TFI 2019: Theories of Fundamental Interactions 2019

lunedì 21 ottobre 2019 - mercoledì 23 ottobre 2019

Turin

Raccolta degli abstract

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Tuesday morning 2 / 2

On duality-symmetric descriptions and self-dual fields in any dimensions.

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I will discuss the problem of duality-symmetric descriptions for free fields
with the main focus on the covariant Lagrangian formulation generalising
that of Pasti, Sorokin and Tonin for duality-symmetric descriptions in d=4k,
as well as self-dual fields in d=4k+2 Minkowski spaces.

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Open Closed Super String Field Theory

Autore: Mritunjay Verma[1]

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The open closed superstring field theory is necessary to study the field theory of an interacting system of open and closed strings. Such systems arise naturally in the presence of D branes. We construct the 1PI effective action and the BV master action for the open closed superstring field theory and generalize the result to the case of unoriented strings.

Monday afternoon 2 / 4

Einstein manifolds with torsion and nonmetricity and some applications in (super)gravity theories

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I will introduce Einstein manifolds with torsion and nonmetricity and present new applications in the context of (super)gravity theories, focusing, in particular, on models in three dimensions.

Monday afternoon 2 / 5

Anti-D6-brane singularities and resolution

Autore: Johan Blåbäck[None]

Recently anti-brane singularities have been argued to be resolved when the polarisation have been taken into account properly. The anti-D6-brane singularity however seems to be the odd-one out. In this talk I will present recent work that suggests that the anti-D6-brane can be resolved in the same way by avoiding previous no-gos, and give numerical evidence that these solutions could be found in supergravity as well.

Tuesday morning 1 / 6

The First Law of Complexity

Autore: Alice Bernamonti[1]; Federico Galli[2]; Rob Myers[3]; Shan-Ming Ruan[3]; Hernandez Juan[3]; Joan Simón [4]

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Based on Nielsen's geometric approach, the variation of holographic complexity for two nearby target states only depends on the end point of the optimal trajectory, a result designated as the first law of complexity. As an example, we will examine the complexity=action conjecture when the AdS vacuum is perturbed by a scalar field excitation, which corresponds to a coherent state.

Wednesday morning 1 / 7

Defects, nested instantons and comet shaped quivers

Autore: Nadir Fasola[1]

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We study the effective SUSY theory of a surface defect describing the parabolic reduction of gauge connections at punctures on Riemann surfaces, which gives rise to a quiver GLSM. We will show how the partition function of such a theory naturally computes certain virtual invariants of the moduli spaces of stable representations of the quiver and how these results relate to a conjecture of Hausel, Letellier and Rodriguez-Villegas about the cohomology of character varieties.

Wednesday morning 2 / 8

Dualities in SUSY Gauge Theories in Various Dimensions

Autore: Azeem Hasan[1]

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Seiberg duality is an infrared equivalence of two 4d, N=1 gauge theories first proposed by Seiberg in 1994. More recently a triality relating 2d, (0,2) theories and a quadrality relating 0d, N=1 matrix models have been discovered, both of these can be viewed as generalizations of Seiberg duality to lower dimensions. We illustrate these dualities with the help of simple examples arising on worldvolume of D-branes probing certain Calabi-Yau singularities. These Calabi-Yau are a higher dimensional generalization of conifold singularity. Applying triality and quadrality to them uncovers similarities to duality cascade for conifold discovered by Klebanov and Strassler.

Wednesday morning 1 / 9

Emitted radiation and geometry

Autore: Francesco Galvagno[1]

[1] *Università di Torino*

We discuss the computation of the radiated energy by an accelerated heavy particle. This quantity is captured by the one-point function of the stress energy tensor in presence of a Wilson line. In a N=2 superconformal theory we prove that this observable is exactly related to a small geometric deformation of the background geometry. In a four dimensional case, supersymmetric localization allows to express the emitted energy in terms of a matrix model on a squashed sphere.

Monday afternoon 1 / 10

Membranes and domain walls in N=1, D=4 SYM

Autore: Dmitri Sorokin[1]

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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 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 which it creates in the Veneziano-Yankielowicz effective theory.

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T, Q and periods in SU(3) N=2 SYM

Autore: Hasmik Poghosyan[1]

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We consider the third order differential equation derived from the deformed Seiberg-Witten differential for pure $cal N=2$ SYM with gauge group $SU(3)$ in Nekrasov-Shatashvili limit of Ω-background. We show that this is the same differential equation that emerges in the context of Ordinary Differential Equation/Integrable Models (ODE/IM) correspondence for $2d$ A_2 Toda CFT with central charge $c=98$. We derive the corresponding QQ and related TQ functional relations and establish the asymptotic behaviour of Q and T functions at small instanton parameter $q\to 0$. Moreover, numerical integration of the Floquet monodromy matrix of the differential equation leads to evaluation of the A-cycles $a_{1,2,3}$ at any point of the moduli space of vacua parametrised by the vector multiplet scalar VEVs $\langle \mathbf{tr}\,\phi^2\rangle$ and $\langle \mathbf{tr}\,\phi^3\rangle$ even for large values of q which are well beyond the reach of instanton calculus. The numerical results at small q are in excellent agreement with instanton calculation. We conjecture a very simple relation between Baxter's T-function and A-cycle periods $a_{1,2,3}$, which is an extension of Alexei Zamolodchikov's conjecture about Mathieu equation.

Monday afternoon 1 / 12

Nucleons and Deuteron electric dipole moment from Holographic QCD (and few words on Isospin breaking)

Autore: Lorenzo Bartolini[1]

Coautore: Stefano Bolognesi [2]; Sven Bjarke Gudnason ; Tommaso Rainaldi [3]

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In the framework of the Witten-Sakai-Sugimoto holographic model of QCD, we describe our progresses in the derivation of a quantitative prediction for the θ-induced electric dipole moment of the nucleons and their deuteron bound state, discussing current limitations and future directions. Then, introducing explicit isospin breaking in the form of different quark masses, we also qualitatively show how the model accounts for mass splittings of isospin multiplets.

Wednesday morning 2 / 13

The fate of the circular Wilson Loops in N=4 dCFT

Autore: Sara Bonansea[1]

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We consider circular Wilson loops in a defect version of N=4 super-Yang-Mills theory which is dual to the D5-D3 brane system. When the loops are parallel to the defect, we can construct both BPS and non-BPS operators. At strong 't Hooft coupling we observe, in the non-BPS case, a Gross-Ooguri-like phase transition in the dual gravitational theory: the familiar disk solution dominates when the operator is far from the defect while a cylindrical string worldsheet, connecting the boundary loop with the probe D5-brane, is

favourite below a certain distance. In the BPS case, the cylindrical solution does not exist for any choice of the physical parameters, suggesting that light-modes supergravity exchanges with the disk solution always saturate the expectation value at strong coupling. We study the double-scaling limit for large k and large 't Hooft coupling that allow us to compare perturbative and non-perturbative results.

Tuesday morning 1 / 14

The BPS limit of AdS black hole thermodynamics and its microscopic counterpart

Autore: Davide Cassani[1]

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The talk will present progress towards a microscopic understanding of the entropy of rotating BPS black holes in AdS. I will describe a new BPS limit of black hole thermodynamics which first focuses on a supersymmetric family of complexified solutions and then reaches extremality. In this limit the chemical potentials obey a constraint that is interpreted as a regularity condition in the Euclidean bulk geometry, and the on-shell gravitational action, which is the grand-canonical counterpart of the Bekenstein-Hawking entropy, takes a very simple form. I will then focus on AdS_5 black holes, where the gravitational analysis instructs us that the holographic dual N=1 superconformal field theory is defined on a twisted S^1 x S^3 with complexified chemical potentials obeying the constraint, and localization allows to compute the partition function exactly. This computation defines a slightly modified supeconformal index as well as a generalization of the supersymmetric Casimir energy. I will discuss how the black hole entropy is encoded in these quantities.

Monday afternoon 1 / 15

Constraints on Boundary-localized Interactions

Autore: Lorenzo Di Pietro[1]

[1] *Università di Trieste*

We consider interacting conformal boundary conditions for bulk theories of free fields. For a free vector field in 4 bulk dimensions there is a rich class of such boundary conditions, coming in families which are connected by a bulk marginal deformation, and with an interesting action of bulk electric-magnetic duality. For the bulk theory of a free scalar in generic dimensions it is not known if any conformal boundary condition exists besides the free ones (Neumann and Dirichlet). We explain how this question can be addressed using conformal bootstrap methods.

Wednesday morning 2 / 16

From 3d dualities to 2d free field correlators and back

Autore: Matteo Sacchi[1]

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Infra-red dualities are interesting phenomena that may characterize the low energy behaviour of quantum field theories. One challenging question is whether it is possible to find some organizing principle that allows us to derive the currently known dualities in low dimensions from some mother dualities in higher dimensions upon dimensional reduction. When the theory is supersymmetric, this problem can be effectively tackled using supersymmetric localization. This technique also allowed us to discover gauge/CFT correspondeces, where exact quantities in supersymmetric gauge theories are mapped to CFT correlators. In this talk, I will first discuss an instance of such correspondences by presenting a connection of 3d $\mathcal{N} = 2$ theories with 2d CFT free field correlators, which can be obtained as a suitable limit of the $S^2 \times S^1$ partition function. After establishing this dictionary, I will show how the logic of the dimensional reduction can be pushed further and even reversed, uplifting some known integral identities for 2d free field correlators to new IR dualities in 3d.

Tuesday morning 2 / 17

Type IIB inflation models

Autore: Veronica Guidetti[1]

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I will talk about different aspects of inflationry models that can arise from 4D effective theories coming from type IIB String Theory. In particular I'll focus on concrete embeddings of fibre and Kähler moduli inflation.

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Integral Supergravity

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Tuesday morning 1 / 23

On complexity in holography

Autore: Roberto Auzzi[None]

Computational complexity is a quantum information concept that recently captured increasing attention in gravitational holography. In particular, the complexity=volume (CV) and complexity=action (CA) conjectures have been proposed as gravitational duals of quantum computational complexity. In this talk I will discuss these holographic conjectures and their subregion generalizations in a few specific situations in asymptotically AdS_3 spacetimes and in its Warped generalization.

Tuesday morning 2 / 24

Bootstrapping dS Exchanges

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