary author: Dr LENTZ, Erik (University of Goettingen)

Co-authors: Dr ROSENBERG, Leslie (University of Washington); Dr QUINN, Thomas (University of Washington)

Presenter: Dr LENTZ, Erik (University of Goettingen)

Track Classification: Cosmology & Astroparticle Physics

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

Nonlinear Dynamics of Preheating after Multifield Inflation with Nonminimal Couplings

Thursday 26 September 2019 14:15 (15 minutes)

We study particle production after multifield inflation with nonminimal couplings to gravity. A comparison between a linearized treatment and lattice simulations allows us to determine when nonlinear effects, such as rescattering and backreaction, become important. We track the equation of state on the lattice and show that it relaxes to 1/3. We also show that the spectra of the produced particles relax to thermal spectra. The duration of reheating depends on the value of the nonminimal coupling. For large values, reheating completes almost instantaneously, whereas for smaller values the energy density remains mostly in the inflaton field and some perturbative decay process is needed for reheating to complete.

Primary author: VAN DE VIS, Jorinde (NIKHEF Amsterdam)

Presenter: VAN DE VIS, Jorinde (NIKHEF Amsterdam)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

All-in-one Relaxion

Wednesday 25 September 2019 14:50 (20 minutes)

We present a unified relaxion solution to the five major outstanding issues in particle physics: the hierarchy problem, dark matter, matter-antimatter asymmetry, neutrino masses and the strong CP problem. The only additional field content in our construction with respect to standard relaxion models is an up-type vector-like fermion pair and three right-handed neutrinos charged under the relaxion shift symmetry.

Primary author: GUPTA, Sandeepan (Durham)

Presenter: GUPTA, Sandeepan (Durham)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Primordial SU(2) Gauge fields and Particle Production in the Early Universe

Thursday 26 September 2019 15:00 (20 minutes)

Primordial SU(2) gauge fields coupled to axions can contribute to the physics of inflation. Their rich phenomenology and unique observational features, e.g., chiral primordial gravitational waves, turned this class of models to a hot topic of study since their discovery in 2011. In this talk, I will briefly review the models in this class, which so far have been studied in the literature. Then, I will talk about the three different types of particles produced by the SU(2) gauge field in this setup, i.e., scalar, fermion, and spin-2 particles. I will explain how the size of the backreaction constrains the parameter space of the models. Next, I will talk about the chiral gravitational waves and how it is produced by the extra spin-2 particle, which is the generic feature of this class of models. Finally, I will finish my talk by the natural inflationary leptogenesis setting provided by this class as their yet another generous opportunity!

Primary author: MALEKNEJAD, Azadeh (MPA Garching)

Presenter: MALEKNEJAD, Azadeh (MPA Garching)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Feebly interacting dark matter: from freeze-in to freeze-out

Thursday 26 September 2019 14:00 (30 minutes)

In my talk I will discuss the dependence of the dark matter production mechanism in the early universe on its coupling to the Standard Model and mediator. For illustration, I will focus on the case of compressed mass spectrum dark matter scenario and show that we can continuously go from freeze-in to freeze-out with an intermediate stage of conversion driven freeze-out. In the latter case, the feeble couplings involve give rise to the possibility to exploit the macroscopic decay length of charged mediators to study the resulting long-lived-particle signatures at collider. I will discuss the experimental reach of such searches on the viable portion of the parameter space.

Primary author: LOPEZ HONOREZ, Laura (Université Libre de Bruxelles)

Presenter: LOPEZ HONOREZ, Laura (Université Libre de Bruxelles)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Quantum gravity and the Standard Model

Wednesday 25 September 2019 14:00 (25 minutes)

Much progress has been made in recent years towards a field-theoretic understanding of quantum gravity within the asymptotic safety conjecture. In this talk, I report progress towards the inclusion of Standard Model matter. We perform an extensive fixed point search in theories involving Ricci scalar and tensor, and Riemann tensor invariants alongside SM matter, up to high polynomial orders in curvature. In this large space of curvature invariants, we identify stable UV fixed points and UV-IR connecting trajectories. We emphasize the role of Ricci and Riemann tensor interactions, the impact of SM matter fields, and highlight differences with fixed points in purely gravitational settings. Implications for quantum gravity model building are discussed.

Primary author: MEDINA VAZQUEZ, Gustavo (University of Sussex)

Presenter: MEDINA VAZQUEZ, Gustavo (University of Sussex)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Strongly interacting dark sectors in the early Universe and at the LHC

Thursday 26 September 2019 14:30 (30 minutes)

I will discuss the cosmology and LHC phenomenology of a consistent strongly interacting dark sector coupled to Standard Model particles through a generic vector mediator. I will lay out the requirements for the model to be cosmologically viable, consider the dominant freeze-out processes and discuss bounds from direct detection. At the LHC the model predicts dark showers, which can give rise to semi-visible jets or displaced vertices. I will first focus on constraints from existing LHC searches and then discuss the sensitivity of proposed dedicated analyses for semi-visible jets. I will also emphasize the complementarity of different search strategies.

Primary author: BERNREUTHER, Elias (RWTH-Aachen)

Presenter: BERNREUTHER, Elias (RWTH-Aachen)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Towards a first principles treatment of warm inflation

Thursday 26 September 2019 14:45 (15 minutes)

"Warm Inflation"is an alternative to the standard inflationary paradigm in cosmology. It is characterized by a quasi-equilibrium between the dissipation due to particle production and the dilution due to the Hubble expansion, which keeps a thermal bath of radiation at a constant high temperature during inflation. We derive a quantum kinetic equation of motion for a slowly-rolling scalar field coupled to a thermal bath from first principles to address the question whether Warm Inflation can be realized consistently in the framework of quantum field theory. We employ the Schwinger-Keldysh formalism to systematically study thermal and quantum corrections to the effective potential that drives the dynamics of the field as well as to the dissipation coefficient that slows down its motion. While the effective potential is shown to have an expected parametric dependence, we show that the main contribution to the dissipation coefficient decreases with the temperature, which contradicts what is assumed in most phenomenological studies of Warm Inflation.

Primary author: BULDGEN, Gilles (UC Louvain)

Presenter: BULDGEN, Gilles (UC Louvain)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

New physics searches at the LHC: the SMEFT approach

Wednesday 25 September 2019 18:00 (30 minutes)

I will give a brief introduction to the Standard Model Effective Field Theory (SMEFT) and discuss how its parameters can be constrained with global analyses of LHC data, allowing to extract information on physics beyond the SM with a minimum bias. As a case study, I will present the preliminary results of a fit to top quark measurements and illustrate some interesting features of this analysis.

Primary author: BRIVIO, Ilaria (Univ. Heidelberg)

Presenter: BRIVIO, Ilaria (Univ. Heidelberg)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Precision calculation for the LHC

Wednesday 25 September 2019 16:30 (30 minutes)

The large quantity of data expected from the Large Hadron Collider (LHC) will allow detailed investigations of the Higgs boson, as well as searches for Beyond the Standard Model (BSM) physics through small deviations in Standard Model (SM) signatures. In order to take full advantage of this dataset, it is essential to confront the measurements with high precision theoretical predictions. These require complicated calculations in the quantum field theories that comprise the SM. I will review the current status and future prospects of these computations, focusing on next-to-next-to-leading order (and higher) calculations in perturbative QCD.

Presenter: ROENTSCH, Raoul (CERN)

Session Classification: Parallel Session: Particle Phenomenology

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

Flavour Constraints on MFV SMEFT

Wednesday 25 September 2019 18:30 (30 minutes)

The one-loop matching between the Standard Model Effective Field Theory (SMEFT) and FCNC operators of the Weak Effective Theory enables the incorporation of high-precision flavour data in Electroweak global fits of SMEFT at high energies. We explore the flavour bounds on the linear combination of the SMEFT Wilson coefficients given by the one-loop matching with a Minimal Flavour Violation assumption.

Primary author: AOUDE, Rafael (Mainz)

Presenter: AOUDE, Rafael (Mainz)

Session Classification: Parallel Session: Particle Phenomenology

Track Classification: Particle Phenomenology

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

Wino potential and Sommerfeld effect at NLO

Wednesday 25 September 2019 17:05 (15 minutes)

For heavy electroweak dark matter, the resummation of large quantum corrections due to long-range potentials (the "Sommerfeld effect") is crucial in determining the precise annihilation cross-section. In this talk, I will consider the one-loop correction to the potential which provides the leading non-relativistic correction to the Sommerfeld effect in the case of wino or wino-like dark matter particles χ_0. I will discuss the impact of this correction on the $\chi_0\chi_0$ annihilation cross-section relevant for indirect detection and the resulting shifts on the zero-energy S-wave resonances.

Primary author: URBAN, Kai (TUM)

Presenter: URBAN, Kai (TUM)

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

Track Classification: Cosmology & Astroparticle Physics

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

Quantum Gravity and the Swampland

Tuesday 24 September 2019 14:15 (30 minutes)

Presenter: SHIU, Gary (U. W. Madison)

Session Classification: Plenary Session

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

Towards Classical de Sitter Solutions

Tuesday 24 September 2019 14:45 (30 minutes)

Presenter: CORDOVA, Clay (IAS)

Session Classification: Plenary Session

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

Microscopic origin of the Bekenstein-Hawking entropy of supersymmetric AdS5 black holes

Tuesday 24 September 2019 15:15 (30 minutes)

Presenter: MARTELLI, Dario (King's College London)

Session Classification: Plenary Session

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

On tensor field theories

Tuesday 24 September 2019 16:15 (30 minutes)

I will present a brief introduction to tensor field theories and their large N limit. I will in particular focus on the renormalization group fixed points and the conformal field theories describing them in a particular model.

Presenter: GURAU, Razvan (CPHT)

Session Classification: Plenary Sessions

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

Asymtotic safety

Tuesday 24 September 2019 16:45 (30 minutes)

Presenter: LITIM, Daniel (Sussex)

Session Classification: Plenary Sessions

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

Probing the Edges of the Universe: Black Holes, Horizons and Strings

Thursday 26 September 2019 17:55 (1 hour)

Session Classification: Hertz Lecture by Prof. Andrew Strominger (Harvard)

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

Black holes in N=4 Super-Yang-Mills

Wednesday 25 September 2019 11:30 (30 minutes)

Presenter: BENINI, Francesco (SISSA)

Session Classification: Plenary Session

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

Complexity, quantum fields and geometry

Wednesday 25 September 2019 09:30 (30 minutes)

Presenter: HELLER, Michal P. (AEI MPG)

Session Classification: Plenary Session

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

The Landscape of Supersymmetric Symmetric Product Orbifolds

Friday 27 September 2019 11:15 (30 minutes)

Presenter: CASTRO, Alejandra (Amsterdam U.)

Session Classification: Plenary Sessions

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

Towards a unitary and renormalizable quantum theory of gravity

Wednesday 25 September 2019 12:00 (30 minutes)

Presenter: STEINWACHS, Christian (Uni. Freiburg)

Session Classification: Plenary Session

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

Canonical Quantum Gravity in the Wilson Loop Representation

Thursday 26 September 2019 09:30 (30 minutes)

Presenter: THIEMANN, Thomas (IQG Erlangen-Nürnberg)

Session Classification: Plenary Session

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

Cosmological perturbations in hybrid quantum cosmology

Thursday 26 September 2019 10:00 (30 minutes)

Presenter: ELIZAGA DE NAVASCUES, Beatriz (FAU)

Session Classification: Plenary Session

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

From scattering amplitudes to gravitational waves

Wednesday 25 September 2019 09:00 (30 minutes)

Presenter: BERN, Zvi (UCLA)

Session Classification: Plenary Session

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

Perturbative supergravity and gauge theory

Thursday 26 September 2019 11:00 (45 minutes)

Presenter: JOHANSSON, Henrik (Uppsala)

Session Classification: Plenary Sessions

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

Fundamental Aspects of Asymptotic Safety

Thursday 26 September 2019 09:00 (30 minutes)

Presenter: SAUERESSIG, Frank (Nijmegen U.)

Session Classification: Plenary Session

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

Bootstrap Methods for Quantum Gravity

Wednesday 25 September 2019 11:00 (30 minutes)

Presenter: ZHIBOEDOV, Alexander (CERN)

Session Classification: Plenary Session

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

Celestial operator products of gluons and gravitons.

Thursday 26 September 2019 11:45 (45 minutes)

Presenter: STROMINGER, Andrew (Harvard)

Session Classification: Plenary Sessions

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

Gravitational Waves Meet Quantum Field Theory

Friday 27 September 2019 09:00 (45 minutes)

Presenter: BUONANNO, Alessandra (AEI MPG)

Session Classification: Plenary Sessions

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

The relativistic binary problem: theoretical challenges

Friday 27 September 2019 09:45 (30 minutes)

Presenter: STEINHOFF, Jan (AEI MPG)

Session Classification: Plenary Sessions

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

Precision Gravity: From the LHC to LISA

Friday 27 September 2019 10:15 (30 minutes)

Presenter: PORTO, Rafael (DESY)

Session Classification: Plenary Sessions

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

Tensor networks as a numerical tool for FQT

Wednesday 25 September 2019 10:00 (30 minutes)

Presenter: BANULS, Mari Carmen (MPQ MPQ)

Session Classification: Plenary Session

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

Dynamic of Tensor and SYK Models

Friday 27 September 2019 11:45 (45 minutes)

Presenter: KLEBANOV, Igor (Princeton)

Session Classification: Plenary Sessions

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

Inelastic dark matter nucleus scattering

Thursday 26 September 2019 15:00 (30 minutes)

Presenter: DOERING, Christian (MPIK)

Session Classification: Parallel Session: Particle Phenomenology

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

Machine learning in particle physics - overview

Wednesday 25 September 2019 15:15 (25 minutes)

Presenter: KASIECZKA, Gregor

Session Classification: Parallel Session: Particle Phenomenology

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

Event Generation with Deep Learning

Thursday 26 September 2019 16:55 (30 minutes)

Presenter: OTTEN, Sydney (NIKHEF)

Session Classification: Parallel Session: Particle Phenomenology

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

Neutron Star Mergers Chirp About Vacuum Energy

Wednesday 25 September 2019 18:25 (20 minutes)

Presenter: ERONCEL, Cem

Session Classification: Parallel Session: Cosmology & Astroparticle Physics

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

Welcome

Tuesday 24 September 2019 14:00 (15 minutes)

Presenter: MNICH, Joachim

Session Classification: Welcome