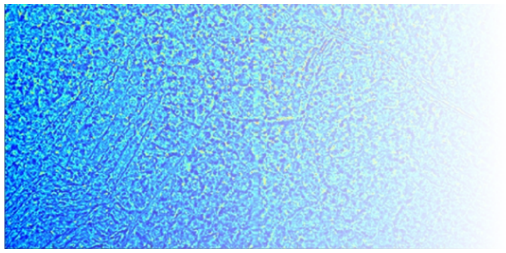

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Comparative evaluation of CZT pixel sensors

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The European Synchrotron Radiation Facility (ESRF) is being subjected to the second phase of its upgrade, the so-called EBS (Extremely Brilliant Source) upgrade. The new storage ring will be able to deliver X-ray beams with brilliance and coherence increased by a factor 100, ushering in a new generation of synchrotrons. In order to exploit this domain ESRF has launched an ambitious instrumentation programme, focusing on high performance detector systems.

Within this effort, we develop hybrid pixel detectors using semiconductor sensors for photon-counting. To counter-balance limitations set to the detection efficiency by existing silicon sensors in the energy range 30-100 keV, we investigate the use of high-Z semiconductor sensors. In the past, pixelated sensors made of Cadmium Telluride (CdTe) and chromium-compensated Gallium Arsenide (GaAs:Cr) have been used successfully, as sensitive medium. Despite the improvement on the crystal quality over the years, limitations such as time-dependent polarisation effects in CdTe and spatial distortions of the effective pixel shape in GaAs:Cr impelling the search for alternatives such as Cadmium Zinc Telluride (CZT).

Several prototype modules based on pixelated CZT sensors have been developed and tested in terms of imaging performance at the ESRF using X-rays sources and monochromatic synchrotron beams. Each module, consisting of a sensor bonded to a single Timepix chip, is coupled to the MAXIPIX readout system. I will report on results obtained focusing on the comparison of the performance achieved with respect to CdTe and GaAs:Cr sensors.

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