

Effects of initial state fluctuations on jet energy loss

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The effect of initial state fluctuations on jet energy loss in relativistic heavy-ion collisions is studied in a 2+1 dimension ideal hydrodynamic model. Within the next-to-leading order perturbative QCD description of hard scatterings, we find that a jet loses slightly more energy in the expanding quark-gluon plasma if the latter is described by the hydrodynamic evolution with fluctuating initial conditions compared to the case with smooth initial conditions. A detailed analysis indicates that this is mainly due to the positive correlation between the fluctuation in the production probability of parton jets from initial nucleon-nucleon hard collisions and the fluctuation in the medium density along the path traversed by the jet. This effect is larger in non-central than in central relativistic heavy ion collisions and also for jet energy loss that has a linear than a quadratic dependence on its path length in the medium.

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