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RADIATION HARDNESS OF PLASTIC SCINTILLATING MATERIALS FOR SCINTILLATOR CALORIMETERS

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Plastic scintillators are currently one of the most economical commercial options for use in particle detection. They are characterized by producing scintillation (detectable photons in the visible part of the light spectrum) when struck by a photon or charged particle. They also have as important characteristics an extremely fast light signal and a high light response. Scintillator plastics are widely used in various fields of science, such as high-energy physics, medicine, dosimetry, and others. Plastic scintillators have a natural material degradation, accentuated when subjected to radiation environments, so materials that are more resistant to radiation play an important role in all these applications. In this sense, PEN (Polyethylene Naphthalate) and PET (Polyethylene Terephthalate) may be one of the options for new scintillator materials, since preliminary studies indicate that PET appears to have more resistance to radiation, while PEN presents a higher light response compared to PET. Another point of great relevance is that PET and PEN scintillate without the need to use dopants. In this context, research on the feasibility of PEN/PET as a development base for new scintillator plastics is pertinent. This study aims at R&D of new scintillating materials based on PET and PEN, as well as composite blends of PET/PEN, aiming to select the blend that results in a higher luminous yield through optical characterization of the produced samples. Initially, samples of blends of PEN, PET, and PEN/PET in various proportions will be produced at the Institute of Polymers and Composites (IPC) of the University of Minho. Subsequently, these samples will be characterized at the Laboratory of Optics and Scintillating Materials (LOMaC) of LIP. In the next step, larger plates will be produced, allowing a more complete characterization of the samples. In this presentation the first results of the light response for PEN and PET samples developed at IPC will be presented. The next steps of this study will also be discussed.

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