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Flow and hyperon polarization at RHIC BES from multi-fluid dynamics

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We present a study of flow and hyperon polarization observables at RHIC BES energies in a MUlti Fluid simulation for Fast IoN collisions (MUFFIN) model. MUFFIN is based on a multi-fluid approach to relativistic heavy-ion collisions, and treats the initial stage of heavy-ion reaction as mutual inter-penetration of baryon-rich fluids. It is implemented from scratch with the use of a versatile 3+1 dimensional relativistic viscous hydrodynamic code vHLLE. The model is aimed at describing heavy-ion collision dynamics at lower RHIC BES energies, including the fixed-target mode, and energies of future FAIR facility.
Global angular momentum and directed flow have the same prerequisites, which are baryon stopping and finite impact parameter. Therefore we study them together. We discuss underlying vorticity development in multi-fluid approach, hyperon - anti-hyperon splitting, and compare our results to the recent data for hyperon polarization from HADES experiment at GSI, and a measurement from fixed-target program at RHIC, in addition to previous measurements within RHIC BES program. We examine directed flow observable at different collision energies, and show its equation-of-state dependence and the effects of final-state hadronic cascade, in a full-fledged dynamical model.

Category

Theory

Collaboration (if applicable)

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