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Helicity polarization and vorticity contribution to the spin alignment in hydrodynamic approaches

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We investigate the hydrodynamic helicity polarization of Λ hyperons, defined as the projection of the spin polarization vector along the directions of particle momenta, at RHIC-BES energies by utilizing the relativistic (3+1)D CLVisc hydrodynamics framework with SMASH initial conditions. As opposed to local spin polarization at high energy collisions, our hydrodynamic simulations demonstrate that the helicity polarization induced by the kinetic vorticity dominates over other contributions at intermediate and low collision energies. Our findings provide an opportunity to probe the fine structure of local kinetic vorticity as a function of azimuthal angle at intermediate and low collision energies by mapping our predictions to the future measurements in experiments. In addition, we also study the vorticity contribution to 00 component of the spin density matrix for final ϕ mesons $\bar{\rho}_{00}^{\phi}$.

Category

Theory

Collaboration (if applicable)

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