

Differential measurements of ϕ -meson global spin alignment in Au+Au collisions at STAR

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Abstract

The STAR collaboration observed a significant global spin alignment (ρ_{00}) signal for ϕ -mesons in Au+Au collisions using the data from the BES-I [1] which cannot be explained by conventional mechanisms, but may be attributable to the influence of a ϕ meson force field [2-6]. In this talk, we present differential measurements of ϕ -meson global spin alignment using the STAR detector in Au+Au collisions at $\sqrt{s_{NN}} = 7.7, 14.6$ and 19.6 GeV from the second phase of the Beam Energy Scan at RHIC (BES-II). This study aims to clarify the source of the ϕ -meson ρ_{00} signal using increased statistics available from BES-II and detector upgrades to STAR after BES-I. The first rapidity (y) dependent ρ_{00} results for ϕ -mesons will be shown, alongside new centrality and transverse momentum (p_T) dependent measurements. The results presented in this talk will help understand the potential link of global spin alignment to vector meson fields and their roles in the evolution of nuclear matter.

References

- [1] STAR Collaboration., Nature **614**, 244–248 (2023)
- [2] X.L. Sheng et al., Physical Review D **101**, 096005 (2020).
- [3] X.L. Sheng et al., Physical Review D **105**, 099903 (2022).
- [4] X.L. Sheng et al., Physical Review D **102**, 056013 (2020).
- [5] X.L. Sheng et al., Physical Review Letters **131**, 042304 (2023).
- [6] X.L. Sheng et al., Physical Review C **108**, 054902 (2023).