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Design of a PET System with Axially Arranged Scintillators Increasing the Field of View

A new detector concept has been developed for a positron emission tomography (PET). This concept is similar to the one used for JPET [1], but there are some conceptual differences. The design of the gantry and the Monte Carlo Simulations are in progress. The basic idea is the axial orientation of the scintillators which are widely used in PET; namely LYSO (Lutetium–yttrium oxyorthosilicate). 64 scintillators of size 3 mm x 5 mm x 100 mm are to be coupled to SiPMs (Silicon photomultipliers) on both sides. The measurement of the time difference and the analysis of the energy spectrum enable the determination of the location where the photon hits the scintillator.

FreeCAD for the 3D design, KiCAD for the electronics circuit design, Geant4 for Monte Carlo Simulations and Root for the data analysis have been used in this project. The work for the imaging of the PET phantoms using pharmaceuticals has also started. In order to be able to obtain a necessary founding for the prototype production, a national project application has been submitted. The system is expected to reduce the amount of radioactive dose almost by 50%, to improve the resolution below 5 mm with less SiPM usage and to process more than two photons which are emitted from positronium [2].

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