Meeting PRIN ”String Theory as a bridge between Gauge Theories and Quantum Gravity”

Report of Contributions

https://agenda.infn.it/e/34123

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

Tracy-Widom distribution in supersymmetric gauge theories

Thursday, 23 February 2023 14:30 (1 hour)

It was recently recognized that various observables in four-dimensional supersymmetric gauge theories can be computed for an arbitrary 't Hooft coupling as determinants of certain semi-infinite matrices. I will show that these quantities can be expressed as Fredholm determinants of the so-called Bessel kernel and they are closely related to celebrated Tracy-Widom distribution (more precisely, its finite temperature generalization) describing level-spacing distributions in matrix model.

Presenter: KORCHEMSKY, Gregory P. (Saclay, IPhT)

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

Corrections to the thermodynamics of AdS_5 black holes and the superconformal index

Thursday, 23 February 2023 16:00 (45 minutes)

We consider a four-derivative extension of minimal gauged supergravity in five dimensions and use it to evaluate the on-shell action of AdS_5 black holes, showing that it fully matches the result from the superconformal index "on the second sheet"after imposing supersymmetry. We then compute the corrected black hole thermodynamics and we find a formula of the BPS entropy as a function of the charges. The latter is shown to match both the Legendre transform of the superconformal index and the Wald entropy. Based on 2208.01007 [hep-th] and on work in progress.

Presenter: RUIPEREZ, Alejandro (Roma Tor Vergata)

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

Higher rank equivariant Donaldson-Witten theory

Thursday, 23 February 2023 16:45 (45 minutes)

Partition function and correlation functions of the topologically twisted $\mathcal{N} = 2$ super Yang-Mills theory on a smooth four-manifold with gauge group $SU(2)$, also known as Donaldson-Witten theory, provide us a way to compute topological invariants of many manifolds classifying their smooth structure (Donaldson invariants). Equivariantisation of this theory, on the one hand, can be considered as a tool to find the original invariants by means of the equivariant localisation, and on the other hand, is interesting by itself, since it also has a topological counterpart (equivariant Donaldson invariants). While for the equivariant Donaldson-Witten theory with $SU(2)$, gauge group quite a lot of results were found, there is still not much known in the case of the higher rank gauge symmetry.
After giving an introduction on the subject I will present our recent results for the higher rank theory, which include generalisation of the recurrence relation for the partition function on $\mathbb{C}^2$ (Zamolodchikov relation) and a proposal for the equivariant Donaldson invariants of the compact toric manifolds.

Presenter: SYSOEVA, Ekaterina (SISSA)

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

Holography with heavy states as a tool to study black holes

Friday, 24 February 2023 09:30 (1 hour)

In holographic CFTs it is interesting to study operators whose dimension scales as the central charge when the latter is taken to be large. As an example of such operators, I consider multi-particle states formed by a large number of BPS single-particle constituents. Focusing on the example of the (AdS_3 x S^3)/CFT_2 duality, I discuss how the gravitational backreaction of these heavy states is described by regular geometries that encode interesting CFT data. The quadratic fluctuations around these geometries capture the heavy-light four point correlators. Finally I comment on similarities and differences between these correlators and similar quantities calculated in the background of asymptotically AdS black holes.

Presenter: RUSSO, Rodolfo (Queen Mary University of London)

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

Fate of Radiating Black Holes With Minimum Mass in Einstein-dilaton-Gauss-Bonnet Theory of Gravity

Friday, 24 February 2023 11:00 (45 minutes)

Einstein-dilaton-Gauss-Bonnet (EdGB) is a theory of modified gravity in which a dilaton-type scalar field is nonminimally coupled to quadratic curvature terms via an exponential function. Black holes (BHs) in this theory are particularly interesting since they possess a critical configuration with minimum mass and finite Hawking temperature. This means that a critical BH loses mass due to Hawking's radiation, but it is not clear what is its fate after this process, since it cannot reach a final configuration with lower mass.
In a recent work we studied this problem by means of fully nonlinear numerical evolutions of spherically symmetric BH spacetimes. Specifically, by simulating the collapse of wave packets of a phantom scalar field we have been able to dynamically reduce the BH mass, reproducing the effect of Hawking's evaporation.
In this talk I will present our results with a particular focus on the case in which the BH mass falls below the critical value. In particular, I will show that a high-curvature elliptic region emerges from the apparent horizon, and I will discuss how this could hint to an incompatibility between EdGB gravity and Hawking evaporation. I will also mention some alternative scenarios for a stable evolution, and future possible research directions.

Presenter: CORELLI, Fabrizio (Sapienza Università di Roma)

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

Meeting organizzativo PRIN

Thursday, 23 February 2023 17:45 (30 minutes)

Presenter: BIANCHI, Massimo (Università di Roma Tor Vergata)