

# Probing novel baryonic Spin Hall Effect via measurement of local spin polarization of $\Lambda$ hyperons in STAR Beam Energy Scan

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The Spin Hall Effect (SHE) is instrumental in investigating quantum effects in many-body systems. Recently, theoretical calculations indicate that the gradient of baryonic chemical potential (analogous to the electric field) can induce a sizable spin Hall current. At the RHIC Beam Energy Scan (BES) energies, the sign as well as the pattern of energy dependence of the difference in the second harmonic coefficient between polarization of  $\Lambda$  and  $\bar{\Lambda}$  hyperons, could be significantly different with and without the baryonic spin Hall current. In this talk, we will present the first measurement of second harmonic coefficients of  $\Lambda$  hyperons' spin polarization ( $\langle \cos(2\phi) \rangle_x$ ,  $\langle \cos(2\phi) \rangle_y$  and  $\langle \cos(2\phi) \rangle_z$ , where  $\phi = \psi - \psi_2$ ) as a function of transverse momentum, rapidity, and collision centrality in RHIC BES-II Au+Au collisions at  $\sqrt{s_{NN}} = 14.6, 19.6$  and 27 GeV. This can serve as the first probe of the baryonic SHE in heavy-ion collisions.

## Theory / experiment

Experiment

## Group or collaboration name

STAR

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