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Global tensor polarization of spin-3/2 hadrons and quark spin correlations in relativistic heavy-ion collisions

The STAR Collaboration results on global spin alignment of vector mesons in heavy-ion collisions [1] reveal that quarks in the quark-gluon plasma (QGP) exhibit not only global polarization[2, 3] but also spin correlations, leading the study on spin effects in heavy-ion collisions to a new climax.

A systematic formalism for describing spin correlations in a system of spin-1/2 particles and their relationships to experimental observables is given in Ref.[4]. This framework is further extended in Ref.[5] to compute the global polarizations of spin-3/2 baryons in relativistic heavy-ion collisions. The calculation results show that the rank-2 and rank-3 tensor polarizations of spin-3/2 baryons reflect local two and three quark spin correlations respectively. A more comprehensive set of results will be published in a forthcoming paper[6].

This report aims to present the relationships between measurable spin-3/2 baryon tensor polarization and quark spin correlations, explore methods to extract these correlations from measurements of successive spin-3/2 baryon decays.

References

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Primary authors: LIANG, Zuo-tang (Shandong University); WANG, Qun (University of Science and Technology of China); WANG, Xin-Nian (Central China Normal University); 张, 哲 (Institute of Modern Physics, Chinese Academy of Sciences); 吕, 济鹏 (Shandong University); YU, Zihan (Shandong University)

Presenter: YU, Zihan (Shandong University)

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