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Understanding the equilibration of matter from time-dependent correlator

The fast thermalization of Quark Gluon Plasma, as suggested by hydrodynamical simulation, is one of the central questions of heavy ion collisions. Theoretical understanding of the mechanism involves field theory out of equilibrium. While the perturbative method becomes less effective due to the strong coupling, the gauge/gravity duality can play an important role. In [1], we studied a gravitational collapse model, which is dual to an equilibration process of a homogeneous QGP. We found that the near-equilibrium correlators of different operators approach their thermal counterpart in a universal fashion. As a first step to explore the far from equilibrium regime, we studied a model with a moving mirror in AdS space [2]. We solved the spatially integrated time-dependent correlator in the dual field theory and found that the singularities of the correlator are consistent with the bulk-cone singularities conjecture [3]. Furthermore, we found a recursive relation among the leading order divergence of the singularities, which allow us to determine the divergences without solving the correlator explicitly [4]. Possible extension to a more realistic equilibration model will be discussed.

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