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| **EIGER and PILATUS3 CdTe DETECTOR SYSTEMS for ADVANCED X-RAY STUDIES**  Stefan Brandstetter on behalf of the DECTRIS team  DECTRIS Ltd, Baden-Dättwil, Switzerland, stefan.brandstetter@dectris.com  E-mail: [stefan.brandstetter@dectris.com](mailto:stefan.brandstetter@dectris.com)  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. Two new HPC detector families enable even more ambitious X-ray science. First, PILATUS3 X CdTe detectors combine the advantages of HPC technology with the superior quantum efficiency of cadmium telluride (CdTe) at energies from about 8 keV to above 80 keV [3]. All other detector properties are identical to those of the successful PILATUS3 X series, e.g. a pixel size of 172 µm × 172 µm and frame rates of up to 500 Hz. Second, EIGER detectors [4] offer smaller pixels of 75 µm × 75 µm, a frame rate of up to 9 kHz, and negligible dead time (3 µs) between exposures. 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.  Here, I present results from different experiments. First, we characterized detector properties like count rate capability, readout noise (restricted to cosmic background), and spatial resolution. Second, combining a nanofocus X-ray tube with a PILATUS3 X CdTe 300K-W detector we resolved features as small as 150 nm from test patterns. This is a promising configuration for nano computed tomography. Moreover, using an EIGER X 1M in ptychography experiments we were able to resolve structures in the order of 40 nm on test patterns. Finally, in experiments carried out with the EIGER X 500K at the CHX beamline at National Synchrotron Light Source II in Brookhaven, United States, we demonstrated the combined power of a fourth-generation synchrotron light source and a state-of-the-art detector for coherent diffraction applications, by taking XPCS data at 9000 Hz. Together, these results show how latest HPC detectors empower advances in X-ray micro- and nanoanalysis.  **References**   1. C. Broennimann et al., J. Synchrotron Rad. 13, 120 (2006). 2. T. Loeliger et al., IEEE Nucl. Sci. Symp. Conf. Rec., 610 (2012). 3. T. Donath et al., J. Phys. Conf. Ser. 425, 062001 (2013). 4. R. Dinapoli et al., Nucl. Instrum. Meth. Phys. Res. A 650, 79 (2011). |
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