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Transverse single spin asymmetries at large Feynman x in the STAR experiment at RHIC

Large Transverse Single Spin Asymmetries (A_N) for forward rapidity inclusive hadron production have been observed over a wide range of center of mass energies. This large A_N has been described by phenomenological TMD models like Sivers and Collins mechanisms for initial and final state effects respectively, or by higher twist contributions in the initial and final states. It is necessary to go beyond inclusive hadron measurements of A_N to isolate the Sivers contributions, and we need to measure fragments in jets to account for the Collins contributions.

The STAR forward electromagnetic calorimeter, Forward Meson Spectrometer (FMS), measures π^0 and η mesons at high x_F (0.2-0.6) where A_N is known to be large. With the addition of pre-shower and post-shower detectors in 2015-2017, FMS is capable of detecting direct photons and Drell-Yan (DY) pairs and, hence, capable of testing the predicted change in sign of A_N in DY and direct photons compared to semi-inclusive DIS. Observation of large A_N for isolated π^0 is still a puzzle. In this context, we take advantage of the large acceptance of FMS to reconstruct electromagnetic jets. We will show A_N for electromagnetic jets and neutral pions and Collins measurements for π^0 's in jets from $p \uparrow + p \uparrow$ collisions at $\sqrt{s} = 500$ GeV.

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