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PMT Test Facility for nEXO

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A key background in rare-event search experiments is the cosmogenic background. Hosting experiments in deep-underground laboratories can mitigate this background to some extent; however, high-energy muons can still reach these locations. An active muon veto system can tag signals from the passage of muons in the detector and exclude them from the data analysis. The nEXO experiment, expected to be installed at SNOLAB, aims to search for $0\nu\beta\beta$ using a time projection chamber (TPC) filled with 5 tonnes of liquid xenon (LXe), enriched to 90\% in the isotope Xe-136. It features a water-Cherenkov Outer Detector, which serves two important functions. First, it provides passive shielding for the TPC, effectively mitigating low-energy neutrons and gamma rays. Second, it actively detects Cherenkov light, primarily from through-going muons, ensuring that any associated signals are systematically excluded from the final analysis. To detect the Cherenkov light in the outer detector, appropriate instrumentation is required. The Outer Detector will be equipped with 125 photomultiplier tubes (PMTs). The Daya Bay Reactor neutrino experiment has made its PMTs available for use in the nEXO experiment. Before installation, a detailed performance test of these PMTs must be conducted. In this talk, I will discuss the ongoing R\&D work of the PMT test facility at Laurentian University for the nEXO experiment.

Keyword-1

Neutrinoless double-beta decay

Keyword-2

Photomultiplier tubes

Keyword-3

Cosmogenic background

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