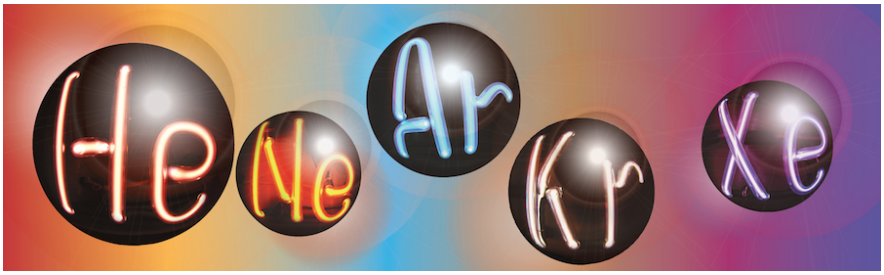

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R&D and characterization of wavelength-shifting reflectors for LEGEND-200 and for future LAr-based detectors

Friday, 17 September 2021 08:45 (15 minutes)

The new design of the LAr veto of the LEGEND-200 neutrinoless double beta decay experiment, as well as many other LAr-based detectors, require materials that can efficiently shift VUV light to the visible range while being reflective to visible light. For the LAr veto of LEGEND-200, 14 square meters of the reflector Tetratex (TTX) were coated in-situ with tetraphenyl butadiene (TPB). For even larger detectors, TPB coating becomes more challenging and plastic films of polyethylene naphthalate (PEN) could be an option to ease scalability. In this context, we characterized the specific sample of the wavelength-shifting reflector (WLSR) from LEGEND-200 and investigated the light yield from the combination of a PEN film with the reflector TTX. Samples from both WLSRs were measured with spectrophotometers, observed with a microscope, and then characterized in a LAr setup equipped with a VUV sensitive photomultiplier. Parameters such as the reflectance, absorption length and light yield of the samples (as well as of the setup and its materials) were measured, such that the intrinsic quantum efficiency of PEN and TPB in LAr (at 87K) could be estimated.

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