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Effect of simulating parity-odd observables in high energy heavy ion collisions on balance functions of charged particles and elliptic flow of pions

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At the early stage of heavy ion collisions, non-trivial topologies of the gauge fields can be created resulting in an imbalance of axial charge density and eventually separation of electric charges along the direction of the magnetic field produced in such collisions. This process is called the chiral magnetic effect (CME). In this work we implement such a charge separation at the partonic level in AMPT for Au+Au collisions at $\sqrt{s_{NN}}$ = 200 GeV to study its consequence on experimental observables. We present the effects on the pion elliptic flow (v_2) and the charged particle balance function (BF) for varying strengths of initial charge separation. We find that the shape of the balance function is sensitive to the increasing charge separation. v_2 of pion shows a strong decreasing trend at higher transverse momenta (p_T) with increasing charge separation. Charge balance functions show a peak at $\Delta\phi \sim 180$ with charge separation implemented in the partonic level as expected for the parity violation. We have also calculated parity observable γ in the form of BF's moments. γ shows a decreasing trend with charge separation. It has a negative value for charge separation produced by flipping more than 30 $\%$ of quarks in the parton level. We also notice that $< \gamma >$ for the same charge correlation and the opposite charge correlation shows negative and positive values, respectively.

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