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EIGER2 Upgrade: New Features for Advanced X-Ray Diffraction Experiments

Friday, 21 October 2022 14:00 (25 minutes)

Hybrid photon counting (HPC) X-ray detectors are crucial components for cutting-edge synchrotron research [1] by providing noise-free detection with advanced acquisition modes. In this regard, the latest HPC detector generation EIGER2 is setting new performance standards that push current horizons in X-ray science. These detectors combine all advantages of previous HPC detector generations while offering (i) 75 µm × 75 µm pixel size, (ii) kilohertz frame rates, (iii) negligible dead time (100 ns), and (iv) count rates of more than 107 photons per pixel.

Here, we evidence how the recently announced feature upgrade extends the capabilities of the EIGER2 and enables faster and cleaner crystallography experiments. We present how the detector enables powder diffraction experiments at up to 100 kHz, capturing transitions in-situ with <100 microsecond time resolution. Further, we show how to make use of the EIGER2s' two energy thresholds to reduce unwanted scattering contributions from higher-harmonics radiation, leading to cleaner and more unambiguous diffraction data. Supported by experimental data from multiple beamlines around the world, these results evidence how the new EIGER2 acquisition features will advance X-ray diffraction experiments for both static and time-resolved crystallography.

[1] Förster, A., et al. (2019) Philos. Trans. R. Soc. Math. Phys. Eng. Sci. 377, 20180241.

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