

High-Resolution Digital 3D CZT Drift Strip Detectors for Spectroscopic X-ray and Gamma Ray Imaging

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In the framework of an Italian PRIN 2022 PNRR project, we proposed to develop advanced modules for SPECT prototypes, in terms of sensitivity, spatial and energy resolution, for quantitative imaging in nuclear medicine. In this context, we developed new high-resolution cadmium–zinc–telluride (CZT) drift strip detectors for room temperature gamma-ray spectroscopic imaging. As widely demonstrated, CdZnTe (CZT) is one of the key materials for the development of room temperature X-ray and gamma ray detectors and several research groups are still involved in advances in both device and the crystal growth technologies [1,2]. The CZT detectors, equipped with orthogonal anode/cathode collecting strips (Figure 1), drift strips and dedicated digital pulse processing allow a detection area of 6 x 20 mm² and excellent room temperature spectroscopic performance (0.8% FWHM at 662 keV). The capabilities in spectroscopic and Compton imaging will be presented.

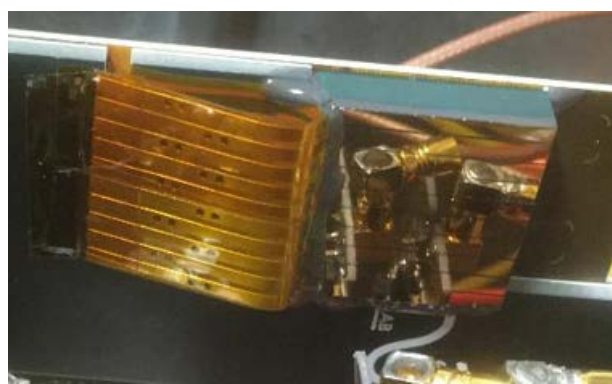


Figure 1. Overview of the cathode strips and bonding of the 3D drift strip CZT detector.

[1] S. Del Sordo *et al.*, *Sensors* 2009, 9, 3491–3526

[2] L. Abbene *et al.*, *J. Synchrotron Rad.* 2020, 27, 319–328.

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