

Abstract Submitted
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Overview of the UCN Neutron Lifetime Experiment UCN τ A.T. HOLLEY¹, Indiana University — Determination of the free neutron lifetime with a precision at or better than one second ($\sim 0.1\%$) is a challenging but important measurement. It plays an essential role in determining the implications of other precision free neutron decay measurements, as well as in models of Big Bang Nucleosynthesis, which are being constrained by increasingly high-precision astrophysical results. The UCN τ collaboration is currently studying the systematics of an ultracold neutron (UCN) magneto-gravitational trap in an effort both to better understand previous storage experiments as well as to develop a trap capable of measuring the free neutron lifetime to better than 0.1%. Our prototype trap utilizes the potential from a Halbach array of high-field permanent magnets and the earth's gravitational field to confine UCN of one spin state in an asymmetric storage volume of ~ 670 L, and provides the capability to count UCN remaining after a variable storage time by emptying into a ^{10}B UCN detector or by counting the activity of a natural vanadium foil which when introduced into the storage volume quickly absorbs the UCN. The general configuration of our current experiment and the nature of the leading systematic effects we are studying will be discussed.

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