Report on the SoLID proposal: Measurement of the Asymmetry Between e+-2H and e--2H Deep Inelastic Scattering Using SoLID and PEPPo at JLab. Spokesperson: Xiaochao Zheng.

On June 7, 2018, the SoLID Proposal Review Committee (Paul Souder, Jian-ping Chen, Karl Slifer, Roger Carlini, and Cynthia Keppel) endorsed the proposal for conditional approval. While scientific case is excellent, extensive work is required to demonstrate the feasibility of the experiment. A conditional approval of the scientific case is necessary to justify the effort on this scale.

The committee found that the goal for the experiment, the measurement of C3q, to be highly motivated. However, the experiment faces two major challenges:

1. The development of a positron source at JLab.
2. The control of the systematic errors. The experiment requires the comparison of cross sections measure data different times with relative errors at the 10-5 level. Nothing like this has ever been attempted before.

Our report will focus on the second point.

 The proposal presents a number of innovative techniques to deal with systematic errors, including determining the differences in beam energy and luminosity by using the kinematic dependence of the cross section. However, a number of possible problems were not addressed, including the stability of the detectors, acceptance and readout electronics. The difference in beam position and angle were also not addressed. The mechanical stability of the magnet will make it hard to reach the field stability to 10-5 level.

The committee had a number of suggestions for improvements. To provide a convincing result, more flips between electrons and positrons would be helpful. The possibility of studying the long-term stability of the measured cross sections from past or near-term future high-statistics experiments was mentioned. In particular, the long-term stability of data for PRExII, MOLLER, and the SoLID SIDIS experiments could be analyzed. Such infor could help demonstrate the feasibility of the experiment. The electron beam could be degraded to match the phase space of the positron beam. A beam current monitor after the target could monitor density fluctuations.

ACTION: The SoLID Collaboration endorses this proposal for conditional approval.