Chiral Magnetic Effect search in isobaric ($^{96}_{44}Ru + ^{96}_{44}Ru$ and $^{96}_{40}Zr + ^{96}_{40}Zr$) collisions at $\sqrt{s_{\rm NN}} = 200$ GeV at STAR using Sliding Dumbbell Method

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Abstract

In the past decade, experimental searches for the Chiral Magnetic Effect (CME) in heavy-ion collisions have yielded no conclusive proof of its existence. To investigate the CME in heavy-ion collisions, a new technique, the Sliding Dumbbell Method (SDM) [1], is devised to search for the back-to-back charge separation on an event-by-event basis. The SDM facilitates the selection of events corresponding to various charge separations (f_{DbCS}) across the dumbbell. The charge separation distributions for each collision centrality are partitioned into 10 percentile bins to identify probable CME-like events corresponding to the highest charge separation across the dumbbell.

Results for two- and three-particle correlators for isobaric (Ru+Ru and Zr+Zr) collisions at $\sqrt{s_{\rm NN}} = 200$ GeV will be discussed with respect to each bin of f_{DbCS} for each collision centrality. By shuffling the charges of particles in a specific collision centrality, we determine the background contribution resulting from statistical fluctuations. Correlated backgrounds among the produced particles that were lost due to shuffling are calculated for a particular f_{DbCS} bin of charged shuffled events using the corresponding original events.

References

[1] J. Singh, A. Attri, and M. M. Aggarwal, Proceedings of the DAE Symp. on Nucl. Phys. **64**, 830 (2019) "http://www.sympnp.org/proceedings/64/E66.pdf".