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Performance and Development of the Neutron Time Projection Chamber[1] GIANPAOLO CAROSI, N.S. BOWDEN, M. HEFFNER, D. CARTER, LLNL, I. JOVANOVIC, Penn. State University, C. ROECKER, J. MINTZ, M. FOXE, Purdue University, P. O'MALLEY, Rutgers University — Here we describe the performance and further development of a directional fast neutron detection system: the Neutron Time Projection Chamber (nTPC). Fast neutron detection shows significant promise as a special nuclear material (SNM) search method. Directionally sensitive detection offers improvement in detection speed compared to proximity searching, powerful suppression of backgrounds, and the ability to map multiple or distributed sources. The nTPC provides an efficient means of measuring the full 3D trajectory, specific ionization (i.e particle ID) and energy of charged particles and is optimized to measure recoil protons from fast neutron scatters in hydrogen or methane gas. Here, we describe detector performance, which includes clearly observing and localizing a fission source at 10s of meters standoff along with the ability to resolve multiple fission sources.

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