Hyperon polarization along the beam direction relative to the second and third order event planes in isobar collisions from STAR

Takafumi Niida for the STAR Collaboration
(University of Tsukuba)

Non-trivial collective velocity field due to anisotropic flow leads to vorticity along the beam direction in heavy-ion collisions. Polarization of Λ and $\bar{\Lambda}$ hyperons along the beam direction relative to the elliptic flow plane has been observed in Au+Au collisions at RHIC and Pb+Pb collisions at the LHC. However, unlike for the case of the global polarization originating from the initial orbital angular momentum, theoretical models fail to describe its magnitude and sign, which is currently under intense discussion. Measurements of the hyperon polarization in colliding systems smaller than Au+Au may shed light on this problem. One can also expect a local polarization arising from higher harmonic flow, which provides new insight into the vorticity and polarization phenomena.

We present the first measurements of Λ hyperon local polarization relative to the second and third order event planes in Ru+Ru and Zr+Zr collisions at $\sqrt{s_{\rm NN}} = 200$ GeV. The results will be compared to those in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV and the physics implications will be discussed.