

TFI 2017
 Theories of the Fundamental Interactions



Report of Contributions

Contribution ID: 0

Type: **not specified**

Brane supersymmetry breaking, non-linear supersymmetry and some applications

Monday, September 11, 2017 2:30 PM (45 minutes)

I shall review how String Theory leads to an intriguing phenomenon, “brane supersymmetry breaking”, whereby supersymmetry is broken at the string scale in $D=10$ with no order parameter to recover it. The phenomenon is accompanied by the emergence of a runaway potential that destabilizes the original Minkowski vacuum, but whose specific form affords potentially interesting indications for the inflationary phase of the Universe.

At low energies supersymmetry appears non-linearly realized, and although we are far from a comprehensive framing of the phenomenon, in ten dimensions or below, four-dimensional $N=1,2$ models with constrained superfields can provide useful probes into this type of dynamics.

Presenter: SAGNOTTI, Augusto (SNS - PI)

Contribution ID: 1

Type: **not specified**

Models of broken supersymmetry with constrained superfields

Monday, September 11, 2017 3:15 PM (45 minutes)

An effective description for theories with spontaneous supersymmetry breaking can be obtained by imposing constraints on superfields, both for global and local supersymmetry. In particular, even if the supersymmetry breaking scale is assumed to be very high, superspace methods can still be used to study effective theories in the low energy regime, where some of the degrees of freedom can be decoupled. I will review the main techniques that have been developed recently in this context and I will apply them to discuss models in which supersymmetry is broken and non-linearly realized, both in the global and in the local case.

Presenter: CRIBIORI, Niccolò (Univ. Padova)

Contribution ID: 2

Type: **not specified**

The Higgs branch of 6d N=(1,0) theories at infinite coupling

Monday, September 11, 2017 4:30 PM (45 minutes)

This talk focuses on vacuum moduli spaces of 6d N=(1,0) field theories that have a superconformal fixed point at infinite coupling. Such theories admit an effective description in terms of a quiver diagram, which can be realised using Type IIA string theory or F-theory at finite coupling. We show that several aspects of the hypermultiplet moduli space, also known as the Higgs branch, of the superconformal field theory (SCFT) at infinite coupling may drastically be different from those obtained naively from the quiver at finite coupling. Using a torus compactification to lower dimensional field theories as a tool, we show how one can extract the information about the Higgs branch of the SCFT at infinite coupling from the finite coupling description. This provides several insights into the physics at infinite coupling of six dimensional field theories.

Presenter: Dr MEKAREEYA, Noppadol (University of Milano-Bicocca)

Contribution ID: 3

Type: **not specified**

Exact results in N=2 Super Yang-Mills Theories with defects

Monday, September 11, 2017 5:15 PM (45 minutes)

We study the non-perturbative behaviour of superconformal gauge theories with rigid N=2 supersymmetry in four dimensions, in particular N=2* theories, in presence of two-dimensional defects and discuss the relation between their S-duality properties and the possibility of computing exact quantum observables. For these theories, the prepotential and the twisted chiral superpotential, that encode respectively the four and two-dimensional low-energy effective dynamics on the Coulomb branch of moduli space, obey a modular anomaly equation whose validity is related to S-duality. This fact allow one to write them in terms of (quasi)-modular forms, thus resumming all instanton contributions. The results can be checked against the microscopic multi-instanton calculus and the chiral ring equations of the quiver theories associated to the coupled 2d/4d systems.

Presenter: FRAU, Marialuisa (TO)

Contribution ID: 4

Type: **not specified**

Force Free Electrodynamics in a Black Hole Background

Tuesday, September 12, 2017 9:30 AM (45 minutes)

In Nature there are several astrophysical systems surrounded by a magnetosphere with a plasma that can be described using the so-called force-free electrodynamics (FFE). This is the case for example of black hole magnetospheres. By analyzing the stationary axisymmetric magnetosphere surrounding a spinning black hole, Blandford and Znajek realized that one could extract energy from a rotating black hole: the Blandford and Znajek mechanism. By studying in detail the Blandford and Znajek monopole solution we find however that it's validity breaks down before reaching the asymptotic region. Motivated by this result, we investigate a new approach to find a solution of FFE equations which is valid everywhere.

Presenter: ORSELLI, Marta (Perugia Univ.)

Contribution ID: 5

Type: **not specified**

De Sitter instability and corpuscular nature of gravity

Tuesday, September 12, 2017 10:15 AM (45 minutes)

Presenter: MUECK, Wolfgang (NA)

Contribution ID: 6

Type: **not specified**

Non-analyticity of holographic Renyi entropy in Lovelock gravity

Tuesday, September 12, 2017 11:30 AM (45 minutes)

Non-analyticity of holographic Renyi entropy in Lovelock gravity

Abstract: We compute holographic Renyi entropies for spherical entangling surfaces on the boundary while considering third order Lovelock gravity with negative cosmological constant in the bulk. Our study shows that third order Lovelock black holes with hyperbolic event horizon are unstable, and at low temperatures those with smaller mass are favoured, giving rise to first order phase transitions in the bulk. We determine regions in the Lovelock parameter space in arbitrary dimensions, where bulk phase transitions happen and where boundary causality constraints are met. We show that each of these points corresponds to a dual boundary conformal field theory whose Renyi entropy exhibits a kink at a certain critical index n .

Presenter: POURHASAN, Razieh (INFN Firenze)

Contribution ID: 7

Type: **not specified**

Fibre inflation models and moduli-space sizes

Tuesday, September 12, 2017 12:15 PM (45 minutes)

In this talk we summarize recent results regarding the global embedding of fibre inflation models. In these models, being based on Calabi-Yau orientifold models of IIB where partial moduli stabilization is achieved in the Large Volume Scenario (LVS), the role of the Kahler cone is special as it determines the geometry of the moduli space. Furthermore, we report on separate research aimed at understanding the size of these spaces in a more model-independent way for arbitrary LVS-vacua.

Presenter: CIUPKE, David (University of Bologna)

Contribution ID: 8

Type: **not specified**

A journey through Wilson loops in 3D Chern-Simons-matter theories

Tuesday, September 12, 2017 2:30 PM (45 minutes)

I will review some recent results concerning BPS Wilson loops in 3D $N=6$ ABJ(M) and $N=4$ Chern-Simons-matter theories, with particular focus on their role in testing AdS/CFT correspondence and integrability underlying it.

Presenter: PENATI, Silvia (MIB)

Contribution ID: 9

Type: **not specified**

N=4 Amplitudes/Wilson loops at strong coupling from integrability

Tuesday, September 12, 2017 3:15 PM (45 minutes)

N=4 Super Yang-Mills is a supersymmetric and conformal gauge theory with remarkable properties. Among them, its duality with a IIB string theory in the AdS₅×S⁵ background and the correspondence between null polygonal Wilson loops and gluon scattering amplitudes. Even more surprisingly, some integrable features pop up when computing a certain class of observables in the theory. For instance, the anomalous dimension of the gauge invariant operators admits a spin chain description where the application of many techniques belonging to integrable systems is possible. As for the null polygonal Wilson loops, a non-perturbative approach employing the integrability of the theory has been proposed and tested in the last few years. In this respect, we have found some results in the strong coupling regime, on the one side reproducing the minimal area computation for the classical string and on the other side analytically proving a previously proposed quantum correction of the same order. A parallel between the fermionic contribution to the Wilson loop and the Nekrasov instanton partition function is proposed. Furthermore, we partially unravelled the matrix structure of the pentagon transition, giving a description in terms of Young tableaux.

Presenter: BONINI, Alfredo (BO)

Contribution ID: 10

Type: **not specified**

K3 string theories, symmetries and wall crossing

Tuesday, September 12, 2017 4:30 PM (45 minutes)

I will consider a large class of four dimensional $N=4$ string models obtained from compactifications of type II string theory on $K3 \times T^2$ and orbifolds thereof. I will show that the multiplicities of $1/4$ BPS states in such models can be determined (almost) uniquely by imposing some simple consistency condition. The main ingredient in this derivation is a careful analysis of the wall crossing phenomenon. These results lead to a better understanding of the action of discrete groups of symmetries on the BPS spectrum of K3 string models. This talk is based on joint work with Natalie Paquette and Max Zimet.

Presenter: VOLPATO, Roberto (Univ. Padova)

Contribution ID: 11

Type: **not specified**

Exotic branes and non-geometric fluxes in string theory

Wednesday, September 13, 2017 9:30 AM (45 minutes)

We obtain a complete classification of the half-supersymmetric branes of IIA/IIB string theory compactified on tori based on non-perturbative dualities. Many of these branes are ‘exotic’, in the sense that they do not arise from the dimensional reduction of branes in ten dimensions. We then consider a specific $N=1$ model in four dimensions with fluxes turned on, and we determine the subset of the space-filling 3-branes of the maximal theory that are not projected out in the model. We point out that all such branes can simultaneously be included to cancel the tadpoles induced by the fluxes, giving in principle many new solutions to the consistency conditions that these fluxes must satisfy.

Presenter: RICCIONI, Fabio (ROMA1)

Contribution ID: 12

Type: **not specified**

Lagrangians for Argyres-Douglas theories, unitarity bound violations and 3d Abelianization

Wednesday, September 13, 2017 10:15 AM (45 minutes)

We consider 4d $N=1$ Lagrangians dual to $N=2$ Argyres-Douglas models. The $N=1$ gauge theories have chiral ring operators with small r -charge, that violate the unitarity bound. We propose a general procedure to UV-complete such theories, isolating the infrared interacting SCFT. This allows to reduce the dualities to 3d and find two physical interpretations: the ‘Abelianization duality’ and its 3d mirror, the ‘sequential confinement RG flow’.

Presenter: BENVENUTI, Sergio (SISSA)

Contribution ID: 13

Type: **not specified**

Strings on Melvin Spaces and the Omega Background

Wednesday, September 13, 2017 11:30 AM (45 minutes)

I shall present recent results on the quantum corrections of gauge couplings for N=2 SYM theories emerging from D-Branes on Melvin spaces, and their connection with the perturbative free energy of N=2 theories on the Omega background.

Presenter: ANGELANTONJ, Carlo (Univ. Torino)

Contribution ID: 14

Type: **not specified**

Large-N CP(N-1) sigma model on a finite interval and the renormalized string energy

Wednesday, September 13, 2017 12:15 PM (45 minutes)

We continue the analysis started in a recent paper of the large-N two-dimensional CP(N-1) sigma model, defined on a finite space interval L with Dirichlet (or Neumann) boundary conditions. We focus our attention on the problem of the renormalized energy density $E(x, \Lambda, L)$ which is found to be a sum of two terms, a constant term coming from the sum over modes, and a term proportional to the mass gap. The approach to $E(x, \Lambda, L) \rightarrow N 4\pi \Lambda^2$ at large $L\Lambda$ is shown, both analytically and numerically, to be exponential: no power corrections are present and in particular no Lüscher term appears. This is consistent with the earlier result which states that the system has a unique massive phase, which interpolates smoothly between the classical weakly-coupled limit for $L\Lambda \rightarrow 0$ and the “confined” phase of the standard CP(N-1) model in two dimensions for $L\Lambda \rightarrow \infty$.

Presenter: KONISHI, Kenichi (PI)

Contribution ID: 15

Type: **not specified**

Monitoring Italian Strings & Gender

Tuesday, September 12, 2017 5:15 PM (30 minutes)

As a follow up of the Outreach & Gender activities of COST “The String Theory Universe”, ended in march, we propose to assess the situation and continue monitoring the growth of the women community working in String Theory and related areas. We open the discussion to comments, suggestions, initiatives.

Presenters: CERESOLE, Anna; PENATI, Silvia (MIB)

Contribution ID: **16**

Type: **not specified**

Cena Sociale

Tuesday, September 12, 2017 8:00 PM (2 hours)