Abstract Submitted
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Study of the New Pulse NMR System for the Jefferson Lab Helium-3 Polarized Target[1] JOSEPH NEWTON, Old Dominion University — At Jefferson Lab, a polarized Helium-3 target is used to study the neutron. The Helium-3 target is undergoing an upgrade to improve its polarization. Measuring it involved a new technique known as pulse Nuclear Magnetic Resonance (NMR). The focus of this project was to find noise in the Pulse NMR signal and to compute the calibration constant to make the polarization easier to deduce. Pulse NMR calibration tests were performed by doing AFP NMR measurements followed by Pulse NMR measurements while varying certain conditions. These included the convection heater, the operation of the oven, and the operation of the laser. Data analysis was done by fitting the pulse NMR signal from the oscilloscope and utilizing the Fourier Transform. Noise was analyzed in the fitting and the Fourier Transform. The calibration constants were affected by the convection heater. The values deviated between the pumping and target chambers of the cell when there was no convection but the values were closer when convection was induced. As far as the noise, it was found to be significant. These results will enable the calculation of the polarization with pulse NMR. In addition, the signal analysis provided insight into the influence of background noise on the pulse NMR measurement.

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