Abstract Submitted
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Photon and Neutron Waveform Differentiation[1] MACKENZIE DEVILBISS, American University — In high-energy particle experiments, background control is key to producing quality data. The K0TO Experiment aims to observe the ultra-rare decay of the neutral kaon into a neutral pion, a neutrino, and an antineutrino. The JSNS[2] Experiment is searching for sterile neutrino evidence by investigating antineutrino oscillations on short length scales. Both experiments have significant background signals caused by neutrons. Photons and neutrons can be distinguished by comparing the respective waveform shapes. Both waveforms have an asymmetric Gaussian shape, but neutron waveforms appear to have a much longer 'tail' decay than photons do. Using this information, we can fit the waveforms and define a standard tail region so that we can compare the area of the tail of the waveform to the total area of the waveform to create a parameter that is different for photons and neutrons. By applying an event cut based on this parameter, photon and neutron signals can be distinguished and background events can be removed from data. After performing waveform separation studies using both liquid scintillator and single CsI crystal setups, it was determined that this parameter is effective in distinguishing photons and neutrons in liquid scintillator, but not using a single CsI crystal.

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Mackenzie Devilbiss
American University

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