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Target Spin Asymmetries from CLAS/JLab

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The CLAS detector at Jefferson lab was used to measure semi-inclusive deep-inelastic scattering of 5.7 GeV electrons from longitudinally polarized protons in an NH₃ target. The target single spin asymmetry is observed to have a significant azimuthal angle dependence for π^+ , π^0 , and π^- , which have been fit with a combination of $\sin(\phi)$ and $\sin(2\phi)$ terms, sensitive to the product of the spin-dependent Collins fragmentation function and twist-3 and twist-2 transverse momentum dependent quark distribution functions, respectively. The data suggest non-zero quark transverse polarization in a longitudinally polarized target, in agreement with a prediction in the quark chiral soliton model. Studies of the double spin asymmetries A_{LL} in the same data set support the applicability of factorization in the kinematic region studied ($W > 2$ GeV, $Q^2 > 1.1$ GeV², and $0.4 < z, 0.7$). In particular, the asymmetries are independent of z and p_t , as predicted if factorization holds.

¹for the CLAS Collaboration