

Semi-inclusive DIS Experiments Using Transversely Polarized Targets in Hall-A: Current Results and Future Plans

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One of the cleanest ways to access the Transverse Momentum Dependent (TMD) spin structure of the nucleon is to measure both single and double spin asymmetries (SSA/DSA) in semi-inclusive DIS reaction using transversely polarized targets. In particular, the experimentally measured SSA on proton and neutron targets can help us in extracting the transversity and Sivers distribution functions of u and d-quarks. Similarly, the measured DSA are sensitive to the quark spin-orbital correlations, and provide access to the TMD parton distribution function (g_{1T}). Currently SIDIS data exists for transverse proton and deuteron targets from HERMES and COMPASS experiments. Recent experiments conducted in Hall-A Jefferson Lab using transversely polarized ^3He provide first such measurements on neutron target[1][2]. The measurement was performed using 5.9 GeV beam from CEBAF and measured the target SSA/DSA in the SIDIS reaction $^3\text{He}e^\uparrow(e, e'\pi^\pm)X$. The kinematical range, $x = 0.19 \sim 0.34$, at $Q^2 = 1.77 \sim 2.73 \text{ (GeV/c)}^2$, was focused on the valence quark region. In this talk I will present the results from this measurement and discuss plans for future high precision measurements in Hall-A, after the 12GeV energy upgrade, using SoLID spectrometer.

[1] X. Qian *et al.* Phys. Rev. Lett. **107**, 072003 (2011)

[2] J. Huang *et al.* Phys. Rev. Lett. **108**, 052001 (2012)

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