

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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ABSTRACT

1 Strong electromagnetic (EM) field in non-central heavy-ion collisions could leave an imprint on the final-state
2 particles. Due to such EM field, particles and anti-particles with opposite charges will receive opposite contributions
3 to their rapidity-odd directed flow ($v_1(y)$). Here, we present the charge-dependent measurements of dv_1/dy near
4 midrapidity for π^\pm , K^\pm , and $p(\bar{p})$ in Au+Au and isobar (${}^{96}_{44}\text{Ru}+{}^{96}_{44}\text{Ru}$ and ${}^{96}_{40}\text{Zr}+{}^{96}_{40}\text{Zr}$) collisions at $\sqrt{s_{NN}} = 200$ GeV,
5 and in Au+Au at 27 GeV, recorded by the STAR detector at the Relativistic Heavy Ion Collider. A clear difference
6 in dv_1/dy between positively and negatively charged hadrons ($\Delta dv_1/dy$) has been observed, and the $\Delta dv_1/dy$ changes
7 from positive in central collisions to negative in peripheral collisions for kaons and protons. While the results in
8 central events can be explained by u and d quarks transported from the initial-state nuclei, those in peripheral events
9 reveal contributions from the Faraday induction and Coulomb effect [1, 2] for the first time in heavy-ion collisions.

10 [1] U. Gürsoy *et al.* *Phy.Rev.C*, **98** 055201 (2018).

11 [2] K. Nakamura *et al.* *arXiv:2212.02124*.