

Fast APD detector with a short tail in the timing response for an experiment using synchrotron radiation X-ray beam

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We developed a fast X-ray detector system for a nuclear resonant scattering (NRS) experiment of thorium-229. The system employs silicon avalanche photo-diode (Si-APD) as a fast X-ray sensor. The system is able to acquire both timing and energy of a single X-ray photon simultaneously in a high rate condition, 106 counts per second for one Si-APD. The performance of the system was investigated in KEK-PF. A quite small tail in the time spectrum by a level of $10^{-8.5}$ at 0.5 ns apart from the peak was achieved. The energy response was measured in the range of 6–33keV. The behaviour was well explained by the simulation. For the future improvement, the position dependences of the responses were also measured. They indicated that the outermost region was poor in comparison to the other region.

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