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Neutron Transport and Systematic Studies with the UCNτ Experiment at LANL DANIEL SALVAT, Indiana University / Los Alamos National Laboratory, THE UCNτ COLLABORATION — The neutron lifetime τ_n is important for understanding charged-current interactions and is a key input for understanding nucleosynthesis. The τ_n uncertainty dominates the uncertainty in the fractional ^{4}He abundance Y_p, and comparing Y_p with astrophysical measurements constrains the effective number of neutrino degrees of freedom which is sensitive to beyond standard model physics. Recent inconsistencies in the τ_n global data have motivated new experiments and the study of systematic effects including those related to the dynamics and loss of trapped ultracold neutrons (UCN). We present the progress of the UCNτ experiment at the Los Alamos Neutron Science Center which uses a NdFeB Halbach array to magnetically and gravitationally confine UCN with minimal loss aside from neutron β decay. The UCN can be emptied from the trap and counted in order to deduce the storage time or detected using *in situ* UCN detection. We present an overview of the apparatus and discuss systematic studies used to develop a next generation measurement of τ_n. We discuss recent neutron guide transmission studies to increase the number of trapped UCN and present recent results with a vanadium foil activation technique for UCN detection.

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