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nEXO studies on optical properties of Silicon photomultipliers

The next generation of Enriched Xenon Observatory (nEXO) is a proposed 5 ton liquid xenon experiment to study neutrinoless double beta decay in ^{136}Xe with target half-life sensitivity of $\sim 10^{28}$ years. The studies require an energy resolution of $\sim 1.0\%$ at neutrinoless double beta decay peak energy and places stringent demands on photon detection. Liquid xenon scintillates in vacuum ultraviolet region (~ 175 nm) and nEXO plans to use silicon photomultipliers (SiPMs) as photon detectors. The limited information available on reflective properties of materials (including SiPMs) in ultraviolet region complicates the optimization of light collection in nEXO. The angular resolved reflectivity and photon detection efficiency of SiPMs in liquid xenon was observed to decrease with the increase of incident angle. The details of measurement will be discussed. Further, the measurements are being incorporated in simulation and plans toward addressing operational challenges of nEXO photon detection system may be discussed.

Mini-abstract

Reflectivity and photon detection efficiency of SiPMs decreases with the increase in incidence angle

Experiment/Collaboration

nEXO

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