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Universality of Energy-Momentum Response in Conformal Kinetic Theories

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Viscous hydrodynamics serves as a successful mesoscopic description of the Quark-Gluon Plasma (QGP) on large time and distance scales. Since highly energetic Jets deposit part of their energy into the QGP in a very localized fashion, it is important to understand to what extent the propagation of the deposited energy can be described within hydrodynamics. We investigate this problem by studying the evolution of energy-momentum perturbations in kinetic theories, with varying gradients from microscopic to macroscopic scales. By comparing results for different microscopic theories (QCD, Yang-Mills, RTA, Scalars) we find a remarkable degree of universality, where the evolution of energy-momentum perturbations of the QGP is rather well described by one hydrodynamic mode and one non-hydrodynamic mode. We discuss the implications of our findings for the theoretical description of the medium response to Jets in Heavy-Ion collisions.

Experiment/Theory

Theory/Phenomenology

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