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Charge-dependent directed flow measurements in Cu+Au collisions at \sqrt{s_{NN}} =200 GeV with the STAR experiment

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At the early stages of non-central heavy-ion collisions, a strong magnetic field perpendicular to the reaction plane is created. In asymmetric Cu+Au collisions, due to the difference in the number of spectators, not only the magnetic field but also a strong electric field (E-field) would be created along the reaction plane and pointing from the Au-nucleus to Cu-nucleus. The lifetime of the E-field would be very short, of the order of a fraction of a fm/c. The quarks and antiquarks that have been already produced at this time would experience the Coulomb force, which results in charge separation of directed flow. Thus, the measurement of the charge-dependent directed flow in Cu+Au provides an opportunity to study the time dependence of light quark production in heavy-ion collisions. Understanding the time evolution of the quark densities is also very important for detailed theoretical predictions of the Chiral Magnetic Effect and Chiral Magnetic Wave, which various experiments are actively searching for.

In this talk, the charge-dependent directed flow in Cu+Au collisions at \sqrt{s_{NN}} =200 GeV measured in the STAR experiment will be presented.
The results are compared with existing model predictions. Implications for the dynamics of quark production and system evolution will be discussed. Higher-harmonic flow will be also presented and compared with results in A+A collisions.

Collaboration

STAR

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