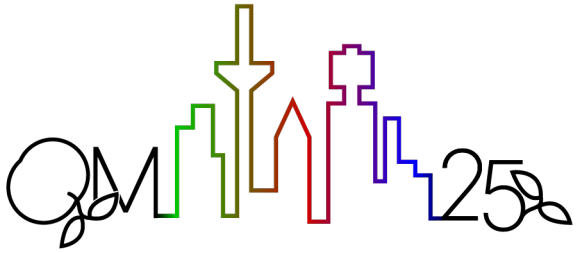

Contribution ID: **707** Type: **Poster**

Stochastic Non-Relativistic Hydrodynamics

Stochastic hydrodynamics provides a dynamical framework for the evolution of fluctuations in heavy-ion collisions. Due to the small volume of the system, thermal fluctuations can become sizeable and probe the equation of state of the system, being particularly sensitive to a possible QCD critical endpoint.
Our present numerical setup can simulate stochastic non-relativistic hydrodynamics in a box, taking only equations of state and transport coefficients as input parameters. Fluctuations are sampled in a Metropolis update step. Since the acceptance probability depends specifically on the change in entropy, the setup is particularly stable and robust to the typical problem of unphysical entropy production. Additionally, approximations or microscopic assumptions about the fluctuations are not necessary.
Apart from the details of the numerical setup, we present macroscopic and microscopic numerical test cases for equilibration properties and fluctuation-dissipation relations, as well as an outlook on renormalization of transport coefficients and the extension to stochastic relativistic hydrodynamics.

Category

Theory

Collaboration (if applicable)

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Session Classification: Poster session 2

Track Classification: New theoretical developments