Abstract Submitted
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Neutron interferometric precision measurement of the n-^{3}He incoherent scattering length[1] M.G. HUBER, M. ARIF, W.C. CHEN, T.R. GENTILE, D.S. HUSSEY, D.A. PUSHIN, L. YANG, NIST, F.E. WIETFELDT, Tulane U., T.C. BLACK, UNC-Wilmington — A new high precision measurement of the incoherent neutron-^{3}He scattering length was recently done at the NIST Neutron Interferometry and Optics Facility. Precision measurements of neutron scattering lengths are an important test of nucleon-nucleon (NN) and three nucleon interaction (3NI) models. In general, theoretical models have failed to agree with experimentally determined scattering lengths for systems with greater than two nucleons. The scattering length for the n-^{3}He system is particularly interesting because large spin-dependent effects make it a unique test of three-nucleon and four-nucleon interactions. Our result of $b_i' = -2.429 \pm 0.012$ (stat.) $\pm$ 0.014 (syst.) fm was obtained by comparing the phase shift caused by a polarized ^{3}He sample for two different neutron spin states using an interferometer. This result and other recent experimental measurements of n-^{3}He scattering lengths will be compared with current NN+3NI models.

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