Contribution ID: **318** Type: **Oral**

Choice of moment and derivation of anisotropic dissipative fluid dynamics

Wednesday, February 8, 2017 3:20 PM (20 minutes)

We present a derivation of anisotropic dissipative fluid dynamics from the moments of the Boltzmann equation based on an expansion around an arbitrary anisotropic single-particle distribution function [1]. We construct such an expansion in terms of polynomials in energy and momentum in the direction of the anisotropy and of irreducible tensors in the two-dimensional momentum space orthogonal to both the fluid velocity and the direction of the anisotropy. From the Boltzmann equation we then derive the set of equations of motion for the irreducible moments of the deviation of the single-particle distribution function from the anisotropic distribution. Truncating this set via the 14-moment approximation, we obtain the equations of motion of anisotropic dissipative fluid dynamics. We further consider a particular choice for the anisotropic distribution function and the boost-invariant expansion of a fluid in one dimension, neglecting deviations from the chosen distribution function [2]. In order to close the conservation equations, we need to select in addition a particular moment of the Boltzmann equation. We discuss the influence of the choice of this moment on the time evolution of fluid-dynamical variables and identify the moment that provides the best match of anisotropic fluid dynamics to the solution of the Boltzmann equation in the relaxation-time approximation.

[1] E. Molnar, H. Niemi and D. H. Rischke, Phys. Rev. D 93, no. 11, 114025 (2016), [arXiv:1602.00573 [nucl-th]].

[2] E. Molnar, H. Niemi and D. H. Rischke, arXiv:1606.09019 [nucl-th].

Preferred Track

Initial State Physics and Approach to Equilibrium

Collaboration

Not applicable

Primary authors: Dr MOLNAR, Etele (Johann Wolfgang Goethe-Universität); NIEMI, Harri

Presenter: NIEMI, Harri

Session Classification: Parallel Session 7.3: Collective Dynamics (II)

Track Classification: Initial State Physics and Approach to Equilibrium