

Search for the Chiral Magnetic Effect with Isobar Collisions at STAR

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Abstract

The chiral magnetic effect (CME) is predicted to occur as a consequence of a local violation of P and CP symmetries of the strong interaction amidst a strong magnetic field generated in relativistic heavy-ion collisions. Experimental manifestation of the CME involves a separation of positively and negatively charged hadrons along the direction of the magnetic field. Previous measurements of the CME-sensitive charge-separation observables remain inconclusive because of large background contributions. In order to better control the influence of signal and backgrounds, the STAR Collaboration has performed a blind analysis of a large data sample of approximately 3.8 billion isobar ($^{96}_{44}\text{Ru} + ^{96}_{44}\text{Ru}$ and $^{96}_{40}\text{Zr} + ^{96}_{40}\text{Zr}$) collisions at the top RHIC energy. Prior to the blind analysis, the CME signatures were pre-defined as a significant excess of the CME-sensitive observables in Ru+Ru collisions over those in Zr+Zr collisions, owing to a larger magnetic field in the former. This presentation reports on the findings from the isobar blind analysis [1].

References

- [1] J. Adam, et al. STAR Collaboration, Search for the Chiral Magnetic Effect with Isobar Collisions at $\sqrt{s_{NN}} = 200$ GeV by the STAR Collaboration at RHIC, (2021), arXiv:2109.00131[nucl-ex].