

THE PUZZLE OF HYDRODYNAMICS IN HEAVY-ION COLLISIONS

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ABSTRACT

The use of relativistic hydrodynamics in Heavy-Ion Collisions is puzzling. The classical requirements of small gradients and pressure corrections are often significantly violated. The classical expectations are subverted [1], a free quantum gas has the entropy flow of a perfect fluid, despite having pressure correction, and entropy is produced, despite being a non-interacting gas. In general the quantum corrections are large with respect to the kinetic limit [2]. It is questionable then any direct derivation of hydrodynamics from the relativistic Boltzmann equation. The method of moments, on the other hand can be generalized to the full off-shell (quantum) regime [3].

Keywords: relativistic hydrodynamics, entropy flux, non-equilibrium density operator

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