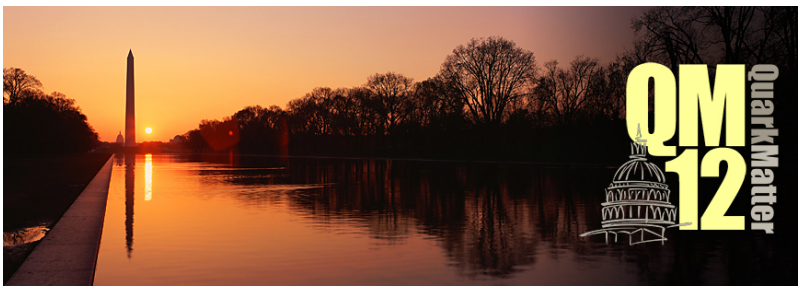
Quark Matter 2012



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Jet Quenching and Holographic Thermalization

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Content :

The AdS/CFT correspondence has been widely used to study the jet quenching of hard probes traveling in the strongly-coupled plasma. Nevertheless, in most of studies, the hard probes were assumed to be created at the late time within the thermalized medium. To understand the thermalization of the medium and its influence on high-energy probes generated in the early time in the strongly-coupled scenario would entail further investigations. In the gravity dual, the thermalization of the medium corresponds to the gravitational collapse and the formation of a black hole. We utilize the AdS-Vaidya metric, which describes a falling mass shell, to analyze the isotropic thermalization. In WKB approximation, the dissipation of a high-energy jet traversing the medium can be characterized by the stopping distance of a massless particle falling along the null geodesic in the gravity dual. We find the stopping distance of an energetic probe in AdS-Vaidya spacetime is equal to that in AdS-Schwarzschild spacetime, which implies that a probe with the energy much greater than the thermalization temperature is not be sensitive to the thermalization process, at least in this idealized scenario. This is different from a gluon probe with finite energy represented by a falling string in the gravity dual, where the stopping distance is governed by the null geodesic starting below the boundary. We find that the stopping distance is increased in the presence of the thermalization process.

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