MP 4: AdS-CFT II

Time: Tuesday 14:00–14:50 Location: H7

MP 4.1 Tue 14:00 H7

Effective Transport Coefficients in Time-Dependent Field Theory: Far-from-Equilibrium Shear Viscosity via Holography — •Michael Florian Wondrak[1,2], Matthias Kaminski[3], and Marcus Bleicher[1,2,4] — [1]Helmholtz Forschungsakademie Hessen für FAIR, Frankfurt am Main, Germany — [2]Institut für Theoretische Physik, Goethe-Universität Frankfurt am Main, Germany — [3]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, USA — [4]GSI Helmholtzzentrum für Schwerionenforschung GmbH, Darmstadt, Germany

The gauge/gravity duality offers an elegant way of characterizing field theories at strong coupling. Close to equilibrium, hydrodynamic transport coefficients have been calculated successfully. Far from equilibrium, the main focus has been on thermalization based on the thermodynamic properties of the theory.

In this talk, we generalize transport coefficients from the near-equilibrium to the highly dynamic regime. Our approach is based on Wigner transformations in combination with Green–Kubo relations. Furthermore, we contrast field-theory and bulk-spacetime generalizations of the entropy density.

We consider a conformal field theory at time-dependent temperature and chemical potential corresponding to an accreting black hole in the bulk. At early and late times, we consistently recover the well-known near equilibrium value of the ratio of shear viscosity and entropy density. During the dynamic regime, there are substantial deviations of order unity.

MP 4.2 Tue 14:25 H7

Berry Phases Probing the Fine-Structure of Entanglement — Souvik Banerjee[1], •Moritz Dorband[1,2], Johanna Erdmenger[1,2], Emma Loos[1,2], René Meyer[1,2], Flavio Nogueira[3], and Jeroen van den Brink[2,3,4] — [1]Institute for Theoretical Physics, Julius-Maximilians-Universität Würzburg, 97074 Würzburg, Germany — [2]Würzburg-Dresden Cluster of Excellence ct.qmat — [3]Institute for Theoretical Solid State Physics, IFW Dresden, 01069 Dresden, Germany — [4]Institute for Theoretical Physics, TU Dresden, 01069 Dresden, Germany

We consider the notion of Berry phase for simple quantum mechanical models as well as for wormholes in gravity and their interpretation in the light of the AdS/CFT correspondence. In both cases the Berry phases arise due to unitary transformations acting on subsystems of the considered models. In the quantum mechanical case, we act with a rotation on half of the system while in the wormhole case, only one throat undergoes time evolution. Since both these transformations are unitary the entanglement properties of the systems are not distinguishable by a local measurement. We substantiate these results for the wormhole by an explicit calculation in two-dimensional gravity.

We furthermore discuss how Berry phases are related to non-exact symplectic forms in parameter space. Again we consider simple quantum mechanical models and gravity wormholes in that regard.