Measurement of Transverse Spin Effects with the Forward Pion Detector of STAR

Larisa Nogach for the STAR collaboration

Institute of High Energy Physics, 1Pobeda street, Protvino, Moscow region 142281, Russia

Measurements by the STAR collaboration of neutral pion production at large Feynman x (x_F) in the first polarized proton collisions at $\sqrt{s}=200$ GeV were reported previously. Cross sections measured at $\eta=3.3$, 3.8 and 4.0 are found to be consistent with next-to-leading order perturbative QCD calculations. The analyzing power is consistent with zero at negative x_F and at positive x_F up to ~0.3, then grows more positive with increasing x_F . This behavior can be described by phenomenological models including the Sivers effect, the Collins effect or higher twist contributions in the initial and final states.

Forward calorimetry at STAR has been extended, and there are plans for further expansion. An integrated luminosity of 6.8 pb⁻¹ with average beam polarization of 60% from online polarimetry measurements was sampled with the upgraded FPD in the 2006 RHIC run. This data sample will allow for a detailed map of the π^0 analyzing power over kinematic variables bounded by $0.3 < x_F < 0.6$ and $1.2 < p_T < 5.0$ GeV/c at $\sqrt{s}=200$ GeV. The expanded FPD has observed multi-photon final states expected to have "jet-like" characteristics. The transverse spin dependence of jet-like events can discriminate between the Collins and Sivers effects and lead to further progress in understanding the origin of single spin asymmetries in forward particle production. Data were also obtained at $\sqrt{s}=62.4$ GeV for x_F up to 1 to test predictions based on phenomenological fits to earlier STAR results.

Recent results, the status of the analysis of 2006 run data and near-term plans will be discussed.