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Calibration of the Photon Detection System of SBND

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SBND is a Liquid Argon Time Projection Chamber (LArTPC), serving as the near detector of the Short Baseline Neutrino program at Fermilab. Its near location (110 m) to the neutrino source and relatively large mass (112 ton active volume) will allow studying neutrino interactions on argon with unprecedented precision. The detector is currently finishing the commissioning phase and has collected its initial neutrino beam data. The Photon Detection System (PDS) of the detector represents a major R&D opportunity for the LArTPC technology. Its design is a hybrid concept combining a primary system of 120 photomultiplier tubes (PMTs), and a secondary system of 192 XARAPUCA devices, all of them located behind the anode plane. Furthermore, covering the cathode plane with highly reflective panels coated with a wavelength shifting compound recovers part of the light emitted towards the cathode, where no optical detectors exist. This new design provides high light-yield and more uniform detection efficiency, an excellent time resolution and an independent position reconstruction (including the drift coordinate) using only the scintillation light. This work will present the first steps towards the calibration of the PMT devices, which is critical to exploit the reconstruction capabilities of this system.

Abstract

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