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Hydrodynamics with chiral anomaly and charge separation in relativistic heavy ion collisions

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Chiral Magnetic Effect (CME) is a phenomenon that for systems with chiral fermions, in the presence of external magnetic field and chirality imbalance, a charge current is generated along the magnetic field direction. The CME predicts that for quark-gluon plasma (QGP) created in relativistic heavy ion collisions, there would be a charge separation perpendicular to the collisional reaction plane. Charge correlation measurements designed for the search of such signal have been done at RHIC and the LHC for which the interpretations, however, remain unclear due to contamination by background effects that are collective flow driven, theoretically poorly constrained, and experimentally hard to separate. Using anomalous (and viscous) hydrodynamic simulations, we make a first attempt at quantifying contributions to observed charge correlations from both CME and background effects in one and same framework. The implications for the search of CME are discussed.

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