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Screen 12 - Preliminary Monte Carlo study of Modular J-PET

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Modular J-PET as the latest prototype of J-PET collaboration, utilizes the unique detection principles thanks to its distinguished detector arrangements. It consists of 24 detection units called modules which are arranged in regular 24-sided polygon circumscribing a circle which provides 50 cm of AFOV. The one advantages of this prototype is an arrangement of scintillators and photo-detectors which provides possibility of performing portable imaging that improves functionality of tomograph. The presented study was carried out by Geant4 application for tomographic emission (GATE)
simulation toolkit. The sensitivity and scatter fraction as two main characteristics of tomographs will be investigated according to the National Electrical Manufacturers Association norm(NEMA NU2-2018).
In this study, the scatter fraction and sensitivity of Modular J-PET have been investigated according to the NEMA NU2-2018 standards. The study was performed by the GATE simulation package. The performed simulations indicate that the peak of sensitivity for Modular J-PET was 4 cps/kBq and the sensitivity was around 1.5 cps/kBq. The Scatter Fraction was calculated based on SSRB algorithmes with the amount of 3.64%. Although the AFOV of Modular j-PET is larger than the standards PET, obtained values of scatter fraction is similar to those computed for commercial PET scanners. For example, the GE Discovery has a scatter fraction of between 21% and 34%, dependent on the mode used and sensitivity for the GE Discovery is 20.4 cps /kBq.

Primary authors: TAYEFI ARDEBILI, Faranak (1- Marian Smoluchowski Institute of Physics, Jagiellonian University, Poland. 2- Total-Body Jagiellonian-PET Laboratory, Jagiellonian University,Poland); Prof. MOSKAL, Pawel (1- Marian Smoluchowski Institute of Physics, Jagiellonian University, Poland. 2- Total-Body Jagiellonian-PET Laboratory, Jagiellonian University,Poland); Dr NIEDZWIECKI, Szymon (1- Marian Smoluchowski Institute of Physics, Jagiellonian University, Poland. 2- Total-Body Jagiellonian-PET Laboratory, Jagiellonian University,Poland)

Presenter: TAYEFI ARDEBILI, Faranak (1- Marian Smoluchowski Institute of Physics, Jagiellonian University, Poland. 2- Total-Body Jagiellonian-PET Laboratory, Jagiellonian University,Poland)

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