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Simulation on the DESPEC Germanium Array Spectrometer (DEGAS)

The DEGAS system is a key instrument of DESPEC and envisioned to be operated with high gamma-ray detection efficiency and high ability in the discrimination of the prevailing intense background radiation. In order to optimize the DEGAS setup and get more information of its performance, corresponding Geant4 simulation framework is developed and verified through comparison with the experimental data. On this basis, further simulation is performed using two geometries. One is box configuration consist of 26 DEGAS detectors, and the other is more compact configuration consist of 28 DEGAS detectors. The results show that in both configurations add-back mode within the DEGAS detector is not the best choice in the presence of high multiplicity gamma-rays. The compact configuration has much more detection efficiency than the other one, but suffers much severe adding peaks in the spectra. In terms of background suppression and peak-to-total ratio, the compact configuration behaves much better, especially when setting the low efficiency DEGAS detectors at the corners as Back-catcher.

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