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

Report of Contributions

https://agenda.infn.it/e/38964

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

Review Talk 1: QFT in AdS and dS

Thursday, 22 February 2024 14:00 (1 hour)

Presenter: DI PIETRO, Lorenzo (Istituto Nazionale di Fisica Nucleare)

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

Gong Show 1

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

Review Talk 2: Aspects of Non-Invertible Self-Duality Symmetries and their Anomalies

Thursday, 22 February 2024 17:15 (1 hour)

Presenter: BENINI, Francesco (SISSA)

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

Review Talk 3: Resurgence and the power of perturbation theory

Friday, 23 February 2024 09:30 (1 hour)

Perturbation theory is one of the most important analytical tool in quantum mechanics and quantum field theory, but it is known to give rise to divergent asymptotic series.
How can we then make sense out of it? Resurgence seems to be a possible answer.
After an historical detour on the study of the asymptotic behaviour of perturbation theory, we introduce basic notions of resurgence and show some application in quantum mechanics and quantum field theory.

Presenter: SERONE, Marco (TS)

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

Gong Show 2

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

Wilson loop correlators at strong coupling in \mathcal{N}=2 quiver gauge theories

Thursday, 22 February 2024 15:30 (15 minutes)

In this talk I will discuss recent developments in the study of Wilson loop correlators in four-dimensional \mathcal{N} = 2 superconformal gauge theories. Using supersymmetric localization, it is possible to map the computation of these observables to an interacting matrix model and obtain expressions for these correlators in terms of Fredholm determinants of a Bessel operator, that are valid for any value of the 't Hooft coupling in the planar limit of the theory. These expressions can then be studied at the leading order of the strong-coupling expansion exploiting the properties of the Bessel operator.

Presenter: VALLARINO, Paolo (Università di Torino)

Session Classification: Gong Show 1

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

Black hole spectroscopy in Einstein-Maxwell-scalar theory

Thursday, 22 February 2024 15:45 (15 minutes)

Since the first discovery of gravitational waves resulting from a binary black hole coalescence, the study of the post-merger phase, known as ringdown, has proven to be one of the most promising tools for testing gravity and exploring fascinating extensions of general relativity. In this talk I will discuss one of these extensions, called Einstein-Maxwell-scalar theory, where a scalar field is minimally coupled to gravity and non-minimally coupled to Maxwell. In addition to the usual Reissner-Nordstrom solutions this theory also admits BH solutions with scalar hair. I will explore how black hole spectroscopy and the investigation of the quasi-normal modes of these solutions offer a valuable pathway to observe deviations from general relativity, potentially revealed through the presence of long-lived modes emerging in the final stage of the ringdown signal.

Presenter: MELIS, Marco (Istituto Nazionale di Fisica Nucleare)

Session Classification: Gong Show 1

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

Analytic computation of black hole quasinormal modes

Thursday, 22 February 2024 16:00 (15 minutes)

In this talk, we describe two methods that provide the quantization condition for the quasinormal mode frequencies in Schwarzschild (anti-)de Sitter black holes in four dimensions. The first consists of using the Nekrasov-Shatashvili functions, or, equivalently, the classical Virasoro conformal blocks, to obtain the connection coefficients for the differential equation encoding the spectral problem. The second method is based on a perturbative expansion of the local solutions of the differential equation, that involves multiple polylogarithmic functions. We conclude by stating our main results and discussing how these methods can be generalized to problems in different backgrounds.

Presenter: ARNAUDO, Paolo (SISSA)

Session Classification: Gong Show 1

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

Open-Closed Duality in String Field Theory

Thursday, 22 February 2024 16:15 (15 minutes)

We approach the problem of open-closed duality through the complete perspective of string field theory (SFT) and we provide a description of the backreaction of a large N stack of D-branes as a new closed string background without D-branes. To achieve this, we first of all give a new convenient formulation of open-closed SFT based on a single open-closed nilpotent structure which captures the consistency of the theory. Then we perform the 't Hooft large N limit, obtaining at the leading order a classical closed SFT plus a quantum but planar open SFT. We then proceed to integrate out the open string sector applying the so-called homotopy transfer to our new nilpotent structure and we end up with a purely classical closed SFT. The obtained closed string theory however have tadpoles, whose strenght is controlled by the 't Hooft coupling. To get rid of the tadpoles we finally perform a vacuum shift, which describes closed strings in the backreacted new background, without D-branes. We test this construction in minimal string theory where, following well-known results by Gaiotto and Rastelli, we show how we can move in the space of $(2, p)$ closed strings by computing the backreaction of a large number of FZZT branes in the $(2, 1)$ background. This talk is based on 2305.02843, 2305.02844 and work in progress.

Presenter: RUFFINO, Alberto (Istituto Nazionale di Fisica Nucleare)

Session Classification: Gong Show 1

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

Correlators and OPE coefficients in Argyres-Douglas Theories

Thursday, 22 February 2024 16:30 (15 minutes)

I will discuss the computation of correlators and observable quantities, in particular OPE coefficients, in Argyres-Douglas theories, that are 4-dimensional N = 2 superconformal field theories, intrinsically strongly coupled and without a Lagrangian description. After a quick presentation on these theories and the motivation of this study, I will recall some results for extremal correlators and OPE coefficients derived through localization on the 4-sphere, showing their almost compatibility with the conformal boostrap method. Then I will pass to discuss the large R-charge limit for the localization results, in order to compare them with the ones obtained through the EFT technique, and in this scenario I will present some new coefficients coming inside the perturbative expansion, showing also consistency with what already known in literature. Finally, I will propose some suggestions in order to make the matching with the results coming from the conformal bootstrap and the EFT methods much better.

Presenter: CIPRIANI, Andrea (Roma Tor Vergata)

Session Classification: Gong Show 1

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

Analytic bootstrap for the O(3) magnetic impurity

Friday, 23 February 2024 11:00 (15 minutes)

"Extended operators such as defects are of fundamental importance in conformal field theories, with applications both in high energy theory and in condensed matter systems at criticality. Recently, analytic bootstrap techniques have been successfully applied to study these objects.
In this talk we will focus on the O(3) magnetic impurity, which at the fixed point is described by a defect conformal field theory.
First, Ward identities arising from the symmetries of the bulk theory and their modification by the presence of the defect are considered. In the case of a free bulk, the inconsistency of these identities implies that in d=3 dimensions there is no non-trivial defect with the assumed symmetries.
Then, in the interacting bulk scenario, the light defect spectrum of the model in the 4-ε expansion is analyzed.
Once the defect spectrum is known, analytic bootstrap techniques are applied to bulk two-point functions to extract an infinite amount of new dCFT data."

Presenter: DE SABBATA, Elia (Istituto Nazionale di Fisica Nucleare)

Session Classification: Gong Show 2

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

Rotating metrics from scattering amplitudes in arbitrary dimensions.

Friday, 23 February 2024 11:15 (15 minutes)

Within the framework of recovering general relativity from scattering amplitudes, it is possible to compute the metric induced by the most generic rotating spherically-symmetric matter configuration at quadrupole order by considering stationary massive spin-1 particles emitting gravitons. This approach leads to a natural definition of a multipole expansion in any dimension and the observation of a new quadrupole moment in the space-part of the metric, allowing us to investigate the black hole-particle correspondence in dimensions greater than four.

Presenter: GAMBINO, Claudio (Istituto Nazionale di Fisica Nucleare)

Session Classification: Gong Show 2

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

Partition function of Argyres-Douglas theories on the blowup.

Friday, 23 February 2024 11:30 (15 minutes)

Supersymmetric QFTs can be studied at the non-perturbative level because quantum corrections are under control. In particular for N=2 theories the IR dynamics is encoded in the Seiberg-Witten curve which is naturally related to an integrable system. In presence of a self-dual Omega background the integrable system becomes time-dependent and is given by Painlevé equations. In this talk we we will study the Nekrasov partition function of SU(2) gauge theory in 4d on the blowup of spacetime and we will show that this gives a new expansion of the Painlevé tau function which encodes interesting physical informations and has special properties in the case of Argyres-Douglas theories.

Presenter: MATJARA, Ideal (SISSA)

Session Classification: Gong Show 2

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

Framed DDF Operators and Minimally Off-shell Solutions of Virasoro Constraints in Bosonic String Theory

Friday, 23 February 2024 11:45 (15 minutes)

DDF operators/states was a formalism first developed by Di Vecchia, Del Giudice and Fubini around 1972. It gives an explicit construction of BRST invariant, not exact (bosonic) string states which I shall briefly recap in the introduction. It is very useful for studying massive string spectra and their scattering amplitudes. After the introduction, the talk will focus on generalising the standard formulation in terms of Local Frames (Framed DDF). I shall explain how this allows us to completely decouple the FDDF operators from the associated tachyon vertex (thereby allowing us to go minimally off-shell) and also comment on its advantages over the standard DDF formulation. We then look at the solutions of the Virasoro constraints for the first two levels explicitly and show that the general solution is not in the usual (TT) gauge. Finally, if time permits we shall look at some recent interesting results of chaotic scattering amplitudes involving DDF states and its possible dependence on the 'spin content' of the states.

Presenter: BISWAS, Dripto (Università di Torino)

Session Classification: Gong Show 2

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

Quasi-Normal Modes of JMaRT: Charge Instability

Friday, 23 February 2024 12:00 (15 minutes)

We consider linear scalar perturbartions of JMaRT geometries in type IIB supergravity beyond the near-decoupling limit. In addition to confirm that these solutions suffers of instability for the presence of an ergoregion without horizon, we also find quasi-normal modes (QNMs) with positive imaginary part that can be interpreted in terms of the emission of charged (scalar) quanta with non zero KK momentum. This is a signal that JMaRT solutions suffers also of a charge instability. Using both the correspondence between gravitational perturbations and quantum Seiberg-Witten curves of N=2 Super Yang-Mills with gauge group SU(2) and Nf = (0;2) flavours and numerical integration methods we find 'charged' unstable QNMs. The endpoint of these instabilities can be a supersymmetric (BPS) configuration.

Presenter: DI BENEDETTO, Carlo (Università di Tor Vergata)

Session Classification: Gong Show 2

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

Charge (in)stability of topological stars

Friday, 23 February 2024 12:15 (15 minutes)

Topological stars are smooth horizonless static solutions of Einstein-Maxwell theory in 5-d and they represent possible microstate geometries for non-supersymmetric black holes. They have been proved to be (linearly) stable by studying their spectrum of chargeless quasi-normal modes; their deformability has been analysed through the Tidal Love Number both in the static and the dynamical case. In this talk, I will explore the possibility of instabilities due to the emission of charged quanta under the electromagnetic field sourced by the solution - i. e. strings winding around the compact direction - in analogy with the charge instability already highlighted for other non-BPS geometries like JMaRT. This issue will be addressed by using a variety of techniques, such as numerical methods, WKB approximation and by exploiting the recently discovered correspondence between black hole/fuzzball perturbation theory and quantum Seiberg-Witten curves.

Presenter: SUDANO, Giuseppe (Università di Tor Vergata)

Session Classification: Gong Show 2