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Evaluation of the MINDView PET insert in a 3T MRI

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We report in this work the current status performance of the brain PET insert developed under the MINDView project. Final construction has been accomplished. Pilot performance studies have been carried out at the lab, partially following the NEMA protocol. It has later been installed at the nuclear medicine department in Klinikum rechts der Isar (Munich) and exhaustively tested inside the Siemens mMR, a whole body PET-MR with a 3T main magnetic field. The PET insert FOV is 154 mm axially and 240 mm transaxially, defined by 3 rings of 20 monolithic crystals each (20 mm thick), coupled to custom 12x12 SiPM arrays. The system sensitivity is above 7% (350-650 keV) with a point-like source at the CFOV.

A variety of MR sequences for brain imaging have been run (EPI, ASL, T1w, T2w and UTE), and the PET response measured, without showing any deterioration. Count rates as a function of sequences were studied not also exhibiting a system malfunction. Also the MR performance has been studied, among other tests the uniformity of the B0 and B1 fields, not showing significant changes when the dedicated brain PET is inserted.

Regarding performance comparison with a state-of-the-art whole body PET system, it shows an improved performance as observed through the mini-Derenzo or other phantoms. Rods of about 2 mm are clearly distinguished with standard iterative reconstruction methods and voxel/pixel sizes.

Detailed analyses will be presented. Currently, the system is in Klinikum rechts der Isar (Munich) and patients recruitment is undergoing.

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