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Measuring ^{3}He Cell Density Using a Tunable Laser[1] HANNAH DEBERG, University of Arkansas, KEVIN KRAMER, Duke University, HAIYAN GAO, Duke University and TUNL — Compton scattering experiments using polarized ^{3}He targets and the High Intensity Gamma Ray Source at the Duke Free Electron Laser Laboratory have been designed to investigate the spin polarizabilities of ^{3}He and the neutron. The targets will consist of high-pressure ^{3}He gas in glass cells that has been polarized by spin-exchange with optically pumped rubidium vapor. A precise knowledge of the number density of ^{3}He in the cells is necessary for the experiments; however, the cells can neither be opened nor contain pressure sensors. The polarization technique requires a small amount of rubidium and N_2 in the cell along with the ^{3}He. The width of the D1 and D2 absorption lines in rubidium are linearly related to the density of ^{3}He gas in the cells. Observing this widening of the absorption spectrum is achieved by using a tunable laser controlled by LabView software and measuring the power transmitted over a range of wavelengths. Preliminary results will be obtained and analyzed before the end of the summer.

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