



Contribution ID: 71

Type: Talk

Proof of concept of the PoWER concept

A proof-of-concept test of the PoWER (Polymer Wavelength Shifter and Enhanced Reflection) photon detection system was carried out at the Leptons Laboratory of UNICAMP. PoWER is an innovative photon detection concept for large liquid argon (LAr) detectors, designed to achieve an exceptionally high light yield—potentially reaching several hundred photoelectrons per MeV—while providing an active veto for interactions occurring outside the fiducial volume. The concept is based on polyethylene naphthalate (PEN) foils acting as wavelength shifters and on a hybrid array of visible- and VUV-sensitive silicon photomultipliers (SiPMs), which enables the active veto functionality.

The prototype consists of two concentric cubes: an outer $10 \times 10 \times 10 \text{ cm}^3$ Teflon enclosure and an inner $8 \times 8 \times 8 \text{ cm}^3$ acrylic cube that defines the active volume. The inner surfaces of the Teflon cube are lined with Vikuiti reflective foil and instrumented with four Hamamatsu S14160-6050HS SiPMs, including two standard devices and two coated with TPB to provide VUV sensitivity. The acrylic cube is internally covered with PEN foils. Three radioactive sources were employed to characterize the detector performance: a natural uranium alpha source placed inside the active volume, a ^{241}Am alpha source located in the veto region, and an external ^{22}Na gamma source. The detector was operated in liquid argon produced by *in situ* liquefaction of high-purity argon gas. Preliminary results on the detector light yield and the performance of the active veto are presented.

Primary authors: MACHADO, Ana A. B.; BERGAMINI MACHADO, Ana Amélia (Universidade Estadual de Campinas); SEGRETO, Ettore (Universidade Estadual de Campinas)

Presenter: SEGRETO, Ettore (Universidade Estadual de Campinas)