Transverse Single Spin Asymmetry for Inclusive and Diffractive Electromagnetic Jets at Forward Rapidities in $p^{\uparrow}$+p Collisions at $\sqrt{s} = 200\,GeV$ and $510\,GeV$ at STAR

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Abstract

There have been numerous attempts, both theoretical and experimental, to understand the origin of the unexpectedly large transverse single spin asymmetry (A_N) for the inclusive hadron production at forward rapidities observed in $p^{\uparrow}$+p collisions at various center-of-mass energies. The twist-3 contributions in the collinear factorization framework and the transverse-momentum-dependent contributions from the initial-state quark and gluon Sivers functions and/or final-state Collins fragmentation functions are potential explanations to this puzzle. Previous analyses of A_N for forward π^0 and electromagnetic jets in $p^{\uparrow}$+p collisions at STAR indicated that there might be non-trivial contributions to the large A_N from diffractive processes [1]. The STAR Forward Meson Spectrometer (FMS) and Endcap ElectroMagnetic Calorimeter (EEMC) can detect photons, neutral pions, and eta mesons in the forward direction, with pseudorapidity coverages of $2.6 < \eta < 4.2$ and $1.0 < \eta < 2.0$, respectively. In this talk, we will present the latest preliminary results and analysis updates on A_N for inclusive and diffractive electromagnetic jets in the FMS and EEMC using $p^{\uparrow}$+p data at $\sqrt{s} = 200$ GeV and 510 GeV collected at STAR.

References

[1] (STAR) J. Adam *et al.*, Phys. Rev. D 103, 092009 (2021)