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The long-wavelength limit of the Boltzmann equation: recent insights in deriving dissipative relativistic fluid dynamics

Wednesday, 5 December 2012 16:00 (30 minutes)

In this talk (based on arXiv:1202.4551 [nucl-th]), I present a new derivation of dissipative relativistic fluid dynamics from the Boltzmann equation via the method of moments. In constrast to previous derivations, the single-particle distribution function is not subjected to a truncation in an uncontrolled way. Instead, it is expanded in terms of irreducible tensors in momentum-space and orthogonal polynomials in energy. The infinite system of moment equations, which is equivalent to the Boltzmann equation, can then be truncated in a controlled way by considering only the slowest microscopic time scale and a rigorous power-counting in Knudsen and inverse Reynolds numbers. I demonstrate that agreement with microscopic solutions of the Boltzmann equation for specific test problems can be improved by going beyond the traditional 14-moment approximation

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