

IMAS: a total body PET with TOF and DOI capabilities

Wednesday, 22 May 2024 09:10 (20 minutes)

Total-Body PET (TB-PET) technology has become very popular in recent years. These systems are very attractive because of their high sensitivity, achieved through their extended axial field of view and, potentially, Time of Flight capabilities, allowing for the simultaneous study of the kinetics of multiple organs. Most of TB-PET designs are based on LYSO crystal pixels without DOI. In this work we present a TB-PET system based on semi-monolithic crystals and, therefore, simultaneously enabling TOF and depth of interaction capabilities. Our design, named IMAS, makes furthermore use of a reduction of signals without compromising performance. We first carried out exhaustive simulation studies of the system geometry, based on 5 rings of 10 cm in the axial direction each, and gaps of about 5 cm, with a total axial length of 71.4 cm. These studies confirm the good performance of the system in terms of spatial resolution, sensitivity and other relevant parameters. The system has been constructed and installed (June 2023) at the largest hospital in our region named La Fe. Very preliminary experimental tests, already predict an almost homogeneous spatial resolution below 4 mm in the whole FOV (as far as at 30 cm off-radial), outperforming any other scanner with a long axial FOV. The system sensitivity is 7.6% with a source at the Center of Field of View. The detectors reached a TOF of about 350 ps. We aim to report a full characterization of the scanner during the workshop.

Field

Systems and applications

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Session Classification: Technologies for total body PET imaging

Track Classification: Total body imaging