One day conference Title and Abstract

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Joan Camps　(Cambridge)

Title: Gravity duals of boundary cones

Abstract: Renyi entropies can sometimes be defined as partition functions on conically singular manifolds. I will discuss their gravity duals, which are regular in the bulk. When the conical singularity is supported on a flat or spherical surface, these bulk geometries are rewritings of the hyperbolic black hole. For more general conical singularities, these bulk geometries are new.

Kento Watanabe　(YITP, Kyoto)

Title: EPR Pairs, Local Projections and Quantum Teleportation in Holography

Abstract: Abstract: Operation is an important concept in quantum systems. In this talk, we discuss 3 quantum operations in QFTs, especially in 2d CFTs : local projection measurements, creations of partial entanglement between two CFTs and swapping of subsystems between two CFTs. We also discuss their holographic duals and the time evolutions of the entanglement entropy. By combining these operations, we present an analogue of quantum teleportation between two CFTs and give its holographic realization. Furthermore, we introduce a new quantity to probe multi- partite entanglement by using local projection measurements. This talk is based on a work with Tokiro Numasawa, Noburo Shiba and Tadashi Takayanagi (arXiv: 1604.0177 [hep-th]).

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Jie-qiang Wu　(Peking)

Title: Holographic Entanglement Entropy For a General State in 2D CFT

Abstract: In this work, we study the entanglement entropy in a general state of two-dimensional conformal field theory in the the large central charge limit. By using the monodromy analysis, we obtain the classical order entanglement entropy for the general state. We show that it is exactly captured by the Ryu-Takayanagi formula, by using the Wilsonian line prescription in the Chern-Simons formulation of the AdS3 gravity.

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Daniel Carney (UBC)

Title: Scattering with partial information

Abstract: I'll discuss some aspects of relativistic scattering formulated in terms of density matrices, where one only has observational access to some of the scattered particles. I will consider both pure and impure initial states, and give some examples of entanglement entropy generation and interference patterns in outgoing observables.

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Hidekazu Tsukiji (YITP, Kyoto)

Title: Thermalization process from chaoticity in Yang-Mills theory by use of the Husimi function

Abstract: Understanding the thermalization process in a pure quantum system is a theoretical challenge. In the semi-classical approximation, the process might be realized by the classical chaotic dynamics. We demonstrate this scenario in several quantum systems including Yang-Mills (YM) fields by using a positive semi-definite quantum distribution function called Husimi function which is given by a coarse graining of Wigner function within the minimal uncertainty. Then entropy is defined in terms of the Husimi function, which is called the Husimi-Wehrl (HW) entropy. We also propose numerical methods to calculate the HW entropy. Using a product ansatz for the Husimi function, which is examined to give only some 10 % over estimate, we succeed in a numerical evaluation of HW entropy of 2D quantum mechanical system and YM theory and show that the growth rate agrees with the sum of the positive Lyapunov exponents.

Masahiko G. Yamada (ISSP, Tokyo)

Title: Design of Ru-based honeycomb metal-organic frameworks and JKΓ model

Abstract: We propose Ru-based honeycomb metal-organic frameworks (MOFs) as new candidates for the realization of the Kitaev-Heisenberg model and the JK$¥Gamma$ model. Thanks to the strong suppression of a direct exchange interaction, it is more likely to realize a spin liquid ground state in MOFs than in the other inorganic candidates, such as iridates and RuCl$_3.$ In order to achieve the Kitaev-dominant regime of the JK$¥Gamma$ model, we here propose two types of ideal organic ligands, oxalate-based ligands and tetraaminopyrazine-based ligands in these MOFs. Then, we discuss control parameters to obtain a Kitaev-dominant MOF and show that the almost degenerate nature of the highest occupied molecular orbitals of

the proposed ligands is important.　Coauthors: Hiroyuki Fujita and Masaki Oshikawa

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Masaki Tezuka　(Kyoto)

Title:　Numerical study of the Sachdev-Ye-Kitaev model

Abstract: The Sachdev-Ye-Kitaev (SYK) model has attracted a lot of attention recently in the context of black hole physics and quantum chaos.
We numerically study various aspects of the SYK model. In particular, we present the real-time dependence of various correlation functions and compare them with analytical results and the random-matrix limit.

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Domenico Orlando　(Bern)

Title: Boundaries, Lattices and the Gravitational Anomaly

Abstract:

I discuss a general proof of the following two facts regarding two-dimensional local quantum field theories with non-vanishing gravitational anomaly:

1. these theories do not admit a lattice regularization (this generalizes the renowned Nielsen--Ninomiya theorem);

2. their Hilbert space does not factorize into Hilbert spaces in complementary regions.

Fact 2 implies in particular that, in the presence of a non-vanishing gravitational anomaly, the usual definitions of quantum entanglement break down.

Joint work with Simeon Hellerman and Masataka Watanabe (IPMU).

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Yuki Nakaguchi　(Tokyo)

Title: Renormalized Entanglement Entropy on Cylinder

Abstract: Renormalized entanglement entropy is known to be monotonically decreasing along RG flow, but in a non-stationary way. To construct a stationary function, we defined "renormalized entanglement entropy on cylinder" by putting a disk on a sphere S^2 instead of a flat space R^2, where the spacetime is a cylinder R x S^2. We checked that this function is monotonically decreasing in a stationary way for a free massive scalar. This presentation is based on arXiv:1508.00979."

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Yoshiki Sato　(Tokyo)

Title: Entanglement entropy for excited states in the Sp(N) model

Abstract:　It is known that the three-dimensional Euclidean Sp(N) model is holographic dual to four-dimensional Vasiliev's higher-spin gauge theory on de Sitter spacetime. The Sp(N) model is not unitary in the sense that the Hamiltonian is not Hermite. However, we can make the Hamiltonian ``pseudo-Hermite"; by introducing a pseudo unitary operator. In this presentation, we consider the (renyi) entanglement entropy for excited states　which are not invariant under the pseudo unitary operator in general.

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Wissam Chemissany　(Leibniz, Hannover)

Title: THE PRINCIPLE OF MINIMAL COMPLEXITY AND GEOMETRY (work on progress with Tobias Osborne)

Abstract:

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Masamichi Miyaji　(YITP, Kyoto)

Title: Chaos from Information Metric

Abstract: We show that rapid growth of information metric of Thermofield double state is directly related to commutator of simple operators.　Following holographic proposal for information metric, we compute information metric of thermofield double state for marginal deformation, by evaluating volume of maximal volume codimension 1 surface, and confirm that information metric increases exponentially with time.　Our result implies thermofield double state of chaotic system is sensitive to change of outer environment.　We note that our holographic calculation of information metric is consistent with the expected decay of　two point function of spacial Wilson loops on great circle.

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Chen-Te Ma　(National Taiwan)

Title: Entanglement with Centers

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Kanato Goto (Tokyo)

Title: Causal Evolutions of Localized Excitations in AdS from large c CFT

Abstract: Toward understanding of AdS/CFT, one of the most important problem is how locality of the bulk spacetime emerges from CFTs. One direct approach to this problem is to study the holographic dual of a bulk localized state which can probe the local physics in AdS. Such a state can be constructed by using an Ishibashi state.

This state correctly reproduces the bulk two point function. However, computations of bulk two point functions are universal in any CFTs including even non-holographic CFTs.

Thus in order to see whether a CFT holographically describes a local spacetime or not, we study four point functions of two bulk local operators and two primary operators for the vacuum. The behavior of such a quantity is strongly depend on whether a CFT is holographic or not. If a CFT has a holographic dual, and the dual gravity theory is local and causal, we can see the local excitation spreads inside the light cone by calculations in CFT side. We cannot see this behavior in a free fermion CFT which is not expected to have a local spacetime as a holographic dual.

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