

Abstract Submitted
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Upscattering Cross Sections for Ultra Cold Neutrons from Gases

SUSAN J. SEESTROM, Los Alamos National Laboratory, UCN τ COLLABORATION — The scattering of ultracold neutrons (UCNs) to energies above the escape potential of a trap is called upscattering. Upscattering due to interaction with residual gases is a potential loss mechanism for UCNs stored in a trap that can impact the extracted neutron lifetime. We have developed a method for measuring the cross sections for UCN upscattering from gases stored in a small measurement cell. Upscattered neutrons are measured directly in a ^3He ionization chamber and transmitted UCN strike a ^{10}B -coated surface at the edges of the measurement cell. The transmitted UCNs are then counted with a HPGe gamma-ray detector that counts 478 keV γ -rays from the $^{10}\text{B}(n, \alpha\gamma)^7\text{Li}$ reaction. The analysis was guided by Monte Carlo descriptions of the LANL UCN source output. We will present cross sections measured for various noble and polyatomic gases, compare these results to calculated cross sections based on models of gas scattering kernels, and use these to estimate the impact of gas upscattering on the measurement of the neutron lifetime.

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