

# **Simulating an Ultracold Neutron Depolarization Experiment to Verify the Integrity of an Analysis Model**

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The depolarization probability per bounce (DPB) is used to understand systematic and statistical effects in experiments requiring polarized  $\sim 100$  neV “ultracold” neutrons (UCN). To predict this effect, dedicated “PPM Depolarization” experiments were performed at Los Alamos National Laboratory to determine the DPB of UCN upon interaction with material guides as a function of ambient holding field. To investigate systematic effects in these experiments, any analysis model must be verified through a Monte Carlo computer simulation. In such simulations, a high-fidelity model of the UCN production source and the experimental geometry is used to simulate the effects of UCN angular and energy distributions. Other variables, such as loss per bounce and specularly, are calibrated to match the simulation to data. After the simulation is verified to be consistent with the experiment, simulated data that is representative of experimental data can be created by varying DPB. If the analysis model fails to correctly predict the programmed DPB, the simulation can guide changes to the analysis model. The simulation method and a comparison to the experimental data will be presented, along with results from tests of one possible analysis model.