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## The Development of Hard X-ray Imaging Detectors at STFC

*Wednesday, 11 February 2026 09:45 (15 minutes)*

This presentation will give an overview of current work at the STFC Detector Development Group to produce a new generation of X-ray imaging detectors for hard X-rays (5 - 600keV) utilising modern compound semiconductor sensor materials such as HF-CdZnTe for photon science applications.

These developments include HEXITEC-MHz, a new generation of our High Energy X-ray Imaging Technology that now operates at a continuous 1 million frames per second. With 80 x 80 pixels on a 250 $\mu$ m pitch, this high frame rate now enables the capture of high resolution (FWHM ~ 1keV) per pixel spectroscopy at photon fluxes of up to 10<sup>8</sup> photons s<sup>-1</sup> mm<sup>2</sup>. [1] Recent experiments alongside Pacific Northwestern National Laboratory (USA) have used the system to demonstrate different imaging modalities including dynamic spectroscopic imaging of ion drift in a solution under a magnetic field with a 250ms temporal resolution and simultaneous spectroscopic radiography, energy dispersive and angular dispersive X-ray diffraction of powder samples.

An update on the XIDyn project, a collaborative X-ray detector development between STFC, ESRF, Diamond Lightsource, University of Heidelberg, and EuXFEL, will also be given [2]. The full XIDyn ASIC which will be delivered by summer 2026 consists of 144 x 192 pixels on a 110 $\mu$ m pitch and operates at continuous frame rates of >100kHz. Using a novel charge cancellation and digitisation design, the detector is capable of capturing images at photon fluxes of up to 10<sup>12</sup> photons s<sup>-1</sup> mm<sup>-2</sup>. Results from the current test chip will be used to illustrate the capabilities of the technology.

### References

[1] M.C. Veale et al 2023 JINST 18 P07048

[2] <https://www.technology.stfc.ac.uk/Pages/News-Conferences-and-Publications/Conferences-Visits-and-Events/SRI2024/SRI2024-Presentations.aspx>

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