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Neutron Lifetime Measurement Using Magnetically Trapped Ultracold Neutrons CRAIG HUFFER, P.R. HUFFMAN, K.W. SCHELHAMMER, NC State University, M.S. DEWEY, M.G. HUBER, P.P. HUGHES, H.P. MUMM, A.K. THOMPSON, NIST, Gaithersburg, K. COAKLEY, NIST, Boulder, A.T. YUE, University of Maryland, C.M. O'SHAUGHNESSY, UNC — The neutron beta-decay lifetime is important in both nuclear astrophysics and in understanding weak interactions in the framework of the Standard Model. An experiment based at the the NIST Center for Neutron Research was designed to address statistical and systematic limitations of former measurements. In our approach, a beam of 0.89 nm neutrons is incident on a superfluid ^{4}He target within the minimum field region of an Ioffe-type magnetic trap. Some of the neutrons are subsequently downscattered by single phonons in the helium to low energies (< 100 neV) and those in the appropriate spin state become trapped. The inverse process, upscattering of UCN, is suppressed by the low phonon density in the < 300 mK helium, allowing the neutron to travel undisturbed through the helium. When the neutron decays the energetic electron produces a scintillation signal in the helium that is detected in real time using photomultiplier tubes. The current measurement is limited by larger than expected systematic corrections. We will discuss the result of the latest dataset and comment on the potential of future measurements.

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