

Jelle Hartong: "Fluid Dynamics for Systems without Boost Invariance"

Wednesday, 20 June 2018 12:00 (45 minutes)

There are many systems in physics whose hydrodynamic limit requires a formulation of fluid dynamics in the absence of boost symmetries. Such a theory of hydrodynamics has so far not been considered in generality. In this talk I will present this theory for perfect fluids, and then generalize it to include first order transport coefficients such as viscosities and conductivities. It will be shown that linearized perturbations around a charged perfect fluid at rest, that obey the Onsager relations, contain 5 dissipative transport coefficients (3 conductivities, 2 viscosities) and one non-dissipative transport coefficient. Special attention will be given to the properties of scale invariant fluids with generic dynamical exponent z . In particular I will present a no-go theorem that states that perfect fluids with $z \neq 1, 2$ cannot be boost invariant.

Keywords:

Fluids without boost symmetry, dynamical scaling vs. boost invariance, speed of sound for a non-boost invariant fluid with dynamical scaling, gas of free Lifshitz particles, new transport coefficients

Session Classification: Morning session