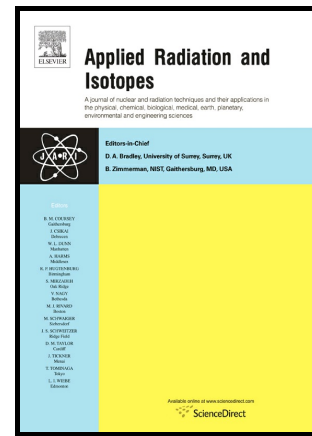


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Gamma Spectrum and Coincidence Summation Simulations with Geant4 in the Analysis of Radionuclide Using BEGe Detector

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Abstract

A Geant4 application has been developed to simulate the gamma spectrum of a BEGe detector. The summation effects were encompassed for both random and true coincidences through a time-based approach. The application well reproduces the typical spectral features such as full energy peaks, escape peaks, summation peaks and Compton/backscatter continuum. The simulated gamma response is consistent with empirical data within 3%, while simulations of the X-ray and baseline regions are valid within a 10% deviation.

Keywords: Geant4, spectrum simulation, coincidence summation, time-based approach, half-life, BEGe detector

1. INTRODUCTION

2 Spectrum simulation using Monte Carlo (MC) technique is invaluable and
3 desirable in gamma spectrometry. A high performance spectrum simulation
4 can readily be used to explore many particular aspects of measurements from
5 a gamma-ray detector, and to analyze the impact of different variables which
6 influence the detector response. The simulation can also be used to generate
7 reference spectra for the evaluation of spectrum analysis software or template

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