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Simulations of Neutron Spin Rotation Measurements by the NSR Collaboration[1] BRET CRAWFORD, Gettysburg College, NSR COLLABORATION — The Neutron Spin Rotation (NSR) collaboration has developed an apparatus capable of measuring the rotation of transversely polarized neutrons to the level of a few times 10^{-7} rad/m to place limits on coupling constants of the hadronic weak interaction (HWI) and long-range exotic fifth forces [RSI 86, 055101 (2015)]. The NSR measurement of $d\phi/dz = [+1.7 \pm 9.1(stat.) \pm 1.4(sys.)] \times 10^{-7}$ rad/m [PRC 83, 022501(R) (2011)] for neutrons in liquid-He constrains both HWI coupling constants and the strength of possible exotic parity-odd long-range interactions [PRL 110, 082003 (2013)]. Given the dependence of possible systematic effects on the neutron phase space, neutron transport, and interactions with the target, a Monte-Carlo transport code was developed to examine the size of possible false rotations and their dependence on beam/apparatus characteristics. In addition, the code has been adapted to determine the sensitivity of measurements with a new target designed to measure a parity-conserving rotation due to possible long-range interactions. Simulation results and a status of the current experiment to place limits on the axial-axial coupling of such a long-range interaction and efforts to improve the HWI limits in liquid helium will be presented.

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