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Probing the Time-Resolving Capabilities of XIDer Assemblies with CdTe and CZT sensors

The XIDer R&D project, between the European Synchrotron Radiation Facility (ESRF) and Heidelberg University, is developing state-of-the-art detectors for the high-energy, high-flux beam-lines of the ESRF Extremely Brilliant Source (EBS). In particular, the XIDer detector aims to tackle the significant challenges posed by time-resolved experiments analysing the pattern of diffracted or scattered X-rays.

To fulfil the needs of these experiments, a novel on-chip incremental digital integration readout scheme with per-pixel digital data output has been implemented. The EBS beam operates with different time structures: from a near-100% duty cycle X-ray beam to an up to 5.7MHz pulsed X-ray beam. This poster shall focus on the latter EBS mode, and how the XIDer ASIC is designed to have a fast front-end and memory storage cells, such that the pulsed EBS beam can be exploited by time-resolved experiments. XIDer ASICs have been hybridised to both cadmium telluride (CdTe) and to cadmium zinc telluride (CZT) planar sensors and characterised through laboratory measurements.

Proof-of-principle measurements of single-bunch isolation using 4-bunch 30keV and 20keV EBS beams have been achieved using the CdTe sensor XIDer assemblies. The most recent measurements of the time-resolving capabilities of assemblies with CdTe and CZT sensors shall be presented.

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