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High Precision Measurement of the Coherent Scattering length of n-^{4}He ROBERT HAUN, Tulane Univ, MICHAEL HUBER, NIST, TIM BLACK, UNC Wilmington, DIMITRY PUSHIN, University of Waterloo, CHANDRA SHAHI, University of Maryland, BEN HEACOCK, NC State University, MUHAMMAD ARIF, NIST, FRED WIETFELDT, Tulane Univ — Neutron interferometry provides a tool for high-precision measurement of scattering lengths for gaseous samples. Examples include measurements of the coherent scattering lengths (b_c) of ^{1}H, ^{2}H, ^{3}He and the incoherent scattering length of ^{3}He. Neutron scattering lengths of light nuclei provide useful tests of nuclear potential models and may serve as inputs for nuclear effective field theories. Our current work is to measure b_c of n-^{4}He to the 10^{-3} relative precision level. We use a perfect silicon neutron interferometer which splits the matter wave of a single neutron, via Bragg diffraction, into two coherent separated paths and recombines them. A relative phase shift, directly proportional to b_c, is introduced by the gas sample. The data from this experiment have been collected and we will report a preliminary result. This work is supported by the National Science Foundation.

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