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Modeling the Partonic Structure of the Nucleon Through Semi-Inclusive Deep Inelastic Scattering¹ DANIEL BANKS, LEONARD GAM-BERG, Penn State University — The focus of this research is to model the transverse spin and momentum partonic structure of the nucleon. Using hard scattering processes such as semi-inclusive deep inelastic scattering (SIDIS) as a means to access this sub-structure it is evident that precise knowledge of the transverse degrees of freedom of partons (momentum and spin angular momentum) are essential to unfold a comprehensive description of the nucleon. Of particular importance are transverse momentum dependent parton distribution and fragmentation functions (TMD PDFs/FFs). By observing the experimental single-spin asymmetries of produced pions for a longitudinally polarized electron beam on an unpolarized nucleon we explore the spin-orbit correlations in the beam-spin asymmetry [1]. Considering these single-spin asymmetries we then model the twist-three TMD PDF, $g^{\perp}(x, \mathbf{k_T})$. We also study the factorization of the SIDIS cross sections for twist-3 TMD PDFs [2] by studying the issue of light cone divergence in the quark-target model.

[1] M. Aghasyan *et al.*, Phys. Lett B **704**, 397 (2011).

[2] L. P. Gamberg *et al.*, Phys. Lett B **639**, 508 (2006).

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