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Chiral Magnetic Effects and Magnetic Field Features in Relativistic Heavy-Ion Collisions

Considering the magnetic field response of the QGP medium, we perform a systematical study of the chiral magnetic effect (CME), and make a comparison with the experimental results for the background-subtracted correlator H at the energies of the RHIC Beam Energy Scan (BES) and the LHC energy. The CME signals from our computations show a centrality trend and beam energy dependence that are qualitatively consistent with the experimental measurements of the charge dependent correlations. The time evolution of the chiral electromagnetic current at the RHIC and LHC energies is systematically studied. Recent STAR measurements suggest a difference in the global spin polarization between hyperons and anti-hyperons, especially at relatively low collision beam energy. One possible cause of this difference is the potential presence of in-medium magnetic field. In this study, we investigate the phenomenological viability of this interpretation. Using the AMPT model framework, we quantify the influence of different magnetic field evolution scenarios on the size of the polarization difference in a wide span of collision beam energies.

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