

A simulation study of parallax error in positron emission tomography by using LSO, LYSO, BGO and GSO scintillation crystals in hexagonal and ring detector geometry by GATE simulation software

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Abstract

The goal of this simulation study is to assess and compare Parallax error with different scintillator crystals in Positron Emission Tomography (PET). For this simulation study we use GEANT4 Application for Tomographic Emission (GATE). The crystals which act as simulators in this study are LSO, GSO, BGO and LYSO. In this work we simulate PET scanner with two ring and hexagonal geometries. Full ring PET scanner which consists of 26 detectors block where each block consists of 96 crystal blocks. In each crystal block there are 25 crystals. For hexagonal geometry in each head we simulate 620 blocks, each one consist 25 crystals. In both the geometries, a cylindrical shaped pancreas phantom is used for this simulation. We set 350 KeV thresholds and 750 KeV upholder. The coincidence window for both geometry is 10 nanoseconds. Also we evaluate effect of gantry rotation on parallax error. To extract parallax of each case, we analyze simulation output via ROOT Tree.

Received: June 08, 2022; **Accepted:** June 18, 2022; **Published:** June 28, 2022

Biography

Ahad Zeinli is the Head of Medical Physics Department, Urmia Medical Science University, and Meysam Dadgar, Iran. He is also currently working as Associate Professor. He has completed his PhD from Tarbiat Modares University.

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