

# **XVIII AVOGADRO MEETING on Strings, Supergravity and Gauge Theories**



## **Report of Contributions**

Contribution ID: 2

Type: **Gong-show talk**

## Worksheet Correlators in Black Hole Microstates

*Tuesday, 20 December 2022 15:00 (10 minutes)*

To account for all the bulk microstates of a three-charge black hole, the supergravity approximation may not suffice and full control over string theory may be essential.

Recently, a specific family of black hole microstates was shown to admit an exact string worldsheet description. The worldsheet theory is a coset of the well-studied  $\text{AdS}_3 \times \mathbb{S}^3 \times \mathbb{T}^4$  model. This allows full control over the entire (perturbative)  $\alpha'$  corrections.

I will show how to construct the physical vertex operators of these models, and how to compute an extensive set of novel heavy-light correlators.

I will present a closed formula for correlators with an arbitrary number of light insertions, written as a function of the correlators on  $\text{AdS}_3 \times \mathbb{S}^3 \times \mathbb{T}^4$ .

**Primary author:** BUFALINI, Davide

**Presenter:** BUFALINI, Davide

**Session Classification:** Gong show

Contribution ID: 4

Type: **Gong-show talk**

## Towards a non-relativistic AdS/CFT duality

*Tuesday, 20 December 2022 15:10 (10 minutes)*

Taking the non-relativistic limit for strings changes the target space geometry, which becomes Newton-Cartan (non-Lorentzian). Therefore the non-relativistic AdS/CFT correspondence would be the first example of non-Lorentzian holography. In this gong-show I will summarise my recent work about understanding the string side of such correspondence.

**Primary author:** FONTANELLA, Andrea**Presenter:** FONTANELLA, Andrea**Session Classification:** Gong show

Contribution ID: 5

Type: **Gong-show talk**

## A gravitational block formula for spindle geometries

*Tuesday, 20 December 2022 15:30 (10 minutes)*

In the past two years there has been a surge in the interest towards low dimensional gauged supergravity solutions where the spacetime metric includes a 2d orbifold known as spindle. Topologically a spindle is a 2-sphere, but it has conical singularities at the two poles. Remarkably, uplifting such solutions to type IIB/11d supergravity on Sasaki-Einstein manifolds leads to perfectly smooth geometries. In this talk, I will introduce some recent developments stemming from applying the geometric extremization procedure on generic  $AdS_2 \times Y_9$  and  $AdS_3 \times Y_7$  geometries, where  $Y_9$  and  $Y_7$  are fibrations of respectively 7d and 5d Sasaki-Einstein manifolds  $X_7$  and  $X_5$  over the spindle  $\Sigma$ . When put on-shell, such geometries are solutions of M-theory and type IIB supergravity respectively, and they are expected to arise as near horizon limit of supersymmetric magnetically charged accelerating  $AdS_4$  black holes uplifted on  $X_7$  and supersymmetric accelerating  $AdS_5$  black strings uplifted on  $X_5$ . The result is a gravitational block formula for respectively the entropy function of the  $AdS_4$  black holes and the trial central charge of the 2d  $\mathcal{N} = (2, 0)$  SCFTs dual to the  $AdS_3$  solutions. This formula looks like a sum of two contributions ("blocks") localized over the two poles of the spindle that depend only on geometric data of the the fibers  $X_7$  and  $X_5$  as well as on how these are twisted over  $\Sigma$ . Remarkably, by algebraically extremizing this quantity over the possible R-symmetry vectors one can obtain the on-shell entropy/central charge without ever having to solve the supergravity equations of motion.

**Primary author:** BOIDO, Andrea (University of Oxford)

**Presenter:** BOIDO, Andrea (University of Oxford)

**Session Classification:** Gong show

Contribution ID: 6

Type: **Gong-show talk**

## Energy and stability of non-supersymmetric strings

*Tuesday, 20 December 2022 17:50 (10 minutes)*

In this talk, I will begin with a review of the known vacua for ten-dimensional non-supersymmetric strings, with and without (R-R or gauge) fluxes, focusing on their stability properties.

Following a recent attempt to define a notion of energy in string compactifications, I will present a Nester-Witten energy for vacua without fluxes. Among these, the Dudas-Mourad vacua, known to be perturbatively stable, turn out to be good candidates for this formalism since they realize a minimum of the energy. However, the presence of codimension-one singularities plays a key role in proving stability, and dynamic mechanisms could hide new channels of instability.

I will also comment on the problems that arise when introducing form fluxes.

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**Presenter:** RAUCCI, Salvatore (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Gong show

Contribution ID: 7

Type: **Gong-show talk**

## Energy transmission and reflection at 2d Janus interfaces

*Tuesday, 20 December 2022 15:40 (10 minutes)*

Scattering from conformal interfaces in two dimensions is universal, since the flux of transmitted and reflected energies does not depend on the details of the initial state.

Previous studies of the transmission coefficient either involved a minimal holographic model with a single thin brane inside three-dimensional AdS, or a double brane model involving the merging of two branes.

In this presentation, I will extend the method to include an infinite set of branes to reproduce the Janus geometry in the continuous limit.

This allows to compute the transmission coefficient of a 2d Janus interface as a function of the deformation parameter of the geometry.

**Primary author:** BAIGUERA, Stefano (Ben-Gurion University of the Negev)

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**Presenter:** BAIGUERA, Stefano (Ben-Gurion University of the Negev)

**Session Classification:** Gong show

Contribution ID: 8

Type: **Gong-show talk**

## Higher symmetries of 5D orbifold SCFTs

*Tuesday, 20 December 2022 16:30 (10 minutes)*

Higher-form symmetries provide a powerful way to constrain the non-perturbative data of a quantum field theory. This is especially valuable in the case of  $d > 4$  superconformal field theories since all known examples are intrinsically strongly coupled. In my short presentation, I will provide two different approaches to the computation of the Defect Group, the symmetry group acting on defects, of 5d SCFT, engineered in M-theory on orbifold Calabi-Yau threefolds. One is based on the algebraic definition of the Defect Group, the other on uses the BPS spectrum of these theories. Both computations agree and gives hints of the presence of much richer structures in these theories.

**Primary author:** MEYNET, Shani Nadir**Presenter:** MEYNET, Shani Nadir**Session Classification:** Gong show

Contribution ID: 9

Type: **Gong-show talk**

## The Holography of Non-Invertible Self-Duality Symmetries

*Tuesday, 20 December 2022 16:40 (10 minutes)*

In recent years a lot of attention has been paid to generalized notions of global symmetries in QFT, and their consequences for the dynamics. In particular, symmetries whose underlying mathematical structure is not described by group theory but by category theory, the so-called non-invertible symmetries, have been discovered to exist also in 4d gauge theories. This raises the important question: how do these symmetries appear from the bulk point of view in theories with a holographic dual? This question is non-trivial since there is no established concept of a gauge field for such symmetries. I will provide a solution to this problem in the case of non-invertible symmetries existing in  $4d \mathcal{N} = 4$  theories in certain points of their conformal manifold. I will explain that these points are holographically dual to points in the moduli space of string theory, where there is an emergent gauge field in the supergravity description. This new degree of freedom has an interplay with the other fields, which results in an intricate structure, reproducing the non-invertible symmetry of the boundary theory.

Based on arXiv:2210.09146 and upcoming work.

**Primary author:** ANTINUCCI, Andrea (Istituto Nazionale di Fisica Nucleare)

**Co-authors:** Prof. BENINI, Francesco (SISSA); Dr COPETTI, Christian (SISSA); GALATI, Giovanni (Istituto Nazionale di Fisica Nucleare); RIZI, Giovanni (Istituto Nazionale di Fisica Nucleare)

**Presenter:** ANTINUCCI, Andrea (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Gong show



Contribution ID: 10

Type: **Gong-show talk**

## On Continuous 2-Category Symmetries and Yang-Mills Theory

*Tuesday, 20 December 2022 16:50 (10 minutes)*

The last few years have witnessed a paradigm shift concerning the concept of symmetry in QFT, with the focus passing from the action on fields in the Lagrangian to the presence in the theory of special extended operators with the remarkable property of depending only topologically on their support. This led to a broader notion of what we call symmetry in QFT, which encompasses apparently exotic cases such as non-invertible symmetries. In this talk, I will show that such symmetries are not that exotic. I will describe a specific instance of a non-invertible symmetry, which happens to be continuous, and arises in a simple “semi-Abelian” gauge theory. I will describe the (higher) categorical structure of the symmetry and discuss the relation between the semi-Abelian theory and the UV limit of Yang-Mills theories, thus providing physical motivation to investigate such symmetries.

Based on 2206.05646.

**Primary author:** RIZI, Giovanni (Istituto Nazionale di Fisica Nucleare)

**Co-authors:** ANTINUCCI, Andrea (Istituto Nazionale di Fisica Nucleare); GALATI, Giovanni (Istituto Nazionale di Fisica Nucleare)

**Presenter:** RIZI, Giovanni (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Gong show

Contribution ID: 11

Type: **Gong-show talk**

## Strong coupling expansions in N=2 quiver gauge theories

*Tuesday, 20 December 2022 17:30 (10 minutes)*

I will discuss recent developments in the study of 3-point functions of chiral single-trace scalar operators in a four-dimensional N=2 superconformal quiver theory with gauge group  $SU(N) \times SU(N)$  and bifundamental matter. Using supersymmetric localization, it is possible to map the computation of these correlators to an interacting matrix model and obtain expressions that are valid for any value of the 't Hooft coupling in the planar limit of the theory. In particular, I will focus on the strong-coupling regime, where these expressions allow us to compute the leading and subleading orders of the 3-point functions and of the corresponding structure constants in an analytic way. We also recover the leading contribution with a holographic calculation using the AdS/CFT correspondence. This agreement confirms the validity of the analytic strong-coupling results and of the holographic correspondence in a nonmaximally supersymmetric setup.

**Primary author:** VALLARINO, Paolo (Università di Torino)

**Presenter:** VALLARINO, Paolo (Università di Torino)

**Session Classification:** Gong show

Contribution ID: 12

Type: **Gong-show talk**

## Higher-spin asymptotic symmetry algebra

*Tuesday, 20 December 2022 17:00 (10 minutes)*

We build an asymptotic symmetry algebra for massless higher-spin fields in asymptotically Minkowski space-time in any space-time dimension. It is constructed at null infinity from the (electric) conformal Carrollian scalar which can be interpreted as the flat-space limit of the singleton representation of the conformal algebra.

**Primary author:** PEKAR, Simon (University of Mons)

**Presenter:** PEKAR, Simon (University of Mons)

**Session Classification:** Gong show

Contribution ID: 13

Type: **Gong-show talk**

## Algebro-geometrical orientifolds and IR dualities

*Tuesday, 20 December 2022 17:10 (10 minutes)*

Orientifold projections are an important ingredient in geometrical engineering of Quantum Field Theory. However, an orientifold can break down the superconformal symmetry and no new superconformal fixed points are admitted (II scenario); nevertheless, in some cases, dubbed I and III scenarios orientifold, a new IR fixed point is achieved and, for III scenario examples, some still not fully understood IR duality seems to emerge. Here we give an algebro-geometrical point of view of III scenario orientifold for toric varieties and we propose the existence of relevant operators that deform the starting oriented CFT triggering a flow. If time permits We will briefly discuss a possible holographic description of this flow.

**Primary author:** MANZONI, Federico (Istituto Nazionale di Fisica Nucleare)

**Presenter:** MANZONI, Federico (Istituto Nazionale di Fisica Nucleare)

**Session Classification:** Gong show

Contribution ID: 14

Type: **Gong-show talk**

## **BPS line operators and topological sectors**

*Tuesday, 20 December 2022 17:40 (10 minutes)*

I describe novel supersymmetric configurations with line and local operators in 3d theories with  $N \geq 4$  supersymmetry and explain how to extract defect CFT data using localization. As an application, I will compute defect correlators of the stress tensor multiplet in ABJM with the 1/2-BPS Wilson line.

**Primary author:** GUERRINI, Luigi**Presenter:** GUERRINI, Luigi**Session Classification:** Gong show

Contribution ID: 15

Type: **Gong-show talk**

## A fresh view on string orbifolds

*Tuesday, 20 December 2022 18:00 (10 minutes)*

In quantum field theory, an orbifold is a way to obtain a new theory from an old one by gauging a finite global symmetry. This definition of orbifold does not make sense for quantum gravity theories, that admit (conjecturally) no global symmetries. In string theory, orbifold refers to the gauging of a global symmetry on the world-sheet theory describing the fundamental string. Alternatively, it is a way to obtain a new string background from an old one by quotienting some isometry. We discuss a new formulation of string orbifolds in terms of the group of gauge symmetries of a given string model. In such a formulation, the parent' and thechild' theories correspond to different ways of breaking or gauging all potential global symmetries of their common subsector. We also comment on the dependence of this orbifold procedure on the duality frame.

**Presenter:** Mr GIACCARI, Stefano Gregorio (Università di Padova)

**Session Classification:** Gong show

Contribution ID: 16

Type: **Gong-show talk**

## Decompactification in the Swampland?

*Tuesday, 20 December 2022 18:10 (10 minutes)*

We study the cosmological evolution of string compactifications where the volume modulus has a non-trivial time dependence. Our main result will be to show how a kinating volume modulus in 4 spacetime dimensions can be uplifted to a classical Kasner solution in 10 d. Within a classical picture, this implies that if the kinetic energy of the rolling scalar were enough to overcome the potential barrier separating the vacuum from the runaway to infinity, there would be a “Big Crunch” of the non-compact dimensions rather than decompactification to 10d, flat spacetime. We conclude with a few comments on how quantum effects would modify this picture, and highlight some differences between dynamical and kinematical statements in the Swampland.

**Presenter:** Dr REVELLO, Filippo (Utrecht University)

**Session Classification:** Gong show

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Type: **Gong-show talk**

## Double copy perspective on asymptotic symmetries

*Tuesday, 20 December 2022 15:20 (10 minutes)*

The double copy (DC) correspondence provides an interesting relation between gravity and gauge theories. Strongly supported in the context of amplitudes, its Lagrangian counterpart has been partially investigated, for which the DC field is described through a convolution. Using this definition, we explore the possibility of extending the correspondence to asymptotic symmetries for the  $N=0$  supergravity multiplet, discussing some main technical issues and proposing a possible identification of supertranslations in terms of gauge components.

**Presenter:** Mr ROMOLI, Matteo (Università di Roma Tre)

**Session Classification:** Gong show