Measurements of Global and Local Polarization of Hyperons in Heavy Ion Collisions from STAR

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The observation of hyperon polarization has revealed the existence of large vorticities in the medium created by heavy-ion collisions. Global polarization indicates vorticities perpendicular to the reaction plane due to the system's orbital angular momentum. Using the high-statistics data collected by the STAR experiment during the RHIC BES-II program with upgraded detector systems, we present the global polarization measurements for Λ, $\bar{\Lambda}$ and $\Xi^{\pm}$ hyperons for Au+Au collisions at BES-II energies ($\sqrt{s_{\rm NN}} = 7.7 - 27$ GeV). These measurements allow us to study possible magnetic field driven effects through the polarization difference between Λ and $\bar{\Lambda}$ hyperon. Anisotropic transverse expansion of the medium generates vorticities along the beam direction, which consequently result in polarization for hyperons, referred to as local polarization. We present the measurements of Λ, $\bar{\Lambda}$ hyperon local polarization in isobar collisions at $\sqrt{s_{\rm NN}} = 200$ GeV and Au+Au collisions at BES-II energies. These results provide new insights into polarization mechanism and vorticity fields in heavy-ion collisions as well as additional constraints on properties and dynamics of the matter created in the collisions.