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Position sensitivity of the proposed segmented germanium detectors for the DESPEC project

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The DESPEC HPGe array is a part of the NuSTAR project at FAIR, Germany. It is aimed at the spectroscopy of the decaying exotic nuclei stopped in the micro-strip silicon implantation detector AIDA. Segmented gamma-ray tracking detectors are proposed for this array in order to maximize detection efficiency and background suppression when searching for very rare events. Two types of detector modules – stacks of 3 16-fold segmented planar crystals and 12- and 16-fold segmented clover detectors – have been investigated and compared from the point of view of the achievable position resolution using pulse shape analysis (PSA). To this end, detector signals from realistic gamma-ray interactions have been calculated. These signals were treated by PSA in order to reconstruct the photon interaction locations. Comparing the initial interaction locations to the reconstructed ones, it was found the the double-sided strip planar detector yielded position reconstruction errors at least a factor 2 lower than the other detectors considered.

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