

High-rate high-resolution performance of new cadmium zinc telluride linear array detectors for energy-resolved X-ray imaging

Monday, 27 May 2024 09:43 (1 minute)

Recently, sub-millimetre cadmium zinc telluride (CdZnTe or CZT) linear array detectors for high-flux spectroscopic X-ray imaging are proposed and fabricated by our group. These activities, in the framework of a PRIN-MUR project, plan the development of room temperature X-ray scanners for contaminant detection in food industry. As widely demonstrated, CZT is one of the key materials for the development of room temperature X-ray and gamma ray detectors and great efforts have been made on both the device and the crystal growth technologies. In this work, we will present the results from spectroscopic and imaging investigations on new high flux HF-CZT linear array detectors, with hole mobility-lifetime product enhancements and sub-millimetre pixels (pixel pitches of 500 μm). The detector response will be measured taking into account the mitigation of the effects of incomplete charge collection, pile-up, charge sharing and high flux radiation induced polarization phenomena. Preliminary tests with custom front-end ASICs showed excellent room temperature energy resolution FWHM of 1 % (0.6 keV) at 59.5 keV.

Collaboration

PRIN-MUR 2022 Project (2022ZEF2RE; CUP: D53D23002480006)

Role of Submitter

I am the presenter

Primary authors: ABBENE, Leonardo (DIFC Università di Palermo); BUTTACAVOLI, Antonino (University of Palermo Department of Physics and Chemistry "E. Segrè"); Prof. PRINCIPATO, Fabio (University of Palermo); Prof. GERARDI, Gaetano (University of Palermo); BETTELLI, Manuele (IMEM-CNR); ZAPPETTINI, Andrea; QUERCIA, Jacopo (Politecnico di Milano); MELE, Filippo (Istituto Nazionale di Fisica Nucleare); BERTUCCIO, Giuseppe (Istituto Nazionale di Fisica Nucleare)

Presenter: ABBENE, Leonardo (DIFC Università di Palermo)

Session Classification: Photo Detectors and Particle ID - Poster session

Track Classification: T2 - Photo Detectors and Particle ID