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Production and characterization of WLS coatings for the photon detection system of noble liquid detectors

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Wavelength-shifting (WLS) materials are essential in noble liquid detectors (such as those using liquid argon or xenon) to convert vacuum ultraviolet (VUV) scintillation light into visible wavelengths, enabling efficient photon detection. The overall performance of these detectors relies heavily on the quality, uniformity, and stability of the wavelength-shifting coatings applied to various substrates.

To this purpose, a large-scale evaporation system has been constructed to deposit wavelength-shifting materials, such as p-Terphenyl (PTP), onto the glass windows intended for installation in the X-Arapuca Megacell, which forms key component of the photon detection system (PDS) of the DUNE experiment.

After deposition, the PTP-coated glass samples undergo quality control procedures.

These include measurements of WLS thickness and uniformity, characterization of essential optical properties, and mechanical as well as environmental stress tests to verify long-term durability.

In this work, a detailed description of the evaporation system and coating process will be provided, the adhesion testing setup and its operational procedures will be reported

and the characterization based on some of optical measurement results will be presented.

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