Abstract Submitted
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Measuring the Neutron Lifetime using Magnetically Trapped Ultracold Neutrons[1] H.P. MUMM, K.J. COAKLEY, M.S. DEWEY, M.G. HUBER, P.P. HUGHES, A.K. THOMPSON, National Institute of Standards and Technology, R. GOLUB, C.R. HUFFER, P.R. HUFFMAN, C.M. O'SHAUGHNESSY, K.W. SCHELHAMMER, North Carolina State University — The neutron beta-decay lifetime is important in both theoretical predictions of the primordial abundance of ^{4}He and providing a strong unitarity test of the CKM mixing matrix. We have previously demonstrated trapping of Ultracold Neutrons (UCN) in a magnetic trap, and, though statistically limited, measured a lifetime consistent with the world average. A major upgrade of the apparatus has now been completed at NIST. In our unique approach, a 0.89 nm neutron beam is incident on a superfluid ^{4}He target within the minimum field region of an Ioffe-type magnetic trap. Neutrons are downscattered by single phonon scattering in liquid helium to near rest and trapped; at sufficiently low temperatures, the low phonon density in the helium suppresses upscatter. The electron accompanying neutron decay produces scintillation in the superfluid helium and can be detected in real time. Previous statistical limitations as well as systematics related to neutron material bottling will be reduced by significant increases in field strength and trap volume. Details of analyses of the systematics as well as the initial performance benchmarks of the new apparatus will be presented.

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