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Measurement of transverse single-spin asymmetries of π^0 and electromagnetic jets at forward rapidity in 200 and 500 GeV transversely polarized proton-proton collisions at STAR

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We present recent results of transverse single-spin asymmetries (TSSA) for neutral pions using the Forward Meson Spectrometer at STAR at center of mass energies of 200 and 500 GeV in proton-proton collisions. The results from the two energies show that the pion TSSA increases continuously with Feynman- x . Comparisons with previous measurements show that the pion TSSA is mostly independent of collision energy from 20 GeV to 510 GeV. It is found that isolated pions with no other particles nearby tend to have higher TSSA than the non-isolated ones which may suggest different mechanisms for the TSSA. In order to separate the contributions of initial and final state effects at both energies, we also measure the TSSA for the electromagnetic jets and the Collins asymmetry through the TSSA of neutral pions inside the electromagnetic jets. The jet TSSA follows the Feynman- x dependence of the pion TSSA, but with a significantly smaller amplitude. The Collins asymmetry is consistent with zero and shows evidence of a j_T dependence, which is the pion transverse momentum with respect to the jet axis. These results provide rich information to understand the physics mechanism of TSSA in hadron collisions.

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