Abstract Submitted
for the DNP06 Meeting of
The American Physical Society

Measuring the Neutron Lifetime using Magnetically Trapped Ultracold LIANG YANG, J.M. DOYLE, Harvard University, F.H. DUBOSE, E. KOROBKINA, R. GOLUB, C.M. O'SHAUGHNESSY, G.L. PALMQUIST, P.-N. SEO, P.R. HUFFMAN, North Carolina State University, K.J. COAKLEY, H.P. MUMM, A.K. THOMPSON, G. YANG, National Institute of Standards and Technology, S.K. LAMOREAUX, Los Alamos National Laboratory — The neutron lifetime plays an important role in the test of standard model and big bang nucleosynthesis. Our collaboration has successfully demonstrated the feasiblity of a neutron lifetime measurement using magnetically trapped ultracold neutrons, which has the potential to improve the current experimental limit. In this experiment, ultracold neutrons are loaded into an Ioffe-type superconducting magnetic trap through inelastic scattering of 0.89 nm neutrons with phonons in superfluid helium-4. Trapped neutrons are detected via the scintillation light of decay electrons in liquid helium. The primary advantages of this technique are continuous detection of decay events and the elimination of wall losses. We are currently upgrading the experiment to incorporate a larger and deeper magnetic trap, that can reduce the statistical uncertainty in the measurement to 1-3 s. The apparatus upgrade and studies of systematic uncertainties such as above-threshold neutrons and Helium-3 impurities will be discussed.

Liang Yang

Date submitted: 29 Jun 2006 Electronic form version 1.4