Contribution ID: **311**   Type: **not specified**

Preliminary results of determining Modular J-PET spatial resolution

Thursday, 14 July 2022 16:40 (15 minutes)

Modular J-PET is the latest prototype of the Jagiellonian-PET, based on long plastic scintillator strips [2]. The modularity of this prototype allows for cost-effective imaging of multi-photon annihilation and positronium imaging, straightforward assembly, and portability [1-3]. Moreover, due to the low weight of a scanner, it is possible to perform an examination with a static bed and mobile detection system closing on the patient from its side, which cancels the need for large rooms in clinics [1-3].

The Modular J-PET consists of 24 modules which are arranged in regular 24-sided polygons circumscribing a circle with a diameter of 73.9 cm [4]. Each module was built out of 13 scintillator strips placed next to each other with a length of 50 cm and a cross-section of 6 mm × 24 mm, read out of scintillation light on both ends is done by an analog Silicon Photomultipliers (SiPMs). This study presents preliminary results of the spatial resolution measurement of the Modular J-PET tomograph performed with Na source placed at various positions inside the detector according to the NEMA_NU 2-2018 standards [5]. The collected data were analyzed using a specialized software program called the J-PET Framework, which is based on the C++ architecture [6]. Experimental data were verified with the GATE simulations [7]. In simulations of the Modular J-PET spatial resolution, a back-to-back gamma source was simulated in the same position as used in the experiment [8]. The results of the simulation were reconstructed with the QETIR package.

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Presenter: TAYEFI ARDEBILI; JAGIELLONIAN UNIVERSITY, POLAND, Faranak

Session Classification: Session 4