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Fluorescence Efficiency of Tetra-Phenyl-Butadiene D.A MOORE, J. MAASSEN, Los Alamos National Laboratory, Dakota State University, V.M. GEHMAN, S. SEIBERT, A. HIME, K. RIELAGE, Los Alamos National Laboratory, D. MEI, Y. SUN, University of South Dakota, DEAP/CLEAN COLLABORATION
— Tetra-Phenyl-Butadiene (TPB), a known organic wavelength shifter, converts UV scintillation light into visible light detectable by Photomultiplier Tubes (PMTs). Experiments based in liquid argon, such as CLEAN and DEAP require TPB to correct for the sensitivity of the PMTs. The primary objective of these experiments is detecting WIMPs (Weakly Interacting Massive Particles) that may compose the dark matter in the Universe. We systematically investigated the effects of different wavelengths on TPB-coated acrylic disks using a deuterium lamp as a source of UV light, a monochromator, and a calibrated photodiode detector. We tested a variety of thicknesses of TPB on acrylic disks and blank disks to analyze the spectra and shed new light on several properties and attributes of TPB. We examined the emission spectrum of TPB and evaluated the conversion efficiency (photons out / photons in) in order to broaden the knowledge of how to optimize the visible light collection on the PMTs, while aiding in several modeling processes. I will present our findings on the efficiency and spectral emission of TPB, along with images of the actual setup, as well as possible future research.

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