

Extracting Neutron Lifetimes from UCN τ Data

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The UCN τ collaboration is working to measure the mean lifetime of a free neutron to 0.1s using very low energy “ultracold” neutrons (UCN). Achieving such high precision is important in a variety of low-energy tests for new physics. A density of UCN is produced in the Los Alamos solid-D₂ superthermal source and is then polarized and guided to a magneto-gravitational trap. The UCN that have high enough energy to escape the trapping potential are cleaned out, and the remaining neutrons are left to decay for two time intervals, a short and long holding time. The difference in the two holding times, along with the normalized number of neutrons left in the trap at the end of the holding periods, are used to calculate the average lifetime of neutrons in the trap. The neutrons are detected using a newly developed *in situ* active detector that observes light from a B-coated ZnS scintillation screen via a pair of photomultiplier tubes. I will present my contribution to work aimed at extracting the mean lifetime of neutrons in the trap from data taken during the 2015/2016 run cycle at Los Alamos National Lab.