

Gauge/Gravity Duality 2021

Report of Contributions

Contribution ID: 1

Type: **not specified**

Hydrodynamisation and entanglement entropy in expanding spacetimes

Monday, 26 July 2021 13:00 (45 minutes)

This talk will be about hydrodynamisation in an FRW universe and entanglement entropy in empty 4-dimensional de Sitter spacetime of a non-conformal QFT [1]. I will first briefly describe the setup and show how a hydrodynamic plasma dilutes and falls out of equilibrium due to expansion towards empty de Sitter spacetime. Interestingly, in the empty setting we can show that extremal surfaces in the holographic dual of spherical entangling regions on the boundary QFT probe beyond the dual event horizon if and only if the entangling region is larger than the cosmological horizon. Finally, I will show new results on hydrodynamisation when including dynamical gravity on the boundary.

[1] Jorge Casalderrey-Solana, Christian Ecker, David Mateos and WS, Strong-coupling dynamics and entanglement in de Sitter space, 2011.08194

Presenter: VAN DER SCHEE, Wilke (CERN)

Contribution ID: 2

Type: **not specified**

D3-brane solitons and black holes

Monday, 26 July 2021 13:50 (45 minutes)

Four dimensional $N=4$ SYM with gauge group $SU(N)$ admits spherically symmetric, dyonically charged solitons holographically dual to certain probe D3-brane configurations in $AdS_5 \times S^5$. A peculiar feature of these solitons, that their masses and charges scale linearly with radius, have lead to the suggestion that they may in some sense provide a QFT analogue of extremal black holes. I will describe work investigating two particular black hole-like properties of these solitons: their quasinormal modes and their entropy.

Presenter: RODGERS, Ronald (University of Southampton)

Contribution ID: 3

Type: **not specified**

Remarks on Color Confinement

Monday, 26 July 2021 15:00 (45 minutes)

Presenter: KLEBANOV, Igor (Princeton University)

Contribution ID: 4

Type: **not specified**

Branes, Islands, and Massive Gravitons

Monday, 26 July 2021 15:50 (45 minutes)

Recent developments have led to a breakthrough in our understanding of the evaporation of black holes in very special systems: gravity in a box, coupled to an external bath. To what extent these considerations apply to generic black holes is a point of debate. In this talk we will demonstrate that one of the main ingredients in these calculations, the appearance of entanglement islands, generally leads to a clash with basic ideas of entanglement wedge reconstruction and Gauss' law. This clash is resolved in the existing examples by one very special feature of gravity in a box, coupled to a bath: the graviton is massive in these systems. This crucial importance of the graviton mass in the existing constructions makes generalizations of current thinking to realistic black holes challenging.

Presenter: KARCH, Andreas (UT Austin)

Contribution ID: 5

Type: **not specified**

Towards a Classification of Fermionic Rational Conformal Field Theories

Tuesday, 27 July 2021 09:50 (45 minutes)

Presenter: BAE, Jinbeom (Korea Institute for Advanced Study)

Contribution ID: 6

Type: **not specified**

TTbar deformed fermionic theories revisited

Tuesday, 27 July 2021 09:00 (45 minutes)

In this talk, I will discuss the TTbar deformation of fermionic theories. First, I briefly review the TTbar deformation of two-dimensional QFTs. And, I demonstrate the Hamiltonian analysis of the TTbar deformation of free fermion, and I show how this reproduces the deformed spectrum. Then, I explain how negative norm states could appear in the TTbar deformed fermionic theories depending on the energy-momentum tensor. Finally, I shortly summarize our results on the TTbar deformation of $N=(1,1)$ SUSY theory.

Presenter: YOON, Junggi (APCTP)

Contribution ID: 7

Type: **not specified**

The volume of the black hole interior at late times

Tuesday, 27 July 2021 11:00 (45 minutes)

The volume of the interior of a two-sided eternal black hole classically grows forever. I will show that in JT gravity, summing the non-perturbative contribution of higher topologies leads to a saturation of the volume of the interior at times exponential in the entropy of the black hole. I will explain that this is evidence for the conjecture that the size of the interior is related to the complexity of the holographically dual quantum state.

Presenter: SAROSI, Gabor (CERN)

Contribution ID: 8

Type: **not specified**

Complexity and Conformal Transformations

Tuesday, 27 July 2021 11:50 (45 minutes)

In this talk I will (mainly) present my recent work on complexity, especially how conformal transformations in AdS₃/CFT₂ can provide useful information to check holographic complexity proposals, as well as considerations of complexity of conformal transformations on the field theory side.

Presenter: FLORY, Mario (Jagiellonian University)

Contribution ID: 9

Type: **not specified**

Enstrophy from symmetry and holography

Wednesday, 28 July 2021 13:30 (45 minutes)

Enstrophy is an approximately conserved quantity in 2+1 dimensional fluid flows that has dramatic consequences for the phenomenology of turbulence: it implies an inverse energy cascade in 2+1 dimensions.

In this talk, I will illustrate an algorithm to construct an enstrophy current for fluid flows with various degrees of symmetry, including, but not limited to, the well-known case of non-relativistic (Galilean) fluid flows.

Moreover, I will identify the accidental symmetry associated with enstrophy conservation in a recently realized effective action for hydrodynamics.

Finally, I will show how horizon symmetries of 3+1 dimensional black holes with Anti-de Sitter asymptotics also lead to enstrophy conservation.

Presenter: PINZANI FOKEEVA, Natalia

Contribution ID: 10

Type: **not specified**

Thermalization of 2d Quantum Field Theories

Wednesday, 28 July 2021 15:30 (45 minutes)

I will show that (1+1)d QFTs typically thermalize more slowly than the expected “Planckian” equilibration time $1/T$. This arises due to causality, which imposes strong constraints on the emergence of hydrodynamic sound in low dimensions. Subluminality of sound further allows one to define a thermodynamic analogue of Zamolodchikov’s C-function, and constrain the sign of the $T\bar{T}$ -bar term in the low energy limit of any 2d QFT.

Presenter: LUCA, Delacrétaz (University of Chicago)

Contribution ID: 11

Type: **not specified**

Half-wormhole in SYK with one time point

Wednesday, 28 July 2021 14:20 (45 minutes)

Presenter: MUKHAMETZHANOV, Baur (IAS (Princeton))

Contribution ID: 12

Type: **not specified**

Holographic Entropy Cone from Marginal Independence

Wednesday, 28 July 2021 16:20 (45 minutes)

This talk will explain recent puzzling revelations in the ongoing efforts to obtain a useful characterization of entanglement structure of geometric states in a holographic CFT, via the so-called holographic entropy cone (HEC). The relations between subsystem entanglement entropies which delimit this cone are known explicitly for only a rather coarse subdivision of the system (specified by N spatial regions, for up to $N = 5$). We argue that, subject to a certain graph theoretic conjecture, the task of finding the HEC for arbitrary N can be recast in terms of a much simpler combinatorial one which effectively reduces to the connectivity of entanglement wedges. More specifically, the N -party HEC can be reconstructed by solving the holographic marginal independence problem (HMIP) for a finer subdivision $N' \geq N$, which technically amounts to identifying which extreme rays of this subadditivity cone are realizable holographically. Curiously, despite the fact that subadditivity is a universal property which states that total correlation cannot be negative, the non-trivial facets of the HEC constructed therefrom nevertheless cannot be recast as correlation measures.

Presenter: HUBENY, Veronika (UC-Davis)