

Abstract Submitted
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Spin Dynamics in the UCN τ Magneto-gravitational Ultracold Neutron Trap¹ ADAM HOLLEY, Tennessee Tech University, UCNTAU COLLABORATION — The UCN τ experiment measures the free neutron lifetime τ_n by counting surviving ultracold neutrons (UCN) following storage in a combined magnetic and gravitational potential. This approach eliminates a significant non- β -decay disappearance channel associated with UCN-matter interactions evident in previous material “bottle” measurements, which is replaced by a considerably smaller systematic effect associated with the spin dynamics of UCN during storage. The depolarization rate can be estimated by comparing empirical measurements of the trap lifetime as the strength of the polarization-preserving “holding” field is varied to a model² based on calculations using an idealized field configuration. This constrains the associated systematic effect to 0.008% of τ_n , well below the current, but not the foreseeable, measurement precision. We will present results from our simulation effort that incorporates empirically determined magnetic field profiles and detailed spin tracking to enhance the fidelity of this constraint.

²A. Steyerl et al., Phys. Rev. C 95, 035502 (2017)

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