

HirosiFest @ Kavli IPMU

Report of Contributions

Contribution ID: 1

Type: **not specified**

Cumrun Vafa (Harvard)

Thursday 20 October 2022 09:10 (50 minutes)

[chair: Masahito Yamazaki (Kavli IPMU)]

“Swampland and the Dark Sector”

Contribution ID: 2

Type: **not specified**

Hitoshi Murayama (UC Berkeley/Kavli IPMU)

Thursday 20 October 2022 10:20 (50 minutes)

[chair: Masahito Yamazaki (Kavli IPMU)]

Contribution ID: 3

Type: **not specified**

Jaewon Song (KAIST)

Thursday 20 October 2022 11:40 (50 minutes)

[chair: Yuji Tachikawa (Kavli IPMU)]

“a vs c in the 4d SCFT landscape”

The central charges of conformal field theories capture many interesting aspects of the dynamics. In this talk, I will discuss aspects of central charges in the landscape of 4d superconformal theories. We find that the scaling behavior of a and c for the large N limit of superconformal gauge theories (with simple gauge group) falls into two categories: $O(N^2)$ and $O(N)$. The $O(N)$ theories exhibit a dense spectrum even in the BPS sector. We also find a large set of $a=c$ SCFTs for a finite N, which poses an interesting question in view of holography. Some of these theories have a tantalizing connection to N=4 SYM theory and are also realizable in class S.

Contribution ID: 4

Type: **not specified**

Lunch

Contribution ID: 5

Type: **not specified**

Masahito Yamazaki (Kavli IPMU)

Thursday 20 October 2022 14:00 (50 minutes)

[chair: Yuji Tachikawa (Kavli IPMU)]

Contribution ID: 6

Type: **not specified**

Yu Nakayama (Rikkyo)

Thursday 20 October 2022 15:10 (50 minutes)

[chair: Takuya Okuda (Tokyo)]

“(Topological) Twist and Scale vs Conformal invariance”

(Topological) twisting a conformal field theory admits more deformations than its original theory. We argue that such deformations often lead to scale-invariant but non-conformal fixed points. One physical example is to allow spin-orbit interaction in the Heisenberg magnet, leading to scale-invariant but non-conformal Aharony-Fisher fixed point. We show similar examples in Euclidean M2-brane holography, where the self-dual field strength plays a prominent role.

Contribution ID: 7

Type: **not specified**

Ashoke Sen (ICTS)

Thursday 20 October 2022 16:10 (50 minutes)

[chair: Takuya Okuda (Tokyo)]

Contribution ID: 8

Type: **not specified**

Takuya Okuda (Tokyo)

Friday 21 October 2022 09:00 (50 minutes)

[chair: Jaewon Song (KAIST)]

“Measurement-based quantum simulation of gauge theories”

Numerical simulation of lattice gauge theories is an indispensable tool in high energy physics, and their quantum simulation is expected to become a major application of quantum computers in the future. In this talk, I show that sequential single-qubit measurements with the bases adapted according to the former measurement outcomes can induce a deterministic Hamiltonian quantum simulation of abelian lattice gauge theories. This is a specialization of the so-called measurement-based quantum computation, with a resource state tailored to simulate a lattice gauge theory. The resource state has a symmetry-protected topological order with respect to generalized global symmetries that are related to the symmetries of the simulated gauge theories on the boundary. If time permits I will sketch imaginary-time quantum simulation and the relation of the resource state with the classical partition function. This talk is based on a work in progress with Hiroki Sukeno.

Contribution ID: 9

Type: **not specified**

Tadashi Takayanagi (YITP, Kyoto)

Friday 21 October 2022 10:10 (50 minutes)

[chair: Jaewon Song (KAIST)]

“CFT Dual of dS3 and Pseudo Entropy”

We propose a holographic duality for gravity on a three-dimensional de Sitter space. This is essentially given by a $k=-2$ limit of SU(2) WZW model. We show that this proposal reproduces the expected free energy in de Sitter gravity. We also analyze the geodesic length in the three dimensional de Sitter spacetime and argue that it is interpreted as holographic pseudo entropy. We will also discuss a time-like entanglement entropy in AdS/CFT which shares a similar property in terms of pseudo entropy.

Contribution ID: 10

Type: **not specified**

Yuji Okawa (Tokyo)

Friday 21 October 2022 11:30 (50 minutes)

[chair: Simeon Hellerman (Kavli IPMU)]

Correlation functions of scalar field theories from homotopy algebras

When actions are written in terms of homotopy algebras such as A_∞ algebras and L_∞ algebras, expressions of on-shell scattering amplitudes in perturbation theory are universal for both string field theories and ordinary field theories. We thus expect that homotopy algebras can be useful in gaining insights into quantum aspects of string field theories from ordinary field theories. In addition to on-shell scattering amplitudes we find that correlation functions can also be described in terms of homotopy algebras, and in this talk we explain explicit expressions for correlation functions of scalar field theories using quantum A_∞ algebras presented in arXiv:2203.05366. Then we further discuss the application to the renormalization group.

Contribution ID: 11

Type: **not specified**

Yuji Tachikawa (Kavli IPMU)

Friday 21 October 2022 13:50 (50 minutes)

[chair: Simeon Hellerman (Kavli IPMU)]

On heterotic 6-branes “without vector structure”

Assuming that string theory has dynamical objects carrying all possible charges, there should be 6-branes in heterotic $so(32)$ theory such that the gauge configuration on their radial direction S^2 is “without vector structure”, i.e. is not an $SO(32)$ gauge configuration. We discuss some of their curious features. This is a work in progress mainly with Kazuya Yonekura.

Contribution ID: 12

Type: **not specified**

Sakura Schafer-Nameki (Oxford)

Friday 21 October 2022 15:10 (50 minutes)

[chair: Cumrun Vafa (Harvard)]

“On Symmetries.”

I will give a summary of some of the exciting recent developments on generalizations of symmetries in quantum field theories, most notably non-invertible or more generally categorical symmetries. For theories that have a string theoretic realization, I will discuss how these structures are implemented in this context and arise naturally e.g. in holographic or geometric realizations.

Contribution ID: **13**

Type: **not specified**

Eric Perlmutter (Saclay)

Friday 21 October 2022 16:10 (50 minutes)

[chair: Cumrun Vafa (Harvard)]

Features & Fantasies of Moduli Dependence in CFT