Contribution ID: **572**   Type: **Oral**

A kinetic regime of hydrodynamic fluctuations and long time tails for a Bjorken expansion

Wednesday 8 February 2017 11:20 (20 minutes)

We develop a set of kinetic equations for hydrodynamic fluctuations which are equivalent to nonlinear hydrodynamics with noise. The hydro-kinetic equations can be coupled to existing second order hydrodynamic codes to incorporate the physics of these fluctuations, which become dominant near the critical point.

We first show that the kinetic response precisely reproduces the renormalization of the shear viscosity and the fractional power ($\propto \omega^{3/2}$) which characterizes
equilibrium correlators of energy and momentum for a static fluid. Such fractonal powers are known as "long time tails", and were previously discussed by Kovtun, Moore and Romatschke.

Then we use the hydro-kinetic equations to analyze thermal fluctuations for a Bjorken expansion, evaluating the contribution of thermal noise from the earliest moments and at late times. In the Bjorken case, the solution to the kinetic equations precisely determines the coefficient of the first fractional power of the gradient expansion ($\propto 1/(\tau T)^{3/2}$) for the expanding system. Numerically, we find that the contribution to the longitudinal pressure from hydrodynamic fluctuations is larger than second order hydrodynamics for typical medium parameters used to simulate heavy ion collisions.

arXiv:1606.07742

Preferred Track

New Theoretical Developments

Collaboration

Not applicable

Author: Dr AKAMATSU, Yukinao (Osaka University)

Co-author: MAZELIAUSKAS, Aleksas

Presenter: Dr AKAMATSU, Yukinao (Osaka University)

Session Classification: Parallel Session 6.3: New Theoretical Developments (II)

Track Classification: New Theoretical Developments