

Charge dependent directed flow of π^\pm , K^\pm , and $p(\bar{p})$ in Au+Au, ${}^{96}_{44}\text{Ru}+{}^{96}_{44}\text{Ru}$, and ${}^{96}_{40}\text{Zr}+{}^{96}_{40}\text{Zr}$ collisions from STAR

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Strong electromagnetic (EM) field in heavy-ion collisions could leave an imprint on the final-state particles. Due to such EM field, particles and anti-particles with opposite charges will receive opposite contributions to their rapidity-odd directed flow. Here, we present the charge-dependent measurements of dv_1/dy near midrapidity for π^\pm , K^\pm , and $p(\bar{p})$ in Au+Au and isobar collisions at $\sqrt{s_{NN}} = 200$ GeV, and in Au+Au at 27 GeV. A clear difference in dv_1/dy between positively and negatively charged hadrons ($\Delta dv_1/dy$) has been observed, and the $\Delta dv_1/dy$ changes from positive in central collisions to negative in peripheral collisions for kaons and protons. While the results in central events can be explained by u and d quarks transported from the initial-state nuclei, those in peripheral events reveal contributions from the Faraday induction and Coulomb effect for the first time in heavy-ion collisions.

Theory / experiment

Experiment

Group or collaboration name

STAR

Author: SHEN, Diyu

Presenter: SHEN, Diyu

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