Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scale

Sun Sep 15, 2019

All day   Arrival day
Sun Sep 15, 2019
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

Mon Sep 16, 2019

09:00 - 09:15   G Zoupanos
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Opening

09:10 - 10:00   Salutations
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Greetings form local authorities Welcome of the President of the Greek AvH
association, Prof. N. Klamaris

10:00 - 10:30   D Lust
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Higher spin states, AdS distance conjecture and the swampland Abstract: I
will discuss several aspects of the string theory swampland, including massive spin-two and
higher spin states and a generalized distance conjecture.

10:35 - 11:05   A Hanany
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: Magnetic Quivers

11:05 - 11:30   Coffee Break
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

11:30 - 12:00   De Wit
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Exact results for an STU-model Abstract: The duality symmetries of the STU-
model of Sen and Vafa are very restrictive. This is utilized to determine the holomorphic function
that encodes its two-derivative Wilsonian effective action and its couplings to the square of the
Weyl tensor to fifth order in perturbation theory. Subsequently, a corresponding duality invariant
topological string partition function is derived. One subsector can be exactly solved by applying
a resummation; it turns out to depend on an effective duality invariant coupling constant which is
defined on a Riemann surface. The remaining terms can be decomposed in terms of a basis of
duality invariant terms with coefficients that can be determined either algebraically or by solving
certain differential equations. The determination of the topological string partition function,
while interesting in its own right, reveals new qualitative features in the result for the Wilsonian
action, which would be difficult to appreciate otherwise.

12:05 - 12:35 E Bergshoeff

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Non-relativistic String theory Abstract: In this talk I will give an overview of
the latest developments in Non-relativistic String Theory viewed as a theory on its own
independent of relativistic string theory.

12:40 - 13:10 B Ovrut

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: R-Parity Violating Decays of Wino Chargino and Bino Neutralino LSPs of the
B-L MSSM Abstract: The R-parity violating decays of Wino Chargino and Bino Neutralino LSPs are
analyzed within the context of the B-L MSSM. These LSPs correspond to statistically determined
soft supersymmetry breaking parameters which, when renormalization group evolved to lower
energy, lead to an effective theory satisfying all phenomenological requirements. The explicit
RPV decay channels of these LSPs to standard model particles, the analytic and numerical decay
rates and the associated branching ratios are presented.

13:15 - 16:00 Lunch

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

16:00 - 16:30 E Plauschinn

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Type IIB flux vacua and tadpole cancellation Abstract: Compactifications of
string theory with geometric and non-geometric fluxes give rise to effective field theories with
non-trivial scalar potentials, which can be used for moduli stabilization and cosmology. In this
talk I briefly review such flux compactifications and emphasize various consistency conditions.
For a particular example I then illustrate the interplay (and tension) between the tadpole-
cancellation condition and obtaining vacua in a perturbatively-controlled regime.

16:35 - 17:05 J Vergados

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: Beyond the Standard Model- The still elusive neutrinos

17:10 - 17:40 C Angelantonj

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: The Geometry Behind Topological Amplitudes

17:40 - 18:10 Coffee Break

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

18:10 - 18:40 J Kim

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: TBA

18:45 - 19:15 A Kehagias

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: The Selfish Higgs

19:20 - 19:50 E Skvortsov

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Quantum Higher Spin Gravity and three-dimensional Bosonization Duality
Abstract: Hypothetical Higher Spin Gravities are supposed to be minimalistic extensions of gravity that embed it into a quantum consistent theory. However, such minimality turns out to be in tension with the field theory approach, as well as with the numerous no-go theorems. We report on the recent progress in constructing Higher Spin Gravities and testing quantum effects therein. The same time, via AdS/CFT Higher Spin Gravities should be related to a variety of interesting three-dimensional CFT's from ABJ to the Ising model. These CFT's were conjectured to exhibit a number of remarkable dualities, in particular, the three-dimensional bosonization duality. We show how Higher Spin Gravity can be useful to prove the bosonization duality at leas in the large N limit.

21:00 - 23:45 Welcome Dinner

Where: Aegli Restaurant (see map on the Corfu2019 site)
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

Tue Sep 17, 2019

09:15 - 09:45 M Petropoulos

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Relativistic fluids, gravity and the fate of hydrodynamic frames Abstract:
Relativistic fluid dynamics is presumed to be hydrodynamic-frame invariant: the fluid velocity could be transformed at wish, as long as this is accompanied by an appropriate transformation o all other fluid dynamical variables, while keeping the energy-momentum tensor and the entropy current invariant. Using fluid/gravity holographic correspondence, we analyse this statement from the gravity side in three spacetime dimensions and set up the dictionary between boundary fluid velocity and bulk gravitational conserved charges. The structure of the latter depends on the hydrodynamic frame, demonstrating that all frames are not equivalent. Choosing e.g. the « Landau-Lifshitz » hydrodynamic frame on the boundary does not allow to reconstruct all bulk Bañados solutions.

09:50 - 10:20 D Sorokin

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Membranes and domain walls in N=1, D=4 SYM Abstract: We will review main features of the pure N=1, D=4 SYM and its effective description by the Veneziano-Yankielowicz generalized sigma-model. We will then argue that the construction of 1/2 BPS domain walls interpolating between different supersymmetric SYM vacua requires the presence of a dynamical membrane source. We will show how such a membrane is coupled to the SYM and present the explicit form of the BPS domain walls created by it in the Veneziano-Yankielowicz effective theory.

10:25 - 10:55 L Jonke

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Gauge symmetry of doubled membrane sigma model and L_∞ algebra
Abstract: Courant sigma-models encode the geometric and non-geometric fluxes of compactified closed string theory as generalized Wess-Zumino terms and exhibit their relation to Courant algebroids. In recent work, we proposed a doubled membrane sigma-model that establishes the corresponding connection to double field theory and its algebroid structure. Here we discuss L_∞ algebra behind the gauge structure of doubled membrane sigma model.

11:00 - 11:30 Coffee Break

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

11:30 - 12:00 P Schupp

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Interaction via deformation: From monopoles to supergravity Abstract:
Deformations of commutation relations can be used to describe fundamental interactions as an arguably slightly more general alternative to the usual gauge principles. This is well established for electromagnetism and useful for the description of magnetic monopoles. We show that the same is true for gravitational interactions, but it requires a graded (super) geometry setting. As an application we present a slick derivation of the bosonic part of the supergravity action. The construction suggests a novel, somewhat more algebraic interpretation of key ingredients of general relativity.

12:05 - 12:35 R Blumenhagen

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: On Swampland Conjectures in String Theory Abstract: The swampland
program aims to extract simple criteria to distinguish effective field theories that can be UV completed into a consistent theory of quantum gravity from those that are not. Aiming at a mixed audience, in this talk an overview on recent developments in this field is provided.

12:40 - 13:10 V Kupriyanov

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Non-commutative deformation of Chern-Simons theory Abstract: The
problem of the consistent definition of gauge theories living on the non-commutative (NC) spaces with a non-constant NC parameter $\Theta(x)$ is discussed. Working in the L$_\infty$ formalism we specify the undeformed theory, 3d abelian Chern-Simons, by setting the initial ℓ_1 brackets. The deformation is introduced by assigning the star commutator to the ℓ_2 bracket. For this initial set up we construct the corresponding L$_\infty$ structure which defines both the NC deformation of the abelian gauge transformations and the field equations covariant under these transformations. To compensate the violation of the Leibniz rule one needs the higher brackets which are proportional to the derivatives of Θ. Proceeding in the slowly varying field approximation when the star commutator is approximated by the Poisson bracket we derive the recurrence relations for the definition of these brackets for arbitrary Θ. For the particular case of $su(2)$-like NC space we obtain an explicit all orders formulas for both NC gauge transformations and NC deformation of Chern-Simons equation which seems to be non-Lagrangian.

13:15 - 16:00 Lunch

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
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16:00 - 16:30   K Stelle

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Braneworld gravity in a hyperbolic transverse space with a mass gap
Abstract: One may construct an effective theory of gravity in a braneworld expanded around a flat subspace of a noncompact type IIA supergravity solution. A nonvanishing Newton constant in the lower dimensional subspace is obtained thanks to the existence of a normalizable transverse wavefunction. The transverse wave equation is an integrable system, permitting the evaluation of higher order terms in the effective braneworld gravity. Here there are some surprises about the realization of diffeomorphism invariance.

16:35 - 17:05   S Penati

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Exact results in AdS4/CFT3 Abstract: I will present exact formulae for the evaluation of BPS Wilson loops and Bremsstrahlung functions in ABJM theory, the three dimensional superconformal field theory of interest for the formulation of the AdS4/CFT3 correspondence. Non-trivial matching with results at weak and strong coupling will be also discussed.

17:10 - 17:40   G Savvidy

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: From Heisenberg-Euler Lagrangian to the discovery of the Chromomagnetic Gluon Condensation Abstract: The phenomena of the chromomagnetic gluon condensation in Yang-Mills theory is reexamined. The exact integration of the Heisenberg-Euler Lagrangian in the limit of massless chiral fermions is performed. The extension of the Heisenberg-Euler Lagrangian to the Yang-Mills theory allows to calculate the corresponding effective action, the energy-momentum tensor and to prove the existence of the chromomagnetic gluon condensation and of the nonzero energy gap between perturbative and non-perturbative vacuum states.

17:45 - 18:15   Coffee Break

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

18:15 - 18:45   I Todorov

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Exceptional quantum algebra for the standard model of particlephysics
Abstract: The exceptional euclidean Jordan algebra J_3^8consisting of 3 × 3 hermitian octonionic matrices, appears to be tailormade for the internal space of the three generations of quarks andleptons. The maximal rank subgroup of the authomorphism group F4 ofJ_3^8 that respects the lepton-quark splitting is SU(3)c × SU(3)ew/Z3.Its restriction to the special Jordan subalgebra J_2^8 ⊂ J_3^8,associated with a single generation of fundamental fermions, is precisely the symmetry group S(U(3) × U(2)) of the Standard Model. TheEuclidean extension H16(R) ⊗ H16(R) of J_2^8, the subalgebra ofhermitian matrices of the associative envelope of J_2^8, involves 32primitive idempotents giving the states of the first generationfermions. The triality relating left and right Spin(8) spinors to8-vectors corresponds to the Yukawa coupling of the Higgs boson toquarks and leptons. The talk is based on the paperhttps://arxiv.org/abs/1604.01247v2 of Michel Dubois-Violette and onongoing work with him and with Svetla Drenska:https://arxiv.org/abs/1806.09450, https://arxiv.org/abs/1805.06739v2,https://arxiv.org/abs/1808.08110.

18:50 - 19:10   T Coudarchet

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Stability and vacuum energy in Gimon-Polchinski model with broken supersymmetry Abstract: In this talk, I will present the construction of stable T^4/Z_2 open string models with broken supersymmetry by compactification and exponentially small constant at one-loop or with positive potentials of runaway type. This is achieved by introducing Wilson lines and establishing the stability with respect to all moduli fields. The models of interest have discrete Wilson lines by the use of stacked branes. This work is a follow-up of hep-th/1812. 09714v1 and is done in collaboration with S. Abel, E. Dudas and H. Partouche.

19:15 - 19:35   S Myungbo

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Wrapped Branes in Romans $F(4)$ Gauged Supergravity Abstract: We explore the spectrum of lower-dimensional anti-de Sitter solutions in $F(4)$ gauged supergravity in six dimensions. The ansatz employed corresponds to D4-branes partially wrapped on various supersymmetric cycles in special holonomy manifolds. Re-visiting and extending the previous results by M. Naka, in this talk we consider the cases of two, three, and four-dimensional supersymmetric cycles within Calabi-Yau threefold, fourfold, G_2 and $Spin(7)$ holonomy manifolds. We also report on non-supersymmetric vacua, and check their stability using the Breitenlohner-Freedman bound.

Wed Sep 18, 2019

09:15 - 09:45   H Kawai

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Quantum Gravity and Naturalness Abstract: We discuss the possibility that naturalness can be understood as an effect of quantum gravity. In particular, we will consider a mechanism by which the electroweak scale is naturally obtained from the Planck scale.

09:50 - 10:20   R Loll

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: Dynamical triangulations of space-time

10:25 - 10:55   D Benedetti

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Melonic CFTs Abstract: Tensor models were originally introduced as a way to sum over geometries, that is, as an approach to quantum gravity. More recently, their large-N limit, dominated by melonic diagrams, has found its place in quantum field theory on a fixed (flat) background as an analytic tool for the study of new fixed points of the renormalization group, i.e. new conformal field theories. I will give an overview of such developments, and present some new results on a specific bosonic model.

11:00 - 11:30   Coffee Break

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

11:30 - 12:00   A Sitarz

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Spectral action and bimetric gravity Abstract: The basic approach to action in noncommutative models is based on the spectral action principle, which usually has been used to recover the standard general relativity, possibly with higher curvature corrections. using a simple toy model of two-sheeted spacetime I'll review the consequences of the models that appear to recover the bimetric gravity.

12:05 - 12:35   D Oriti

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Toward emergent spacetime in quantum gravity: Quantum Black Holes from scratch Abstract: We introduce the general problem of obtaining an emergent continuum spacetime and geometry from the non-spatiotemporal structures of quantum gravity, focusing on the group field theory formalism. We then illustrate recent results concerning emergent cosmological dynamics, briefly, and, more extensively, quantum black holes, from this ground-up perspective. If time allows, we also discuss recent work on recasting group field theory structures in the language of tensor networks to get holographic entropy formulas.

12:40 - 13:10   G Barnich

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Charged black body radiation Abstract: The semiclassical contribution to the partition function is obtained by evaluating the Euclidean action improved through suitable boundary terms. We address the question of which degrees of freedom are responsible for this contribution. A physical toy model for the gravitational problem is a charged vacuum capacitor. For a planar charged vacuum capacitor with perfectly conducting plates, we identify the degrees of freedom that, in the quantum theory, give rise to additional contributions to the standard black body result proportional to the area of the plates and that allow for a microscopic derivation of the thermodynamics of the charged capacitor. Based on: Phys. Rev. D 99, 026007, 2019, https://arxiv.org/abs/1806.00549.

13:15 - 16:00   Lunch

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

16:00 - 16:30   G Semenoff

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: Entanglement and the Infrared

16:35 - 17:05   H Steinacker

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: Gravity and the Schwarzschild solution on a quantum FLRW space-time in Yang-Mills matrix models Abstract: We discuss perturbations of a recently found 3+1-dimensional FLRW quantum space-time solution in Yang-Mills matrix models. In particular, the linearized Schwarzschild metric is obtained as a solution. Along with the propagating graviton modes, this strongly suggests that 3+1 dimensional (quantum) gravity emerges from the IKKT matrix model on this background. There is an extra scalar metric mode, which could be perceived as dark matter from the GR point of view.

17:10 - 17:40   A Platania

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: From renormalization group flows to quantum spacetimes in Asymptotically
Safe Gravity Abstract: According to the "Asymptotic Safety conjecture", first postulated by
Weinberg, quantization of gravity might result in a (non-perturbatively) renormalizable quantum
field theory, whose high-energy limit is governed by a non-trivial fixed point of the gravitational
renormalization group flow. The corresponding scale-invariant regime implies an effective
weakening of the gravitational interaction at high energies. In this talk I will review fundamental
aspects of Asymptotically Safe Gravity and discuss some of its phenomenological implications.

17:45 - 18:15   Coffee Break

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos

18:15 - 18:45   J Bengeloun

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
Title: On the counting tensor model observables as U(N) and O(N) classical
invariants Abstract: Real or complex tensor model observables are U(N) and O(N) classical
invariants. They form the backbone of the tensor theory space (model constructs, correlators).
We will present the symmetric group-theoretic formulation of their enumeration as colored
graphs. From their counting formulae, we have a correspondence with topological field theory or
2-cellular complexes that brings other interpretations of the same countings. Finally, tensor
model observables can be endowed with an algebra structure that turns out to be semi-simple. In
the case of the complex tensors, we will finally discuss the representation theoretic base of the
algebra making explicit its Wedderburn-Artin decomposition.

18:50 - 19:20   R Zhu

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: Web construction of ABCDEFG quiver gauge theories

19:25 - 19:55   C Wetterich

Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description: Title: How solid is the quantum gravity prediction for the Higgs boson mass?

20:15 - 23:00   Conference Dinner

Where: Tripas Restaurant (Kinopiastes Village)
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos
Description:
map: https://drive.google.com/open?
id=137MVM1GxutbVloFmTi0WMtlk9la_LY02&usp=sharing

Thu Sep 19, 2019

All day   Departure Day

Thu Sep 19, 2019
Calendar: Humboldt Kolleg "Frontiers in Physics: From Electroweak to the Planck Scales"
Created by: Konstantinos Anagnostopoulos