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Overview of the Jefferson Lab Hall C SIDIS Experimental Program

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A new era of Semi-Inclusive Deep Inelastic Scattering (SIDIS) experiments at Jefferson Lab's Hall C began in 2018 after the commissioning of the new Super High Momentum Spectrometer (SHMS), and using the upgraded 11 GeV intense CW electron beam. Combined with the existing High Momentum Spectrometer (HMS), one can now perform SIDIS measurements on liquid Hydrogen and Deuterium as well as a variety of solid targets. The use of small acceptance focusing spectrometers and high luminosity allows the precise determination of very small cross sections. In particular it allows one to map out the SIDIS reaction, with high statistical accuracy, with respect to any of the variables x , Q^2 , z , p_T , and ϕ^* while keeping the other variables fixed.

First experiments focused on measurements of charged pion SIDIS at 10.5 GeV exploring the p_T and ϕ^* dependence as well as a study of charge symmetry breaking. In 2023 the SHMS carriage was used to hold a new high-resolution EM calorimeter, the Neutral Particle Spectrometer (NPS) and data were collected simultaneously on DVCS and neutral pion SIDIS. Since the DVCS experiment required a separation of the longitudinal/transverse (L/T) cross sections, this separation will also be possible for the SIDIS reaction. Finally, in summer 2025, experiments dedicated to determining the L/T charged pion SIDIS ratio from hydrogen, deuterium, carbon and copper have received their first block of running time, and are scheduled to be completed in 2026. Highlights from each of these programs will be presented along with discussion of future plans.

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