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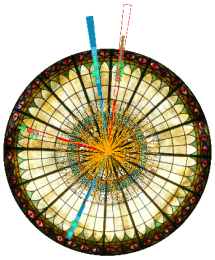

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Precision Measurements of Parity-Violation in Deep Inelastic Scattering using SoLID

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A new proposal to measure parity violating deep inelastic asymmetry (PVDIS) will provide a precision test of the Standard Model through an unique constraints on axial-vector neutral quark current couplings and a precision measurement of the weak mixing angle. We plan to measure the asymmetry to about 0.5% precision over the Bjoken x from 0.3 to 0.7 where the PV asymmetry is approximately independent of hadronic structure. If any deviations observed, the residual hadronic and new physics contributions in the asymmetry could be separated by kinematic dependence of the PVDIS asymmetry. At the proposed precision level, asymmetry will be sensitive to novel hadronic structure effects including charge symmetry violation (CSV) effects and higher twist effects. Observation of these effects itself will be beneficial to building better theoretical models. A deuterium target will be used for Standard Model tests while a d/u quark distribution ratio measurement is proposed using a hydrogen target.

The broad reach in kinematic and high statistical precision at which PVDIS asymmetries are planned to measure, a large angle acceptance, high luminosity, and large azimuthal acceptance device is a necessity. We are proposing a new spectrometer based on a solenoid magnet called Solenoidal Large Intensity Device (SoLID) that will provide broad range of electroweak and QCD physics measurements to be conducted at the Jefferson Laboratory. The apparatus will have set of tracking gas electron multiplier (GEM) detectors, a gas Cerenkov detector, and a sampling electromagnetic calorimeter to provide particle identification. The experiment will be conducted as a high rate counting mode experiment.

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