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

Tuesday 25 April 2023 17:00 (20 minutes)

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 $\pi^{\pm}$, $K^{\pm}$, 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 $\Delta dv_1/d$y 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

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Session Classification: Poster Session

Track Classification: Intense field and vorticity