Contribution ID: **148** Type: **Oral**

Global quark spin correlations in relativistic heavy ion collisions

Measurements by the STAR Collaboration of global Λ hyperon polarization and ϕ, K^{*0} meson spin alignment in heavy-ion collisions [1, 2] have confirmed the global polarization of quark matter [3, 4] and indicated strong quark–antiquark spin correlations. Quark spin correlations have emerged as a new frontier and a rapidly developing research hotspot.

In Ref. [5], we propose a systematic method to describe quark spin correlations in quark matter, classifying them into local and long-range correlations. We show that the effective quark correlations contain genuine spin correlations originating directly from the dynamical process as well as those induced by averaging other degrees of freedom. We present a comprehensive study of the global polarization and spin correlations of vector mesons, spin-1/2 and spin-3/2 baryons, and baryon–(anti)baryon pairs in heavy-ion collisions [6]. This talk will summarize the main ideas and results [5, 6] and discuss future prospects.

References

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Session Classification: Spin in heavy ion collisions

Track Classification: Spin in heavy ion collisions