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Hydrodynamic fluctuations in a non-boost-invariant viscous fluid dynamics

Hydrodynamic or local thermal fluctuations are an important source of event-by-event fluctuations in relativistic heavy-ion collisions. It is a challenge to identify and investigate their effects on experimental observables. Application of the theory of hydrodynamic fluctuations to the boost-invariant (Bjorken) flow has shown that long-range (rapidity) two-particle correlations are induced by fluctuations due to propagation of the sound modes. We have studied the effects of these fluctuations using a lattice QCD-based equation of state. We find that these correlations extend over large rapidities for various choices of the shear viscosity to entropy density ratio, underlining the importance of hydrodynamic fluctuations. The boost-invariant solution is only an
approximation to the true longitudinal dynamics, valid at mid-rapidity. We have also considered a non-boost-invariant viscous expansion and investigated the effect of hydrodynamic fluctuations within the framework of linearized hydrodynamics. The background solution in this more general case depends explicitly on rapidity. We present our
results for the long-range rapidity correlations in this realistic scenario.

Preferred Track

Collective Dynamics

Collaboration

Not applicable

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