DECTRIS

Fast, faster...

SELUN



DECTRIS SELUN

Next Level Photon Counting for Coherent Scattering Techniques

Fast, faster, SELUN: Accelerate measurements to 120,000 frames per second with the next generation hybrid photon counting (HPC) X-ray detector. Designed to exploit the high coherent fluxes of 4th-generation synchrotrons, SELUN offers an unparalleled match of sustained frame rate and count rate – full dynamic range, even at maximum speed.

SELUN's standout feature is the continuous frame rate of 120 kHz with a duty cycle of >98.8%. This can be achieved through on-chip 2x2 pixel binning in combination with a novel in-pixel compression scheme. The detector features a continuous 190x190 pixel matrix with a 100 µm pixel pitch and is compatible with both silicon and high-Z sensors to provide optimal quantum efficiency, both at low (8-25 keV) and high (10-80 keV) photon energies. Its ultra-fast front end with DECTRIS Instant Retrigger® technology enables photon counting at exceptional rates exceeding 4.5 G ph/s/mm², independent of the frame rate: Resolve weak and strong signals simultaneously, with zero noise contribution, single pixel spatial resolution, and maximum detection efficiency.

SELUN is ideal for coherent scattering techniques such as Ptychography, Bragg Coherent Diffraction Imaging (BCDI), and X-ray Photon Correlation Spectroscopy (XPCS), in which fast, precise, and reliable measurements over hours and days are crucial for success. Its user-friendly design uses the same modern SIMPLON API controls and data interface as the widespread EIGER2 and PILATUS4 detector families, ensuring seamless integration. Expect unparalleled speed, dynamic range, and reliability at your beamline with DECTRIS SELUN®.

Key Advantages

Fast, continuous frame rates: 120 kHz 2x2 binned, and 30 kHz full readout with a duty cycle of >98.8%.

High dynamic range, even at full speed: 4.5 G ph/s/mm².

Photon-counting data quality: No readout noise and no dark signal, for an optimal signal-to-noise ratio.

Easy to use, stable & reliable: Proven DECTRIS quality paired with expert-level technical support.

Applications

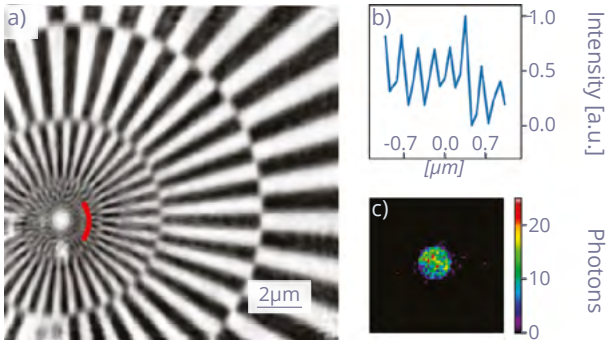
- Ptychography
- CDI
- XPCS
- BCDI

110 kHz ptychography at DLS I13

a) 20x20 µm² phase image of a Siemens star test pattern, scanned at 11 keV with 800 µm²/s.

b) Line profile extracted from a) (the red line), showing a resolution of 285 nm.

c) Typical diffractogram; the max. photon count is 22 photons per pixel.



Reference: Cipiccia, S., Fratini, M., Erin, E. *et al.* Fast X-ray ptychography: towards nanoscale imaging of large volume of brain. *Eur. Phys. J. Plus* **139**, 434 (2024).

Technical Specifications

SELUN	Si	High-Z
Frame rate (max.) [Hz]	2x2 binned: 120’000 Full: 30’000	
Readout time	continuous readout, >98.8% duty cycle	
Count rate [ph/s/pixel]	2x2 binned: 1.8×10^8 Full: 4.5×10^7	
Active area (W x H) [mm^2]	19.0 x 19.0	
Pixel array (W x H)	2x2 binned: 94 x 94 Full: 190 x 190	
Pixel size (W x H) [μm^2]	2x2 binned: 200 x 200 Full: 100 x 100	
Image bit depth [bits]	32, 16	
Sensor thickness [µm]	450	1500
Energy range [keV]	8-25	10-80
Option for vacuum compatibility	Yes	
Option for removable window	yes	no
Dimensions (W x H x D) [mm^3]	114 x 92 x 241.5	
Weight [kg]	3.7	

* Specifications are subject to change without prior notice

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