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Optical, structural and aging study of P-Terphenyl thin films

Scintillation light is a powerful tool in liquid argon (LAr) based detectors for rare events searches, since it can be used for timing, calorimetric and particle discrimination purposes. Photons are emitted in the Vacuum Ultra Violet, in a ten nm band centered around 128 nm where most of the commercially available photosensors are not sensitive. p-Terphenyl (PTP) thin films are a common choice of wavelength shifter used in combination with LAr, that converts VUV light into the near-visible range (350-400 nm). This work investigates the optical, structural, and aging properties of PTP thin films as a function of thickness and wavelength. Measurements of relative conversion efficiencies were performed with a vacuum monochromator and a deuterium lamp at the Leptons Lab (Universidade Estadual de Campinas, Brazil). Preliminary results show that, within the investigated interval, there exists an optimal film thickness that maximizes the conversion factor in the VUV region. In addition, an aging setup developed to expose 2.5 cm × 2.5 cm films to continuous, constant-intensity LED irradiation at four distinct wavelengths. The mass and relative conversion efficiency of these films were periodically monitored against a reference sample to track degradation. This study is still in progress, with long-term degradation data being accumulated.

Primary author: LONGHITANO PAGLIUSO, Lucca (Universidade Estadual de Campinas)

Co-authors: Prof. BERGAMINI MACHADO, Ana Amélia (Universidade Estadual de Campinas); Dr AGUIAR DE MENDONÇA, Ana Paula (Universidade Estadual de Campinas); Prof. SEGRETO, Ettore (Universidade Estadual de Campinas); Ms ANDRES RODRIGUES, Ieda (Universidade Estadual de Campinas); Ms BARBOSA ALVES, Mirela (Universidade Estadual de Campinas); Mr POMARICO ZETULA, Murilo (Universidade Estadual de Campinas)

Presenter: LONGHITANO PAGLIUSO, Lucca (Universidade Estadual de Campinas)