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Simulation of UCN transport in the UCN τ Experiment¹ EVAN ADAMEK, CHEN-YU LIU, DANIEL SALVAT, NATHAN CALLAHAN, Indiana University, UCN τ COLLABORATION — The UCN τ experiment aims to measure the neutron β -decay lifetime to 1 s total uncertainty and beyond by trapping ultracold neutrons (UCN) in a magneto-gravitational trap, in which UCN undergo no material interactions with the walls of the trap. To investigate UCN transport in the experiment, we have built Monte-Carlo simulations of the full-scale experiment using GEANT4. We have modeled the delivery of UCN to the trap with a highly accurate transport geometry. The model is bench-marked against the experimental data collected in the early 2013 run. The simulation is used to compare proposed geometry upgrades to enhance the efficiency of UCN delivery (planned for the late 2013 run). In addition, work is underway to expand the scope of simulation to include β and γ detection, with the goal of modeling our in-situ UCN detector using the technique of neutron activation on a large-surface Vanadium foil. Here we present the results of this simulation effort.

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