

Abstract Submitted  
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**Plans for a measurement of the neutron lifetime to better than 0.3s using a Penning trap and absolute measurement of neutron fluence**

JONATHAN MULHOLLAND, Univ of Tennessee, Knoxville, NBL3 COLLABORATION — The decay of the free neutron is the prototypical charged current semi-leptonic weak process. A precise value for the neutron lifetime is required for consistency tests of the Standard Model and is needed to predict the primordial He4 abundance from the theory of Big Bang Nucleosynthesis. Plans are being made for an in-beam measurement of the neutron lifetime with an anticipated 0.3s of uncertainty or better. This effort is part of a phased campaign of neutron lifetime measurements based at the NIST Center for Neutron Research, using the Sussex-ILL-NIST technique [1]. Advances in neutron fluence measurement, used in [2] to provide the best existing in-beam determination of the neutron lifetime, as well as new silicon detector technology, in use now at LANSCE [3], address the two largest contributors to the uncertainty of in-beam measurements—the statistical uncertainty associated with proton counting and the systematic uncertainty in the neutron fluence measurement. The experimental design and projected uncertainties for the 0.3s measurement will be discussed.

[1] J. S. Nico et al., Phys. Rev. C 71, 055502 (2005).

[2] A. Yue et al. Phys. Rev. Lett. 111, 222501.

[3] Salas-Bacci et al. Nucl. Instrum. Methods A 735 (2014) 408-414

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