Supergravity 2025

Report of Contributions

https://indico.cern.ch/e/1522689

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

Registration

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

Non-relativistic p-brane limits of supergravity

Tuesday 16 September 2025 09:30 (50 minutes)

I will discuss so-called non-relativistic p-brane limits of (the bosonic part) of supergravity in diverse dimensions that lead to a generalized Newton-Cartan gravity with a Newton potential that satisfies a Poisson equation in the directions transverse to thep-brane. Iwilldiscussafewgeneralizationsthatmakecontactwithboth(thebosonic part of) eleven-dimensional supergravity and ten-dimensional heterotic supergravity.

Presenter: BERGSHOEFF

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

E8 families from exceptional invariants to Painlevé magics via supergravities

Tuesday 16 September 2025 10:50 (50 minutes)

Presenter: JULIA

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

N=2 Supergravity and the Swampland

Tuesday 16 September 2025 11:40 (50 minutes)

We discuss N=2 supergravity theories in four dimensions and connect it with the swampland program and the distance conjectures. Examples with both vector multiplets and hypermultiplets will be discussed. An interesting new class of models arises from freely acting orbifolds in string theory.

Presenter: VANDOREN

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

The surprising structure of non-relativistic 11D supergravity

Tuesday 16 September 2025 14:00 (50 minutes)

In this talk, I will outline the construction of a non-relativistic limit of 11-dimensional supergravity that leads to a theory with an underlying membrane Newton-Cartan geometry. I will argue that consistency of the non-relativistic limit requires the imposition of constraints, requiring that certain bosonic and fermionic torsions and curvatures vanish. I will show that in one version of these constraints only 16 supersymmetry transformations are kept, leading to a simple constraint structure in which however the supersymmetry algebra does not close into diffeomorphisms. Keeping all 32 supersymmetry transformations requires a complicated sequence of bosonic and fermionic constraints, eventually involving three derivatives of bosonic fields. Finally, I will discuss a family of supersymmetric solutions that satisfy all constraints and that contains a non-relativistic limit of the M2 supergravity solution that was obtained by Lambert and Smith as a background relevant for non-relativistic holography

Presenter: ROSSEEL

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

Aspects of gauge-strings duality

Tuesday 16 September 2025 14:50 (50 minutes)

I will discuss recent progress in the duality between gauge fields and strings, with an emphasis on the Supergravity side of things. The material is taken from the papers I wrote in the last year. I hope to make the presentation accessible to members of the audience with different technical expertise.

Presenter: NUNEZ

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

Gong Show and Poster Session

Tuesday 16 September 2025 16:10 (1h 50m)

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

Surprises from Non-Supersymmetric Strings

Wednesday 17 September 2025 09:30 (50 minutes)

Presenter: SAGNOTTI

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

AdS3/CFT2 and defect CFTs

Wednesday 17 September 2025 10:50 (50 minutes)

I will discuss recent interpretations of AdS3 solutions as holographic duals of surface defect CFTs. One solution will be interpreted as an extension of ABJM to the massive case, in which one of the external directions becomes an energy scale and generates a flow towards an AdS3 space. A second solution will be related to surface defects embedded in 6d (1,0) CFTs living in D6-NS5-D8 brane intersections. In this second example we will find an interesting connection with the phenomenon of deconstruction.

Presenter: LOZANO

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

Thermodynamics of near-extreme rotating black holes

Wednesday 17 September 2025 11:40 (50 minutes)

From the perspective of classical gravity, a black hole is the simplest object we know of. At the same time, it possesses huge entropy, hinting at an incredibly complex microstructure: understanding this fact falls in the realm of quantum gravity. In this talk I will review recent results concerning the microscopics and the thermodynamics of near-extreme black holes in asymptotically flat and Anti-de Sitter space. In the first part, I will describe how recently developed techniques allow to compute the quantum corrections to the entropy of fast spinning Kerr black holes. I will show that the quantum-corrected near-extremal entropy exhibits 3/2logT behavior characteristic of the Schwarzian model, and predicts a lifting of the ground state degeneracy for the extremal Kerr black hole. In the second part, I will show the computation for the density of states for fast spinning AdS4 black holes in theories of gauged supergravity. The solutions admit a supersymmetric limit: I will comment on the spectrum of near-BPS states and on the interpretation in terms of the dual 3d field theory.

Presenter: TOLDO

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

On non-supersymmetric vacua in string theory

Wednesday 17 September 2025 14:00 (50 minutes)

I will discuss new classes of supersymmetry-breaking AdS vacua in string theory. In the first part, using calibrations, I will obtain type II vacua that enjoy partial or total protection from decays mediated by D-brane bubbles. In the second, I will work in non-supersymmetric heterotic theory; I will outline a method to obtain solutions on G/H coset spaces, with H-valued gauge field, and describe several examples.

Presenter: TOMASIELLO

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

Supergravity in one dimension

Wednesday 17 September 2025 14:50 (50 minutes)

A particularly interesting corner of the holographic dualities is the correspondence between the backgrounds of Dp-branes and their non-conformal field theory duals. Extrapolating this correspondence to the extremal case of p=-1, suggests a holographic duality for the IKKT matrix model. The dual D-instanton background is a half-supersymmetric BPS solution of Euclidean IIB supergravity. I describe the relevant maximallysupersymmetricone-dimensionalsupergravitytheoryaroundthisbackground and the match of its fields to the lowest BPS multiplet of gauge invariant operators of the IKKT model.

Presenter: SAMTLEBEN

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

Precision Holography for Dp-branes

Wednesday 17 September 2025 16:10 (50 minutes)

Presenter: BOBEV

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

Localization in Supergravity

Wednesday 17 September 2025 17:00 (50 minutes)

Important BPS quantities, including central charges, black hole entropy and the on-shell action, can be computed for supersymmetric solutions of supergravity without ever solving the Einstein equations or the Killing spinor equations. Instead one exploits the fact that the solutions have a Killing vector and a set of equivariantly closed forms. This allows one to compute just by inputting some global data and utilising the Berligne-Verne-Atiyah-Bott localisation theorem. We explain the formalism and illustrate with some examples.

Presenter: GAUNTLETT

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

Supergravities I and II and their (enhanced) dualities

Thursday 18 September 2025 09:30 (50 minutes)

Combinations of dimensional reduction and dualities will be discussed leading to type I and type II supergravities in D=4 and D=6 with maximal supersymmetry. The relations between the different types of supergravity are also connected to choices of gauge fixing for the representatives of the coset spaces. The preserved manifest global symmetries differ and this raises questions on gauge equivalence of these theories. (In collaboration with R. Kallosh and H. Samtleben).

Presenter: VAN PROEYEN

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

Casimir energy and the stability of supergravity vacua

Thursday 18 September 2025 10:50 (50 minutes)

We discuss the perturbative stability of susy breaking Minkowski vacua in supergravity compactifications on Riemann-flat manifolds.

Presenter: DALL'AGATA

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

Supergravity from Superstring Field Theory

Thursday 18 September 2025 11:40 (50 minutes)

A new superstring field theory gives a background independent 2nd-quantised formulation of superstring theory. In particular, it gives a novel formulation of the supergravity action with a democratic action for the RR gauge fields. This involves some novel gravitational couplings and the geometry behind these will be discussed.

Presenter: HULL

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

Scale-separated AdS3 flux vacua of type IIB

Thursday 18 September 2025 14:00 (50 minutes)

The existence of AdS/CFT pairs with scale separation remains an open question, with no explicit examples known to date and doubts raised about their very possibility. In this talk, I will present the first examples of type IIB AdS3 flux vacua that exhibit parametrically-controlled scale separation. Remarkably, these solutions come equipped with integer-valued conformal dimensions for the would-be dual CFT2 operators, making the task of identifying and understanding the corresponding CFT2s particularly compelling. I will also comment on the implications of our results in light of the Swampland program.

Presenter: GUARINO

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

Supergravity, String Theory and Homotopy Algebras

Thursday 18 September 2025 14:50 (50 minutes)

I give an overview of homotopy algebras such as L∞ algebras as a tool for supergravity and other theories. Possible applications include: i)a first-principle derivation of "double copy", which relates, for instance, N=4 super-Yang-Mills to N=8 supergravity in D=4; ii) the use of homotopy transfer to transport the Kaluza-Klein spectrum of exceptional field theory or supergravity on AdS to its boundary; iii) as new foundations for quantum field theory via factorization algebras.

Presenter: HOHM

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

From Supergravity to Machine Learning: a Mathematical Adventure

Thursday 18 September 2025 16:10 (50 minutes)

In this talk starting from a critical analysis of the existing Neural Networks we illustrate their geometrical reformulation that cures their original sin, namely the use of ad-hoc point-wise activation functions, that are contradictory with covariance and with the supposedly vector space structure of the hidden layers. Starting from first principles, namely the need of a distance function and homogeneity, we identify the hidden layers with non-compact symmetric spaces and show that their characterization as normal Alekseevsky Riemannian spaces is crucial. Non-linearity is provided by the exponential map from solvable Lie algebras to solvable Lie groups and the general form of the map between adjacent hidden layers is reduced to an isometric map, whose core is a solvable Lie algebra homomorphism (the true mathematical nature of the learnable weights) followed by a generic isometry of the next layer (the true mathematical nature of the bias vectors). The implications and the on going developments are briefly outlined.

Presenter: FRÈ

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

Welcome

Tuesday 16 September 2025 09:25 (5 minutes)