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Measurements of the Chiral Magnetic Effect with Background Isolation in 200 GeV Au+Au Collisions at STAR

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Using two novel methods, pair invariant mass (m_{inv}) [1] and comparative measurements with respect to reaction plane (ψ_{RP}) and participant plane (ψ_{PP}) [2], we isolate the chiral magnetic effect (CME) from backgrounds in 200 GeV Au+Au collisions at STAR.

The invariant mass method identifies the resonance background contributions, coupled with the elliptic flow (v_2), to the charge correlator CME observable ($\Delta\gamma$). At high mass ($m_{inv} > 1.5 \text{ GeV}/c^2$) where resonance contribution is small, $\Delta\gamma$ is found to be consistent with zero within uncertainty. In the low mass region ($m_{inv} < 1.5 \text{ GeV}/c^2$), resonance peaks are observed in $\Delta\gamma$ as function of m_{inv} . A two-component model fit is devised to extract the CME signal, assumed smooth in m_{inv} .

In the comparative method, the ψ_{RP} is assessed by spectator neutrons measured by the ZDC, and the ψ_{PP} by the 2nd harmonic event plane measured by TPC. The v_2 is stronger along ψ_{PP} and weaker along ψ_{RP} ; in contrast, the magnetic field, being from spectator protons, is weaker along ψ_{PP} and stronger along ψ_{RP} . As a result the $\Delta\gamma$ measured with respect to ψ_{RP} and ψ_{PP} contain different amounts of CME and background, and can thus determine these two contributions. We report the results from this determination.

References

- [1] J. Zhao, H. Li, F. Wang, arXiv:1705.05410 (2017).
- [2] H. Xu, J. Zhao, X. Wang, H. Li, Z. Lin, C. Shen, F. Wang, arXiv:1710.07265 (2017).

Content type

Experiment

Collaboration

STAR

Centralised submission by Collaboration

Presenter name already specified

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