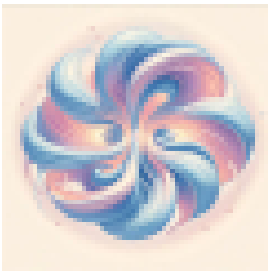

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Relativistic stochastic advection diffusion equation using Metropolis

jeudi 25 juillet 2024 15:30 (30 minutes)

We present a method for simulating the stochastic relativistic advection-diffusion equation using the Metropolis algorithm. This approach simulates dissipative dynamics by randomly transferring charge between fluid cells, combined with ideal hydrodynamic time steps. Charge transfers are accepted or rejected based on entropy as a statistical weight in a Metropolis step. This reproduces expected dissipative strains in relativistic hydrodynamics within a specific hydrodynamic frame known as the density-frame. Numerical results, with and without noise, are compared to relativistic kinetics and analytical expectations. Notably, unlike other numerical approaches, this method is strictly first order in gradients and lacks non-hydrodynamic modes. The simplicity and convergence properties of the Metropolis algorithm make it promising for simulating stochastic relativistic fluids in heavy ion collisions and critical phenomena.

Auteurs principaux: Prof. BASAR, Gokce (University of North Carolina); M. BHAMBURE, Jay (Stony Brook University); Dr SINGH, Rajeev (West University of Timisoara); TEANEY, Derek (Stony Brook University)

Orateur: Dr SINGH, Rajeev (West University of Timisoara)

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