

Ghost effect from Boltzmann theory

吴磊 Lehigh University

摘要: The hydrodynamic limit aims to derive fluid equations (such as the Euler and Navier-Stokes equations) from kinetic theory (such as the Boltzmann and Landau equations) in a rigorous manner. This is a key ingredient for addressing the Hilbert sixth problem. As the Knudsen number (which measures mean free path) approaches zero, almost all standard fluid equations can be derived through proper scaling. Our work presents an unusual hydrodynamic limit that shows genuine kinetic effects, known as the ghost effect. The density and temperature of order 1 are coupled with the velocity of order ε which acts like a "ghost" that can't be observed at the fluid level. This suggests that standard fluid mechanics is incomplete in describing many-particle systems even at the continuum regime. This is joint work with Raffaele Esposito, Yan Guo and Rossana Marra, and is mainly based on preprints <https://arxiv.org/abs/2301.09427> and <https://arxiv.org/abs/2301.09560>.

时间: 2023年7月14日 15:00

地点: 文萃楼E1008