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## Measuring the Global Spin Alignment of $\phi$ meson in Heavy Ion Collisions by STAR

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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,  $\rho_{00}$ , is measured by a fit to the acceptance and efficiency corrected  $\phi$  meson yield versus polar angle ( $\theta^*$ ) 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  $\rho_{00}$  by utilizing the  $\langle \cos^2\theta^* \rangle$  as a function of pair-invariant mass instead of analyzing the  $\phi$  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 and discuss physics implications.

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

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