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Local spin polarization in high energy heavy ion collisions

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We revisit the azimuthal angle dependence of the local spin polarization of hyperons in heavy-ion collisions at 200 GeV in the framework of the (3+1)D viscous hydrodynamic model CLVisc. Two different initial conditions are considered in our simulation: the optical Glauber initial condition without initial orbital angular momentum and the AMPT initial condition with an initial orbital angular momentum. We find that the azimuthal angle dependence of the hyperon polarization strongly depends on the choice of the so-called 'spin chemical potential'. If it is chosen to be proportional to the temperature vorticity, our simulation shows qualitatively coincidental results with the recent measurements at RHIC for both the longitudinal and transverse polarization. We argue that such a coincidence may be related to the fact that the temperature vorticity is approximately conserved in the hot quark-gluon matter.

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