Abstract Submitted
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From Lattice Boltzmann to hydrodynamics in dissipative relativistic fluids[1] ALESSANDRO GABBANA, INFN-Ferrara and Universit di Ferrara and Bergische Universitt Wuppertal, MILLER MENDOZA, ETH Zrich, SAURO SUCCI, Istituto per le Applicazioni del Calcolo C.N.R., RAFFAELE TRIPICCIONE, INFN-Ferrara and Universit di Ferrara — Relativistic fluid dynamics is currently applied to several fields of modern physics, covering many physical scales, from astrophysics, to atomic scales (e.g. in the study of effective 2D systems such as graphene) and further down to subnuclear scales (e.g. quark-gluon plasmas). This talk focuses on recent progress in the largely debated connection between kinetic transport coefficients and macroscopic hydrodynamic parameters in dissipative relativistic fluid dynamics. We use a new relativistic Lattice Boltzmann method (RLBM), able to handle from ultra-relativistic to almost non-relativistic flows, and obtain strong evidence that the Chapman-Enskog expansion provides the correct pathway from kinetic theory to hydrodynamics. This analysis confirms recently obtained theoretical results, which can be used to obtain accurate calibrations for RLBM methods applied to realistic physics systems in the relativistic regime. Using this calibration methodology, RLBM methods are able to deliver improved physical accuracy in the simulation of the physical systems described above.

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