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Non-boost-invariant dissipative hydrodynamics

We study the evolution of the one-dimensional, non-boost-invariant evolution of a hot dense system, in similar conditions to the ones found in Quark Gluon Plasma created in heavy-ion experiments. We neglect transverse dynamic, but we relax the assupmption of longitudinal boost invariance and rapidity independence.
We compare the results obtained from several formulations of viscous hydrodynics and a recent approach to anisotropic hydrodynamics, which treats the pressure anisotropy in a non-perturbative fashion.
As expected from presvious comparisons, viscous hydrodynamics and anisotropic hydrodynamics have a relatively good agreement in the center (mid rapidity) of the system. However the situation is very different at the edges. All formulations of viscous hydrodynamics provide large negative pressures for large rapidities which may leads to misleading conclusion about particles production. The passage from positive to negative pressure has the character of a shock (sudden change in narrow range of rapidity), and may be probematic for the determination of freeze-out hypersurfaces, especially for event-by-event simulations and small systems.
We found an unexpected dependence of the results of viscous hydrodynamics on the specific treatment of the shear-shear coupling.

Preferred Track

Collective Dynamics

Collaboration

Not applicable

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