



Contribution ID: 3

Type: Oral

Characterization of CsI(Tl) and LYSO(Ce) detectors scintillators and validation with MCNPX and GEANT4 codes.

Wednesday 24 April 2019 15:30 (20 minutes)

ABSTRACT

The Monte Carlo method is used to calculate the photon detection efficiency of scintillator detectors exposed to gamma rays in the energy range of 59.5 KeV to 1274.54 KeV. This work aims at calculating the response functions for two scintillation detectors CsI(Tl) and LYSO(Ce) (Lu_{1.9}Y_{0.1}SiO₅:Ce0.5%) of size 10x10x5 mm³, to gamma-ray sources up to 1274.54 keV. Both detectors were modeled with the software MCNPX and GEANT4 codes. The results were compared to experimental energy spectrum and photopeak efficiency measurements from ²²Na, ¹³⁷Cs, ⁶⁰Co and ²⁴¹Am radioactive sources. The results showed good agreement with the experimental data.

Keywords: gamma-ray spectrometry, inorganic scintillator, CsI(Tl), LYSO(Ce), Monte Carlo simulation, Energy Resolution, Efficiency.

References

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Session Classification: Detector simulation

Track Classification: Detector simulation