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PMT Waveforms for Pulse Shape Discrimination in JSNS2

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The JSNS2 experiment aims to search for the existence of sterile neutrino at J-PARC. A 1 MW beam of 3 GeV protons incident on a spallation neutron target produces an intense neutrino beam from muon decay at rest. The experiment will search for muon anti-neutrino to electron anti-neutrino oscillations which are detected by the inverse beta decay (IBD) interaction, followed by gammas from neutron capture on Gd. One of the dominant backgrounds of IBD events is fast neutrons induced by cosmic muons. In order to reject the background, the pulse shape discrimination (PSD) method is used to differentiate between neutron and gamma. In JSNS2, 1400L of DIN, 8% of concentration, was dissolved into GdLS in Dec. 2020 to improve the PSD capability. In this talk, we introduce how to use PMT waveforms for PSD, and the waveform difference between neutron and gamma from data taken after the DIN dissolution will be shown.

Collaboration name

JSNS2

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