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Double Photon Emission Compton imaging based on event-driven SOI and GAGG-SiPM pixel detectors

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Compton imaging is a promising gamma-ray imaging method because of its collimator-less detection and the application to medical field is expected. However the imaging capability for distributed sources is still under investigation because of its low signal to noise ratio derived from Compton cones. To solve this problem, we introduce double photon emission imaging based on Compton imaging for cascaded gamma rays from nuclides, such as In-111 as a new imaging method. The coincidence detection of cascaded photons greatly decreases the effect of Compton cones. An event-driven fine-pitch SOI 36 μm pixel detector and 8 by 8 array of HR-GAGG-SiPM are used as scatter and absorber in the designed Compton imager. The basic performance of double photon emission Compton imaging is characterized.

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