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Measurement of the Transverse Single-Spin Asymmetries for π^0 and Jet-like Events at Forward Rapidities at STAR in $p + p$ Collisions at $\sqrt{s} = 500$ GeV

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Large transverse single-spin asymmetries (A_N) have been observed for forward inclusive hadron production in $p + p$ collisions at various experiments. In the collinear perturbative scattering picture, twist-3 multi-parton correlations can give rise to such an asymmetry. A transversely polarized quark can also give rise to a spin-dependent distribution of its hadron fragments via the higher twist equivalents of the Collins fragmentation function. The observed A_N may involve contributions from both processes. These can be disentangled by studying asymmetries for jets, direct photons and jet-fragments.

The STAR Forward Meson Spectrometer (FMS), a Pb-glass electromagnetic calorimeter covering the pseudo-rapidity (η) range 2.6-4.2 and full azimuth, can detect photons, neutral pions and eta mesons. We are measuring A_N for π^0 and jet-like events reconstructed from photons in the FMS in $p + p$ collisions at $\sqrt{s} = 500$ GeV that were recorded during the 2011 RHIC run. We study A_N as a function of the number of observed photons in FMS, thereby exploring asymmetries for a range of event classes. We further study A_N for forward jets and its dependency with forward-midrapidity jet correlation. The current status of the analysis will be discussed.

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