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Scintillation and Optical Properties of the Low-Background Scintillator, PEN

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To improve detector sensitivities, neutrino physics and dark matter searches are pursuing novel low background and self-vetoing materials for components. One material of interest is poly(ethylene-2, 6-naphatalate) (PEN) for its inherent scintillating and wavelength shifting properties, as well as its commercial availability and structural stability. Commercially available PEN material is typically limited to films with thicknesses less than 0.01 mm. As such, the PEN working group (a part of the LEGEND collaboration) has developed a method to produce PEN components with excellent optical properties of thicknesses up to 5 mm, and with a specific activity of less than mBq/kg. These thicker components typically have different molecular orientations, which exhibit different optical and luminescent properties. Using these thicker components, characterization of PEN was conducted at the University of Notre Dame's Nuclear Science Laboratory. In this talk we will discuss the results of this measurement as well as particle discrimination and quenching factor.

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