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Search for the Chiral Magnetic Wave with Anisotropic Flow of Identified Particles at RHIC-STAR

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The chiral magnetic wave (CMW) has been theorized to propagate in the Quark-Gluon Plasma formed in high-energy heavy-ion collisions. It could cause a finite electric quadrupole moment of the collision system, and may be observed by charge asymmetry, A_{ch} , dependence of elliptic flow of positively and negatively charged hadrons. However, non-CMW mechanisms such as Local charge conservation (LCC) and hydrodynamics with isospin effect [1], could also contribute to the experimental observations.

In this talk, we present the STAR measurements of elliptic flow, v_2 , and triangular flow, v_3 , of charged pions, along with v_2 of charged kaons and protons, as a function of A_{ch} in Au+Au collisions at $\sqrt{s_{NN}} = 27, 39, 62.4$ and 200 GeV. The similarity between pion and kaon slopes suggests that the isospin effect is not the dominant mechanism. The slope parameters of $\Delta v_2(A_{ch})$ and $\Delta v_3(A_{ch})$ are reported and compared in different centrality and transverse momentum intervals to investigate the LCC background. The difference between the normalized Δv_2 and Δv_3 slopes, along with the measurements in small systems (p+Au and d+Au at $\sqrt{s_{NN}} = 200$ GeV), will be presented. Our data favor the CMW interpretation and disfavor the possibility that the observations result from LCC or hydrodynamics at RHIC energies.

Reference

[1] Y. Hatta, A. Monnai and B.-W. Xiao, Nucl. Phys. A947, 155 (2016).

Content type

Experiment

Collaboration

STAR

Centralised submission by Collaboration

Presenter name already specified

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