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Hybrid approach to relativistic heavy-ion collisions at the RHIC BES energies

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Using a hybrid (viscous hydrodynamics + hadronic cascade) framework, we model event-by-event bulk dynamics of relativistic heavy-ion collisions at the Relativistic Heavy Ion Collider (RHIC) Beam Energy Scan (BES) collision energies, including the effects from non-zero net baryon current and its dissipative diffusion during the evolution. This framework is in full (3+1)D, which allows us to study the non-trivial longitudinal structure and dynamics of the collision systems, for example, the baryon stopping and transport, as well as longitudinal fluctuations. We study hadronic chemistry, identified particle spectra, anisotropic flow, and HBT interferometry over the energy range relevant to the RHIC BES. For the first time, quantitative effects of boost-invariance breaking, net-baryon current/diffusion, and pre-equilibrium dynamics on these hadronic observables will be addressed. Finally, flow predictions for recent d+Au collisions at BES energies will be presented within the same framework. They shed new light on understanding the collective nature of small quark-gluon droplets.

Preferred Track

Collective Dynamics

Collaboration

BEST

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