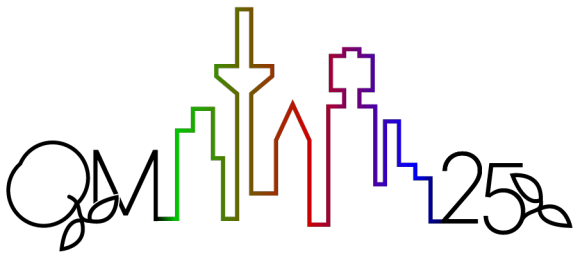

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Initial state dynamics and baryon stopping at RHIC BES energies: transport modeling vs. multi-fluid approach

In this work, we compare two multi-stage approaches for RHIC BES energies that both model the hot and dense part of the medium evolution with fluid dynamics, while have different strategies for the early-stage dynamics and baryon stopping. This work is important in the context of RHIC Beam Energy Scan program and future FAIR experiments, exploring the phase diagram of QCD and locating its possible critical point. At such energies, the nuclear inter-penetration time is large, therefore constraining the early-stage dynamics, that is most sensitive to the EoS at high baryon densities, is essential.

The first approach is dynamical fluidization, where the fluid is generated from a transport approach (SMASH) based on sufficient local energy density in the hadronic state by fluidizing hadrons, realizing a dynamic core-corona scenario. The fireball fluid is in this case generated with both energy and baryon currents, thus is not baryon-free.

The second approach is represented by MUlti Fluid simulation for Fast IoN collisions (MUFFIN) model, that treats the colliding nuclei as two cold baryon-rich fluids with the third fireball fluid emerging from their friction baryon-less (in the current implementation).

First the friction terms in the multifluid model and their counterparts, source terms in the dynamical fluidization approach are compared, exploring how the transport approach can inform the friction term formulation. The difference in the formation of the central fireball fluid is also studied, specifically the energy and baryon density distributions and their effect on the resulting spectra, primarily net-proton distributions.

Category

Theory

Collaboration (if applicable)

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