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Non-Hydrodynamic Modes from Linear Response in Kinetic Theory

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Viscous hydrodynamics serves as a successful mesoscopic description of the QGP produced in relativistic heavy-ion collisions. In order to investigate, how such an effective description emerges from the underlying microscopic dynamics we calculate the non-hydrodynamic and hydrodynamic modes of linear response in the sound channel from a first-principle calculation in kinetic theory. We do this with a new approach wherein we linearize and discretize the collision kernel to calculate eigenvalues directly. This allows us to study the Green's functions at any point in time or frequency space. Our study focuses on scalar theory with quartic interaction and we find that the analytic structure of Green's functions in the complex plane is far more complicated than just poles or cuts which is the first step towards an equivalent study in QCD kinetic theory.

Category

Theory

Collaboration (if applicable)

Authors: Prof. SCHLICHTING, Soeren (Universität Bielefeld); OCHSENFELD, Stephan (Bielefeld University)

Presenter: OCHSENFELD, Stephan (Bielefeld University)

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