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TMD Physics at 12-GeV Jefferson Lab with SoLID

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(for the SoLID Collaboration)

The Solenoidal Large Intensity Device (SoLID) has been proposed in Hall A at Jefferson Lab, which will fully utilize the great physics potential of the 12-GeV energy upgrade by combining high luminosities and large acceptance. Three of five highly-rated approved experiments are the semi-inclusive deep inelastic scatterings (SIDIS) of 11 GeV and 8.8 GeV electron beams on transversely and longitudinally polarized ^3He targets and a transversely polarized proton target with detection of charged pions and electrons in coincidence to study the transverse momentum dependent parton distributions (TMDs). The SoLID SIDIS experiment will provide 4-d (x, z, Q^2, PT) mappings of Sivers, Collins, pretzelosity and worm-gear asymmetries in the valence quark region with high precision. In this talk, we will present the expected physics results from SoLID SIDIS measurements 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. This work is supported in part by the US Department of Energy under contract numbers DE-FG02-03ER41231 and by the Duke Kunshan University.

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