Measuring the Global Spin Alignment of ϕ meson in Heavy Ion Collisions by STAR

C.W. Robertson[1]
(for the STAR Collaboration)
[1] *Department of Physics and Astronomy, Purdue University, West Lafayette, IN 47907, USA*
(Dated: May 30, 2024)

In non-central heavy-ion collisions, a large orbital angular momentum is produced. A part of the orbital angular momentum can polarize the quarks and anti-quarks, hence the vector mesons, inside the medium. Recently, STAR measured the global spin alignment of $\phi(1020)$ and $K^*(892)$ mesons in Au+Au collisions from the RHIC Beam Energy Scan I (BES I) program [1]. The global spin alignment, quantified by the 00^{th} coefficient of the spin density matrix, ρ_{00}, is measured by a fit to the acceptance and efficiency corrected ϕ meson yield versus polar angle (θ^*) between the daughter kaon in the parent's rest frame and the orbital angular momentum direction. In this talk, we present an alternative approach to extract ρ_{00} by utilizing the $\langle \cos^2 \theta^* \rangle$ as a function of pair-invariant mass instead of analyzing the ϕ meson yields in $\cos\theta^*$ bins. We use a data-driven method to correct for acceptance and efficiency. We report new analysis from this method.

[1] M. Abdallah *et al.* (STAR Collaboration), Nature **614**, 244–248 (2022).