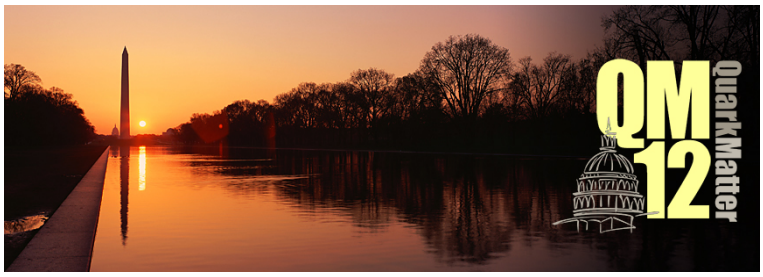

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Derivation of transient relativistic fluid dynamics from the Boltzmann equation for a multi-component system

Tuesday, August 14, 2012 3:55 PM (20 minutes)

We present a general derivation of relativistic fluid dynamics from the relativistic Boltzmann equation using the method of moments [1]. The main difference between our approach and the traditional 14-moment approximation is that we do not close the fluid-dynamical equations of motion by truncating the expansion of the single-particle momentum distribution function. Instead, we keep all the terms in the moment expansion and truncate the exact equations of motion for these moments according to a systematic power counting scheme in Knudsen and inverse Reynolds numbers. We apply this formalism to obtain an approximate expression for the non-equilibrium single-particle momentum distribution function of a hadron resonance gas. Then, we investigate the implications of our new formalism in the freeze-out description of the hadron resonance gas and compare it with the method traditionally used in heavy-ion collisions, the 14-moment approximation.

[1] G.S. Denicol, H. Niemi, E. Molnar, and D.H. Rischke, arXiv:1202.4551 [nucl-th].

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