Measurements of Vector Meson Global Spin Alignment in Heavy-Ion Collisions at RHIC

Zhenyu Ye (for the STAR collaboration)

STAR collaboration observed a global spin alignment of φ-mesons in Au+Au collisions using the data from the first phase of the RHIC Beam Energy Scan program (BES- I) [1]. This cannot be explained by conventional mechanisms but may be attributable to the influence of vector meson force fields. In this talk, we present new measurements of vector meson global spin alignment by the STAR collaboration, including φ-mesons using higher-statistics Au+Au data at $\sqrt{s_{NN}}$= 7.7, 14.6, and 19.6 GeV from the BES-II program, φ, ω, and J/ψ-mesons in Au+Au, Ru+Ru, and Zr+Zr collisions at $\sqrt{s_{NN}}$= 200 GeV. These differential global spin alignment measurements of vector mesons with various constituent quarks can help understand the roles of the vector meson force field, medium evolution, and hadronization mechanisms in global spin alignment.

[1] STAR Collaboration. Nature 614, 244248 (2023)