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Simulating the position sensitivity of a large-volume segmented germanium clover detector

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The iThemba LABS segmented clover detector (TIGRESS type) comprises four HPGe crystals, each one segmented eight-fold. Such new generation Ge detectors are able to perform γ -ray tracking but are more complex to work with. In order to properly maximise the use of this detector a method to locate gamma-ray interaction points within the detector was developed. The gamma ray interaction points were reconstructed at different radial and azimuthal positions around the detector volume. Multi Geometry Simulation (MGS) and Advanced Detector Libraries (ADL) were used to simulate the detector response at different positions. The response of an HPGe detector was also experimentally determined for certain positions around the detector to a particular energy deposited at a well-defined (x,y,z) location. This was done by using a scanning table where gamma rays were collimated to target a particular interaction point on the detector and digitized pulses were recorded for those points. An average of all characteristic waveforms was performed for each point to minimize noise fluctuations. The experimental waveforms were compared to the simulated ones where experimental corrections such as crosstalk were also performed. Corrections for the response function of the preamplifier were also incorporated in the signal output.

Apply to be considered for a student ; award (Yes / No)?

N/A

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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