

Abstract Submitted
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A New ^3He -Target Design for Compton Scattering Experiment

S. MAHALCHICK, Barnard College, H. GAO, G. LASKARIS, W. WEIR, Duke University, Q. YE, Oakridge National Laboratory, Q.J. YE, Duke University — The neutron spin polarizabilities describe the stiffness of the neutron spin to external electric and magnetic fields. A double-polarized elastic Compton Scattering experiment will try to determine the neutron spin polarizabilities using a new polarized ^3He target and the circularly polarized γ -beam of HI γ S facility at the Duke Free Electron Laser Laboratory (DFELL). To polarize the ^3He target, a newly constructed solenoid is being used which can provide a very uniform magnetic field around the target area and allows to place High Intensity Gamma Source NaI Detector Arrays (HINDA) closer to the target. The ideal target polarization is 40-60% and will be measured using the nuclear magnetic resonance (NMR) and electron paramagnetic resonance (EPR) techniques. A prototype of the polarized ^3He target is being constructed in the Medium Energy Physics Group laboratories at Duke and is currently being tested. The experiment is expected to take place in 2013 after the DFELL upgrade. I will be presenting details of the construction process, including design specifications and data from the magnetic field mapping, as well as preliminary target polarization results. This work is supported by the US Department of Energy, under contract number DE-FG02-03ER41231, and by the National Science Foundation, grant number NSF-PHY-08-51813.

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