Abstract Submitted
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Measuring scattering lengths of gaseous samples[1] M.G. HUBER, NIST, T.C. BLACK, UNC-Wilmington, R. HAUN, Tulane U., D.A. PUSHIN, U. of Waterloo, C.B. SHAHI, F.E. WEITFELDT, Tulane U. — Neutron interferometry represents one of the most precise techniques for measuring the coherent scattering lengths (b_c) of particular nuclear isotopes. Currently b_c for helium-4 is known only to 1 % relative uncertainty; a factor of ten higher than precision measurements of other light isotopes. Scattering lengths are measured using a neutron interferometer and by comparing the phase shift a neutron acquires as it passes through a gaseous sample relative to that of a neutron passing through vacuum. The density of the gas is determined by continuous monitoring of the samples temperature and pressure. Challenges for these types of experiments include achieving the necessary long-term phase stability and accurate determination of the phase shift caused by the aluminum cell used to hold the gas; a phase shift many times greater than that of the sample. The present status on the effort to measure the n-4He scattering length at the NIST center for Neutron Research will be given.

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