

Abstract Submitted
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Apparatus Improvements for the Neutron Spin Rotation Device E.S. ANDERSON¹, Indiana University Physics Department — The NSR collaboration proposes to search for parity violation in n-4He by searching for a rotation of the plane of polarization of transversely polarized neutrons moving through the liquid. This observable is sensitive to a linear combination of isovector and isoscalar weak amplitudes which is orthogonal to those already measured in p-4He. An earlier measurement conducted at NIST reported $d\theta/dz = [+1.7 \pm 9.1(\text{stat}) \pm 1.4(\text{sys.})] \times 10^{-7}$ rad/m [1]. We discuss apparatus improvements in preparation for a future experiment with a combined statistical and systematic error of 10^{-7} rad/m, which should suffice to see a nonzero effect. Statistical uncertainties and noise will be reduced using the new high fluence NG-C beamline at NIST, a helium reliquefier to eliminate LHe filling down time, and a liquid helium bellows pump for faster oscillation of the parity signal through liquid motion. Systematic errors can be reduced with improvements in magnetic shielding and greater uniformity of polarized neutron optics from new supermirror polarizers and analyzers.

[1] W.M. Snow et al, Phys. Rev. C **83** 2 2501 (2010).

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