

## Potential use of Solid Frozen-Spin HD Targets with Electron Beams

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Solid frozen-spin hydrogen-deuteride targets, have been used successfully with polarized photon beams for nuclear physics measurements over the past decade, first at Brookhaven Lab, and recently at Jefferson Lab [1-4]. With the completion of the 12 GeV upgrade to the Jefferson Lab accelerator, the focus of polarized HD at JLab has shifted to experiments with electron beams. In particular, three experiments requiring transversely polarized HD (to study Transverse Momentum and Generalized Parton Distributions) have been approved by the JLab PAC for Hall-B with the highest scientific rating and designated "High Impact". Recognizing the need for development and testing of the HD target with charged particles, Jefferson Lab is developing a small 10 MeV accelerator that can serve as a test bed. While beam-energy loss in the target at 10 GeV is much larger, most of this is in the form of bremsstrahlung which leaves the HD unaffected. In fact, a 10 MeV beam from this Facility will deposit roughly the same energy in the target as GeV beams. However, these low energy beams are much less rigid and strongly focused by the magnetic fields within the target cryostat. Extensive transport simulations and target modifications have been carried out in designing a program of tests that are expected to be representative of full scale GeV experiments. While these initial tests will be run with a longitudinal holding field, development of a novel transverse magnet based on a bulk high-Tc superconductor is underway for the Hall-B experiments. This talk will summarize the factors affecting target polarization and the status of preparations and development for eHD experiments.

- [1] S. Hoblit et al., Phys. Rev. Lett. 102 (2009) 172002.
- [2] D. Ho et al., Phys. Rev. Lett. 118 (2017) 242002.
- [1] C.D. Bass, et al., Nucl. Inst. Meth. Phys. Res. A737 (2014) 107.
- [2] M.M. Lowry, et al., Nucl. Inst. Meth. Phys. Res. A815 (2016) 31.

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