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Using polarized ^{3}He to probe 3-body interactions

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Low n nuclei with spin are important for understanding spin-dependent portions of 3-body interactions. These three body forces account for about 5% of the nuclear biding energy, but are poorly experimentally constrained. The binding energy of ^{4}He for example can only be predicted to about 1% with current theoretical calculations. The polarized n-^{3}He system can be used to probe these interactions with precision measurements of the associated cross sections. We have been following a two tiered path. First is to improve the accuracy of the n-^{3}He incoherent scattering cross section b_i though neutron spin-echo measutments, and second is to attempt to measure explicitly the polarized n-^{3}He absorption cross section σ_p (or absolute ^{3}He polarimetry) which is needed for an absolute determination of b_i. Recent experiments to measure b_i were performed at the SNS-NSE with data analysis ongoing, and measurements of σ_p are planned for the spring at ISIS.

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