

DECTRIS



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JUNGFRAU

High Speed. High Flux. High Confidence.

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"JUNGFRAU": CH, CN, EU, JP, KR, UK, USA
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DECTRIS JUNGFRAU

The DECTRIS JUNGFRAU® is our first charge-integrating detector, built for the extreme flux of 4th-generation synchrotrons. Per-pixel charge integration with three-level dynamic gain switching captures single photons and the most intense Bragg peaks in the same frame, without saturation, at a continuous 2,000 Hz across the full 4-megapixel area.

Each 75 µm pixel selects one of three calibrated gain stages depending upon the charge it collects: single-photon sensitivity at low flux; more than 10⁴ photons per pixel per frame at the top end. Charge integration has no instantaneous count-rate limit to work around, and the sustained 2,000 Hz readout reliably records every frame of your experiment for seconds, minutes, or even hours. On-detector autosummation combines sub-frames on the fly, extending the effective dynamic range and delivering fully calibrated images at the frame rate you need.

This detector is specifically built for applications that demand the highest local intensities, such as serial synchrotron crystallography (SSX); single crystal diffraction; pump-probe experiments; time-resolved SAXS/WAXS: Full-frame speed; uncompromised dynamic range; DECTRIS reliability.

Key Advantages



Full-speed, full-frame.

Continuous 2,000 Hz across the full 4 MP frame - for every frame of the measurement, not just a fixed burst.



High dynamic range for the highest flux.

From single photons to over 10⁴ photons per pixel per frame with no instantaneous count-rate limit: A powerful complement to photon counting.



Photon counts, out of the box.

Energy calibration, pedestal correction, flat-field, and autosummation turn the raw signal into photon counts for you - no offline processing is required.

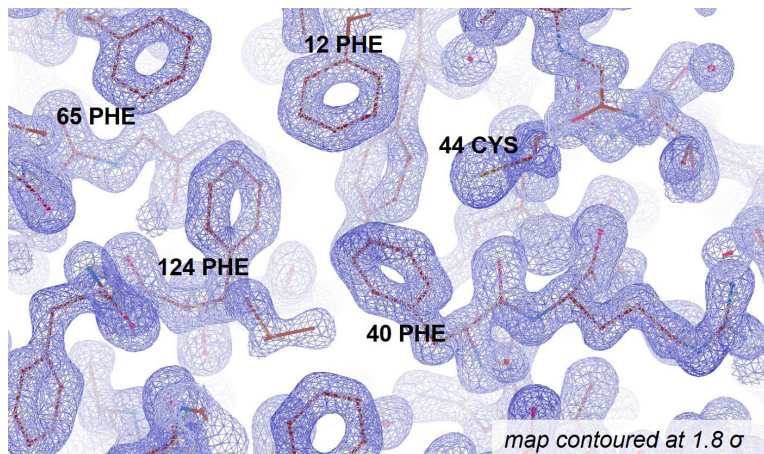


Easy to integrate, reliable:

JUNGFRAU uses the same SIMPLON API, HDF5/NeXus, and Streaming interfaces as EIGER2 and PILATUS4; delivered and supported to DECTRIS standards.

Proven at the beamline: P14, PETRAIII

"The DECTRIS JUNGFRAU is fully suitable for any application in crystallography - out of the box. We collected precise and accurate rotation MX data."
Gleb Bourenkov, EMBL Hamburg



Electron density map from a DECTRIS JUNGFRAU rotation dataset (1.7 Å resolution, map contoured at 1.8 σ). Data: G. Bourenkov, EMBL Hamburg (P14, PETRA III). 360° dataset from a Cyclophilin–Cyclosporin complex crystal recorded in 1.8 s ($\Delta\phi = 0.1^\circ$, $R_{\text{merge}} = 3.9\%$, $R_{\text{work}} = 11.6\%$, $R_{\text{free}} = 15.7\%$).

Technical Specifications

SENSOR & GEOMETRY

Sensor material / thickness	Silicon, 450 µm
Pixel size (W × H)	75 × 75 µm ²
Pixel array (W × H)	2068 × 2168 pixels
Active area (W × H)	155.1 × 162.6 mm ²
Number of modules	8 (2 × 4 matrix)
Module gaps (vertical / horizontal)	10 / 40 pixels

PERFORMANCE

Frame rate	2,000 Hz, continuous, full frame
Readout	Continuous readout, duty cycle > 98%
Max. signal	>10,000 photons/pixel/frame @ 12 keV ¹
Response linearity	1% across the dynamic range
Energy range	7 - 18 keV ²
Image bit depth	32 / 16 bit
Trigger modes	software and hardware trigger (TTL)

DATA & CONTROL

Control & data interfaces	SIMPLON API, HDF5/NeXus, ZMQ stream, Monitor
Max. data rate	18 GB/s (16-bit, 2 kHz)
Detector control unit	1 rack-mounted server

PHYSICAL & ENVIROMENT

Cooling	Liquid coolant, 17 °C
Detector operation	At ambient temperature; dry-air supply required
Dimensions (W × H × D)	300 × 313 x 551 mm
Weight	Approx. 30 kg

Specifications are subject to change without prior notice.

¹ Max signal inversely proportional to photon energy. ² Extension below 7 keV is being characterized.