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Development of a gamma-ray tracking detector and its performance test

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The gamma-ray tracking detector is a germanium detector realizing both high efficiency and Compton background suppression by reconstructing the scattering process of the incident gamma-rays from the positions and energy deposits of the gamma-rays at each interaction points in the detector. Its high position resolution is also beneficial for accurate Doppler correction. In the tracking detector, the interaction positions are determined three-dimensionally with high position resolution by analyzing the signal waveform from the segmented electrodes. We have measured waveforms for different interaction points of gamma-rays using a GRETINA Quad Detector. The experiment was performed using a gamma-ray beam from the GACKO beam line at the NewSUBARU electron storage ring facility. The three dimensional position of the interaction in points are selected first by collimating the incident gamma-rays and then by measuring the gamma-rays scatted at 90 degree in the detector by using a narrow slit. Obtained waveforms were compared with the simulated waveform.

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