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Neutron Detection Improvements for Measurement of Neutron Lifetime GREGORY MANUS, CHEN-YU LIU, DANIEL SALVAT, CHRISTOPHER CUDE, AARON HANSON, SONYA SAWTELLE, Indiana University — Ultra Cold Neutrons (UCN) have energies low enough to be confined in material and magnetic traps, yet it makes transmission into typical neutron detectors a non-trivial task. The neutron lifetime experiment at LANL may require improvements to a standard ionization chamber detector or an entirely different approach to UCN detection [1]. We compare Si and Zr ionization chamber windows to their Al counterparts. Si's smooth surface and uniform bulk density reduces the total elastic scattering cross-section. Zr's mechanical strength enables thinner, more transparent detector windows than Al. Also, various geometries of electrode grid planes are simulated in Garfield and built. Furthermore, to minimize time and spectrum dependent systematic errors of collection efficiency, we bypass transporting the UCN from trap to detector by detecting UCN directly in the trap. Here we empty BF3 and Ar into the trap where UCN capture in B releases Li and α particles detected by their ionization of Ar. The B capture also emits a gamma which can be detected. Details and progress will be presented at the conference.

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