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A High-Magnetic-Field Polarized 3He Target for JLab's CLAS12

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Polarized ^{3}He nuclear targets have been invaluable surrogates for polarized neutron targets in spin-dependent scattering studies of the quark and gluon structure of matter. Traditional polarized ^{3}He targets have seen dramatic improvements in the last three decades, however they have been limited in their use in spectrometers that utilize high-magnetic-field tracking systems, such as Jefferson Lab's CLAS12 spectrometer. Developments in high-magnetic-field metastability exchange optical pumping of ^{3}He, recently brought to bear for a polarized ^{3}He ion source for RHIC and the EIC, offer a path to a high-field polarized ^{3}He fixed target. By combining these techniques with a double-cell cryogenic target design, such as the one used for the MIT-Bates 88-02 experiment, polarization and target density comparable to traditional polarized ^{3}He targets can be reached while within a high magnetic field environment. We will discuss the conceptual design for such a target, preview a concept for achieving polarization transverse to the incident beam with this method, and show our progress in this target's development.

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