

# TMD Physics with SoLID at Jefferson Lab 12GeV

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There have been many efforts to access the transverse momentum dependent parton distributions (TMDs) by using the semi-inclusive deep inelastic scatterings (SIDIS) processes. The next generation SIDIS experiments with the proposed Solenoidal Large Intensity Device (SoLID) in Hall A at Jefferson Lab, will fully utilize the great physics potential of the 12-GeV energy upgrade by combining high luminosities and large acceptance. We will use 11 GeV and 8.8 GeV electron beams on transversely and longitudinally polarized  $^3\text{He}$  targets and a transversely polarized proton target with detection of charged pions and electrons in coincidence. The SoLID SIDIS experiments will provide 4D ( $x$ ,  $z$ ,  $Q^2$ ,  $P_T$ ) mappings of Sivers, Collins, pretzelosity and worm-gear asymmetries in the valence quark region with unprecedented precision. In this talk, we will present the experiment plans and the expected physics results on TMD extractions, transversity distributions, and the tensor charge of u and d quarks. The constraint on quark electric dipole moments (EDMs) with the tensor charge measurement and neutron EDM experiments will also be discussed.

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