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Development of 3d printable scintillating plastic for bolometric 0vββ decay experiments

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The 3dSPARK (3D-Printed Scintillating Polymer Assembly for Rare Events at milliKelvin Temperature) project aims to develop a novel type of assembly for next-generation bolometric neutrinoless double beta decay experiments. A significant part of the background in bolometric experiments originates from contamination of the copper frames traditionally used in the assembly. By using a 3D-printed polymer-based mechanical structure, whose design can be highly optimised thanks to the flexibility of additive manufacturing, the mass is reduced, and the gamma interaction probability is lowered due to the material's low atomic number. Additionally, this approach enables the structure to function as an active veto by incorporating a scintillating compound, which can ultimately help to further reduce the background contribution from the detector structure. In this talk, we will present an overview of the project and show the potential of this technology to decrease the background level, as demonstrated by Geant4 simulation studies. We will also present the first results on the optical characterisation of the 3d scintillating plastic.

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