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Probing UCNτ Systematic Effects Through Neutron Tracking Simulations FRANCISCO GONZALEZ, Indiana Univ - Bloomington, UCNTAU COLLABORATION — The UCNτ experiment at Los Alamos National Laboratory measures the neutron lifetime by storing ultracold neutrons (UCN) in a magneto-gravitational trap for variable holding times. Potential UCN loss mechanisms besides β-decay lead to systematic uncertainties. In particular, UCN with energies above the trapping potential could escape during storage; this effect is minimized through the use of a cleaner lowered into the trap prior to the storage period, and cleaned neutrons are counted using a new "active" UCN cleaner. Possible time dependent changes in the phase-space distribution of UCN could lead to changes in the detection efficiency or exacerbate over-threshold neutron losses. This effect is reduced through in-situ detection, and quantified by lowering the primary detector in steps to probe various UCN energies. A custom Monte Carlo simulation of UCN trajectories has been developed on Indiana Universitys Big Red 3 supercomputing cluster to model UCN dynamics and constrain systematic effects. We will present results of these simulations as part of an effort to reduce UCNτs total uncertainty to 0.2s.

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