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## **Intrinsic XRF correction in CdTe Timepix3 spectral detectors**

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ADVAPIX is an energy dispersive hybrid pixel detector based on a semiconductor sensor (Si/CdTE/CZT/GaAS) and developed for X-ray spectral imaging (3-200 keV). The sensor is read out by the recently developed Timepix3 ASIC. Timepix3 is formed of 256 x 256 pixels with a pixel pitch of 55  $\mu\text{m}$  developed by the Medipix consortium. Each Timepix3 pixel is capable of recording simultaneous Time-Over-Threshold (Energy) and fast-Time-of-Arrival (fTOA, resolution: 1.56 ns) up to 0.4 Mcts/s/mm<sup>2</sup>. The fTOA information is used to recover the pixel clusters corresponding to a single photon interaction, which significantly suppresses the charge sharing artifacts in the energy spectrum. The fTOA information can also be used to identify simultaneous photon interactions in separated parts of the detector sensor. By combining fTOA and TOT (Energy) information, it is thus possible to identify intrinsic XRF photons from the detector sensor as well as the photons with reduced energies, and correct for them in the spectrum and spectral images. In this work, we present a new energy dispersive, 1 mm thick, CdTe detector (ADVAPIX-Timepix3) and we use simultaneous TOT and fTOA information to correct for artifacts caused by the intrinsic XRF photons from the CdTe sensor.

The attached figure shows an Americium 241 spectrum with and without the XRF correction. The original spectrum shows the peak close to 59 keV from the Americium 241 decay lines. It also shows the intrinsic XRF emission from the CdTe sensor close to 23 keV as well as the escape peak. The corrected spectrum shows significant suppression of the XRF peak and the escape peak as well as an increase in the photon counts in the emission peak.

**Author:** Dr KHALIL, Mohamad (Technical University of Denmark)

**Co-authors:** Dr JAKUBEK, Jan (ADVACAM s.r.o.); SCHOU DREIER, Erik (University of Copenhagen); Dr KEHRES, Jan (Department of Physics, DTU Physics, Technical University of Denmark); TURECEK, Daniel (ADVACAM); Dr LUND OLSEN, Ulrik (Department of Physics, DTU Physics, Technical University of Denmark)

**Presenter:** Dr KHALIL, Mohamad (Technical University of Denmark)

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