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Coherent X-Ray Experiments at 9000 Hz

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Hybrid Photon Counting (HPC) X-ray detectors [1,2] have transformed synchrotron research in the last decade by enabling noise-free detection and new data acquisition modes. Their excellent stability at high frame rates is essential for superior data quality. The EIGER detector family [3] offers a small pixel size of 75 µm × 75 µm and continuous readout with negligible dead time. The recently introduced EIGER X 500K detector is the fastest member of the family and provides frame rates of up to 9 kHz. These properties not only advance established methods like X-ray crystallography but also empower new fields of X-ray photon research like X-ray photon correlation spectroscopy and coherent studies.

Results from different synchrotron experiments highlight characteristics and capabilities of EIGER detector systems. These include a high count rate capability, the absence of readout noise, and high spatial resolution. Moreover, the superior performance of EIGER in coherent diffraction applications and X-ray photon correlation spectroscopy will be demonstrated. Experiments carried out at the CHX beamline at National Synchrotron Light Source II in Brookhaven, United States, show the combined power of a fourth-generation synchrotron light source and a state-of-the-art detector.

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