

Performance evaluation of semi-monolithic detectors for TB-PET systems

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The i3M is currently involved in the development of a clinical Total Body PET (TB-PET) scanner of approximately 80 cm diameter and 70 cm axial coverage. At this moment, different detectors based on semi-monolithic blocks with different surface treatments and read out by different SiPM arrays are being characterized, in order to assess how the different parameters affect the detector performance. In all cases, the external dimensions of the detector block are 25.8×25.8×20 mm³. The materials employed in the surfaces are Enhanced Specular Reflector (ESR), black painting and retroreflector. The two photodetectors employed belong to the series 13 and 14 from Hamamatsu Photonics. The results obtained for the four detectors under characterization show an energy resolution ranging from 10% up to 13% at 511 keV, a spatial and DOI resolution better than 3 mm and 4 mm, respectively, for all cases and a Detector Time Resolution (DTR) ranging from 195 ps up to 346 ps when energy-weighted averaging of the different timestamps belonging to the same event is applied.

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