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Optimization of Spin-Polarization of Helium-3 Target Cell by Thermal Convection Processes STACY KARTHAS[1], University of New Hampshire — Polarized Helium-3 (3He) is an effective polarized neutron target that has been used in particle accelerators like the Thomas Jefferson National Accelerator Facility (TJNAF) for the past three decades to study properties of the neutron. Due to the spin structure of its nucleons, the nucleus of 3He can be approximated as a single polarized neutron. The previous generations of 3He targets have reached their limit in polarization and are not ideal for use as targets with the 12 GeV update at TJNAF due to large polarization gradients. The new target cell uses thermal convection to transfer polarized gas to the target chamber quickly. The focus of this project was to study the effects of the new convection system, at various gas velocities, on Adiabatic Fast Passage (AFP) polarization loss that results from measuring the polarization of 3He with Nuclear Magnetic Resonance (NMR). Gas velocities were varied by using a Kapton flexible heater to induce thermal convection. This target cell loses less than one percent of its polarization by measurement when convection is induced at a gas velocity under 6 cm/min thereby verifying the possible use of convection induction for the future experiments.

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