DIS 2015
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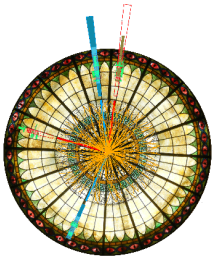

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The Halls B and C semi-inclusive deep inelastic scattering program towards the transverse momentum dependence of valence quarks

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Inclusive and semi-inclusive deep inelastic scattering (DIS and SIDIS) are important tools for understanding the structure of nucleons and nuclei. Spin asymmetries in polarized SIDIS are directly related to transverse momentum dependent parton distributions (TMDs) and fragmentation functions. The usual collinear parton distribution functions depend on the fraction of hadron momentum carried by the parton, x, and the space-time resolution scale, Q^2. The TMDs, which depend also on the intrinsic transverse momentum of the parton, k_T, provide a three-dimensional partonic picture of the nucleon in momentum space. These TMDs have not yet been studied in detail. The 12 GeV era at JLab can move this to a new level of sophistication, thanks to the extraordinary statistical accuracy achievable and the extended kinematic reach provided by the 11 GeV beam. This calls for a multi-pronged approach with multi-dimensional data, for all combinations of beam and target polarization, and different hadrons. Hall B with its large-acceptance CLAS12 spectrometer will likely be the workhorse of SIDIS physics to provide multi-dimensional cross sections, azimuthal distributions and single- and double-spin asymmetries, using both unpolarized and polarized proton and deuteron targets, and unpolarized nuclear targets. The much-anticipated addition of a RICH detector to the CLAS12 base equipment will start an unprecedented SIDIS program with kaons, giving insights to the strange flavor dependence of the TMDs. Hall C with its "pinhole"magnetic spectrometer pair would add precision cross sections and their ratios for both pions and kaons. The rigid connection to the pivot allows for longitudinal-transverse separations, unique amongst the Hall experimental setups. Given the relative simplicity to change the magnet polarities, and the anticipated large reproducibility and systematic understanding of the spectrometer setup, Hall C will be the best place for 1%-level measurements of π^+/π^- ratios, or kaon ratios, and due to its precision will allow for longitudinal-transverse separations, unique amongst the Hall experimental setups. Disadvantage of the setup is the lack of full azimuthal coverage at larger p_T. The multi-pronged SIDIS approach combining foreseen 12-GeV experiments in large acceptance Hall B and precision Hall C will be presented.

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