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# Local and global polarization of $\Lambda$ hyperons across RHIC-BES energies: The roles of spin hall effect, initial condition, and baryon diffusion

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We perform a systematic study on the local and global spin polarization of $\Lambda$ and $\bar{\Lambda}$ hyperons[1] in relativistic heavy-ion collisions at beam energy scan energies via the (3+1)-dimensional CLVisc hydrodynamics model[2] with a AMPT and SMASH initial conditions. Following the quantum kinetic theory, we decompose the polarization vector as the parts induced by thermal vorticity, shear tensor and the spin Hall effect (SHE). We find that the polarization induced by the SHE and the total polarization strongly depends on the initial conditions. And the polarization along the beam direction is sensitive to the baryon diffusion coefficient, but the local polarization along the out-of-plane direction is not. Our results for the global polarization agree well with the data of the STAR Collaboration.

[1] Xiang-Yu Wu, Cong Yi, Guang-You Qin, and Shi Pu, Phys.Rev.C 105, 064909 (2022)
[2]Xiang-Yu Wu, Guang-You Qin, Long-Gang Pang, and Xin-Nian Wang, Phys. Rev.C 105,034909(2022)

## Theory / experiment

Theory

## Group or collaboration name

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