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Development and characterization of a novel energy calibration method for photon-counting GaAs:Cr-TIMEPIX3 detectors

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Photon-counting detectors (PCDs) are emerging as a cornerstone technology for the development of the next-generation computed tomography. Among this type of detector, the hybrid GaAs:Cr-TIMEPIX3 detector demonstrates great potential due to its combination of high gamma detection efficiency and high readout speed.

In this study, a novel energy calibration method for GaAs:Cr-TIMEPIX3 was introduced. This method utilizes a monochromatic X-ray source at the Dzhelepov Laboratory of Nuclear Problems combined with test pulses. The performance of the calibrated detector was evaluated by studying the XRF spectra of metal target foils, which allowed for clear identification of characteristic emission lines and demonstrated a significant improvement in energy resolution.

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