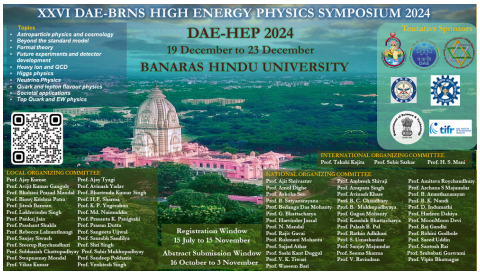

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Methodologies for Investigating Discrepancies in Simulated Low-Energy Background Response of HPGe Detectors

We have developed a background model for a High-Purity Germanium (HPGe) detector using Monte Carlo simulations, focusing on accurately representing low-energy interactions within the 0 to 100 keV range. Initial simulations revealed discrepancies between experimental and simulated spectra, with peaks at 63 keV, 77 keV, and 87 keV appearing in simulations but absent in experimental data. To address this, we optimized the capping thickness of the HPGe crystal and refined the position of the front-end electronics relative to the crystal. By adjusting the capping thickness to 4 mm, the simulated 63 keV peak was successfully suppressed, improving agreement with the experimental spectrum. Further position refinements of the front-end electronics were performed to minimize discrepancies, enhancing the model's accuracy in the low-energy region.

Field of contribution

Experiment

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Track Classification: Future experiments and detector development