

Global polarization of Lambda hyperons in Au+Au Collisions at RHIC BES

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Non-central heavy-ion collisions have large ($\sim 10^5 \hbar$) angular momentum which may be transferred, in part, to the quark-gluon plasma through shear forces that generate a vortical substructure in the hydrodynamic flow field. The vortical nature of the system is expected to polarize emitted hadrons along the direction of system angular momentum. Λ and $\bar{\Lambda}$ hyperons, which reveal their polarization through decay topology, should be polarized similarly. The vorticity of the fluid is an important parameter for the generation of a Chiral Vortical Effect (CVE).

These same collisions are also characterized by dynamic magnetic fields with magnitude as large as 10^{14} Tesla. A splitting between Λ and $\bar{\Lambda}$ polarization may signal a magnetic coupling and provide a quantitative estimate of the field strength at freeze out. Details of the magnetic field and its evolution are of particular interest to other novel phenomena, e.g. the Chiral Magnetic Effect (CME).

The STAR Collaboration has made the first observation of global hyperon polarization in non-central Au+Au collisions at Beam Energy Scan energies. A magnetic splitting is hinted at, but the improved statistics and resolution achievable with future runs are required to make a definitive measurement of the magnetic field.

Preferred Track

Collective Dynamics

Collaboration

STAR

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