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Simulation of a Neutron Time Projection Chamber Detector JESSICA MINTZ, MICHAEL FOXE, Purdue University, NATHANIEL BOWDEN, MIKE HEFFNER, ADAM BERNSTEIN, LLNL, IGOR JOVANOVIC, Purdue University — A neutron time projection chamber (nTPC) prototype constructed at Lawrence Livermore National Laboratory is a promising detector for directional detection of shielded special nuclear material, exhibiting powerful background rejection and neutron/gamma discrimination. The location of the fast neutron source is determined by detection of preferentially forward-pointed proton recoils in our hydrogen/methane-filled nTPC. A simulation of the nTPC in a real environment is conducted, characterizing the angular spread of detected proton recoils by taking into account the detector design, detector environment, and various analysis cuts. Accuracy of nTPC pointing to the neutron source is determined by simulation. Comparison of the simulation results with the experimental data undergoing the identical data analysis indicates the accuracy of the detector model and detector limitations. Among the limitations, particular attention is given to several classes of events which may reduce the pointing accuracy, including multiple scatters within the chamber and neutron scatters off of the surrounding material.

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