# MP 6: Holography: AdS/CFT

Time: Wednesday 16:15–17:15 Location: KH 02.013

MP 6.1 Wed 16:15 KH 02.013

**Deriving Area Metric Dynamics from Entanglement** — •Lavish Chawla[1,2], Aranya Bhattacharya[1,3], Mario Flory[1], and Mateusz Kulig[1] — [1]Jagiellonian University in Krakow, Poland — [2]Friedrich-Schiller-Universität Jena, Germany — [3]University of Bristol, United Kingdom

In this talk, we will present recent progress on deriving the equations of motion for a generalised geometric structure-area metrics-linearised around empty Anti-de Sitter (AdS) spacetime within the framework of the AdS/CFT correspondence. The discussion is organized into three parts. First, we will introduce the defining properties of area metric tensor and briefly discuss their emergence in various approaches of quantum gravity, as well as why they are relevant in holography. In the second part, we focus on spherical entangling regions in three-dimensional CFTs, and, by combining the first law of entanglement with the Ryu-Takayanagi formula, we determine how leading order area metric fluctuations in the asymptotic AdS expansion contribute to the holographic stress tensor. This provides a new entry in the holographic dictionary linking area metric perturbations to boundary energy momentum data. Finally, using this dictionary, we show that for finite spherical subregions, the combined requirements of the first law of entanglement and holographic entanglement entropy impose non-trivial constraints on the dynamics of area metric perturbations.

MP 6.2 Wed 16:30 KH 02.013

**Bulk actions and equations for Area Metrics in AdS/CFT** — Aranya Bhattacharya[1,2], Lavish Chawla[1,3], •Mario Flory[1], and Mateusz Kulig[1] — [1]Jagiellonian University, Cracow, Poland — [2]University of Bristol, Bristol, UK — [3]Friedrich-Schiller-Universität, Jena, Germany

Continuing the talk by L. Chawla, we investigate possible bulk Lagrangians for linearised area metric perturbations around AdS space. Beyond the Ryu-Takayanagi formula and the first law of entanglement, we expect these Lagrangians to be severely constrained by the requirement of consistency with holographic renormalisation. To make progress in this direction, we analyse the asymptotic behaviour allowed for the area metric fluctuations by generic model Lagrangians and their equations of motion. Finally, we show that expressing these fluctuations in terms of Lanczos-like potentials leads to a particularly elegant formulation of the linearised theory.

MP 6.3 Wed 16:45 KH 02.013

**Deformations of the Chiral SYK Model and its Gravity Dual** — Dmitry Bagrets[2], Konstantin Weisenberger[1], and •Sarina Michael[1] — [1]Universität zu Köln, Zülpicher Straße 77, 50937 Köln — [2]Forschungszentrum Jülich, Wilhelm-Johnen-Straße, 52428 Jülich

Based on previous work [Altland2025], we construct an extension of the (1+1)-dimensional chiral SYK model, which provides a microscopic realization of a maximally chaotic yet exactly solvable system, and also it turned out to be the holographic dual of a BTZ black hole. In the deep infrared, both are governed by a generalization of the Schwarzian theory, the Alekseev-Shatashvili (AS) action, which captures the dynamics of soft-mode fluctuations. On the gravity side, we include rotating BTZ geometries, giving a split into left- and right-moving temperatures in the dual CFT, and we add fermions on this background to find the boundary correlators. We rederive these also from pure $AdS_3$ via diffeomorphisms and extend this construction to genuinely off-shell boundary reparametrizations. On the CFT side, we study a bilocal deformation of the IR description using renormalization-group methods and show that it induces a crossover in the power law of the propagator, leading to a phase diagram with a critical line separating the two regimes.

MP 6.4 Wed 17:00 KH 02.013

**Determining masses of hadronic bound states using a holographic ansatz** — •Konrad Becker — Julius Maximilians Universität Würzburg

Holography has been found to be an exceptional tool in particle physics. In this talk I will introduce a holographic bottom-up model based on AdS/CFT which we use to describe a QCD-like theory. In this model one can calculate masses of scalar and vector mesons as well as baryons. I also introduce a way of including an additional global symmetry on the field theory side. This can be used to include flavor symmetry in such a model. Breaking this symmetry by giving different masses to the quarks gives predictions for the lightest QCD baryons which match the measured results surprisingly well.