Contribution ID: **101** Contribution code: **POS-BLK-07** Type: **Poster**

Probing novel baryonic spin Hall effect using Λ spin polarization at STAR

Tuesday 14 June 2022 17:25 (1 minute)

The Spin Hall Effect (SHE) is a generation of spin polarization for moving spin carriers in materials under an external electric field and is instrumental in investigating quantum effects in many-body systems [1]. Recent theoretical calculations indicate that the gradient of baryonic chemical potential (analogous to the electric field) can induce a sizeable spin Hall current in Au+Au collisions at $\sqrt{s_{NN}} \sim 10$ GeV. Furthermore, at the RHIC Beam Energy Scan (BES) energies, the sign as well as the pattern of energy dependence of the difference between the harmonics of spin polarization of Λ and $\overline{\Lambda}$ hyperons, can be significantly different with and without the presence of baryonic spin Hall current [2-4].

In this talk, we will present the harmonic coefficients of Λ hyperons' spin polarization ($P_x \sin(2\Delta\phi)$, $P_y \cos(2\Delta\phi)$, $P_z \sin(2\Delta\phi)$) as functions of transverse momentum, rapidity, and collision centrality in RHIC BES-II Au+Au collisions at $\sqrt{s_{NN}}$ = 7.7, 14.6, 19.6, and 27 GeV. These measurements serve as the first experimental probe of the predicted baryonic SHE in heavy-ion collisions.

[1] Y. Kato *el al.*, Science 306 (2004) 1910
[2] S. Liu *et al.*, JHEP 07 (2021) 181
[3] B. Fu *et al.*, Phys. Rev. Lett. 127 (2021) 142301
[4] B. Fu *et al.*, arXiv: 2201.12970 (2022)

Present via

Online

Author: HU, Qiang (Institute of Modern Physics of Chinese Academy of Science)

Co-author: STAR COLLABORATION

Presenters: HU, Qiang (Institute of Modern Physics of Chinese Academy of Science); HU, Qiang

Session Classification: Poster

Track Classification: Bulk matter phenomena, QCD phase diagram, and Critical point