

Abstract Submitted  
for the DNP11 Meeting of  
The American Physical Society

**A Magneto-Gravitational Trap for the Measurement of the Free Neutron Lifetime** DANIEL SALVAT, Indiana University, UCNTAU COLLABORATION — Recent measurements of the free neutron beta-decay lifetime using trapped Ultra-Cold Neutrons (UCN) have yielded results with high precision ( $\sim 1$  s), but with central values significantly lower than the previous world average. To resolve this controversy, we initiated a new effort to measure the neutron beta-decay lifetime using UCN in a magneto-gravitational trap at the Los Alamos Neutron Science Center. The trap eliminates wall interactions which lead to additional UCN loss. We will present the design of the trap, and R&D results. Extensive Monte Carlo techniques are in development to investigate the time dependence of the neutron phase space within the trap, and systematically study marginally trapped UCN. We also investigate a novel method for UCN detection, wherein a vanadium foil absorbs neutrons within the trap, and the foil activation is measured using a beta-gamma coincidence technique. This provides a clean signal proportional to the number of trapped UCN, and avoids the process of emptying UCN from the trap. The current experimental status, and plans for a proof-of-principle 1 second measurement of the lifetime will be discussed.

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Date submitted: 01 Jul 2011

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