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Simulating Multi Pixel Detectors for Advanced Radiation Monitoring

This study examined the influence of multi-pixel detector (MPD) geometry on performance in environmental radiation monitoring, with emphasis on geometric configuration, angular response, and spectral quality. Geant4 simulations were used to model both cubic and non-cubic detector arrays, which were evaluated through metrics including hit distribution, angular sensitivity, and energy uniformity. The results indicated that regular cubic arrays offered the most reliable balance of angular coverage and manufacturability, whereas non-cubic geometries introduced added complexity. Experimental validation was conducted using four CsI detectors (37 cm³), and tested with Cs-137 and Co-60 sources at multiple positions. Overall, the findings demonstrate that detector geometry influences both localisation and isotope identification capability.

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