

Assessment of the Imaging Performance of the CITIUS High-Resolution Detector for Heavy Charged Particles and Neutrons

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This paper presents an evaluation of the response and imaging performance of CITIUS - a high-speed X-ray detector developed for use at SPring-8 and SPring-8-II - when applied to heavy charged particles and neutrons.

In the detection of heavy charged particles, imaging accuracy is primarily determined by the diffusion and drift of charges generated in the active layer, as well as the extent of charge sharing among pixels. To evaluate the detector's response under high charge density conditions, we first conducted an experiment using monoenergetic alpha particles emitted from an Am-241 source. Subsequently, template fitting was applied to the measured cluster shapes to extract the back bias dependence of charge diffusion and pixel-level noise. Based on these results, a detector simulation model was developed to evaluate the spatial resolution for heavy charged particles and neutrons as a function of pixel size and noise level.