



PHOTON III

- Photon counting with mixed mode detection

The best crystal structures for publication require X-ray detectors with high signal-to-noise ratios and accurate intensities. The PHOTON III matches these requirements perfectly, offering mixed mode detection for the first time. Mixed mode detection simultaneously combines photon counting and integration, providing data of ultimate quality for both strong and weak reflections. Conventional photon counting detectors, like HPC or HPADs, suffer from poor linearity and count rate limitations for strong reflections, significantly degrading data quality. The mixed mode PHOTON III detector eliminates all detector noise, delivering the highest linearity and guaranteeing the highest quality data for your most challenging samples.

The PHOTON III is available in three different sizes because at Bruker we don't believe in a one-size-fits-all approach. The detector active area is tailored to ensure the best performance for your application needs.

Users admire the detectors' ultimate sensitivity over a wide energy range, low point-spread and parallax-free diffraction data. The PHOTON III also features high-energy event discrimination (HEED) that eliminates ubiquitous cosmic radiation artefacts making it the best detector ever developed.

PHOTON III

Large Active Area,
Mixed Mode Detector
for Perfect Data



The new PHOTON III detectors are available in various sizes and are integrated with the D8 VENTURE and D8 QUEST X-ray crystallography solutions.



The PHOTON III is the next-generation detector that uniquely combines photon counting and integrating modes. Mixed mode lets you collect the best data without compromise for weak and strong reflections alike.

Features

	PHOTON III 7	PHOTON III 14
Detection Mode	Mixed mode detection with simultaneous integrating	
Active area (mm)	104 × 69	104 × 139
Sensor format (pixels)	768 × 512	768 × 1,024
Pixel size (microns)	135	
Total dead area (%)	0	
Percentage of active area with charge sharing losses (%)	0	
Count rate nonlinearity (% at 10 ⁶ X-rays per pixel-sec)	0	
Maximum parallax error (pixels)	<1	
Operating energy range (keV)	5 - 30	
Dimensions (w × h × d)	152 × 161.5 × 156.3	156 × 230 × 265
Weight (kg)	3.5	7.3
Cooling	Air-cooled	



Features and Benefits

	PHOTON III 28	Benefit
	photon counting and	Highest dynamic range for the best data quality from all challenging samples
	208 × 139	Active area tailored to crystallographic application
	1,536 × 1,024	
		Good point-spread function for resolution of large unit cells
		Full reciprocal space coverage for complete data
		Accurate data
		Best data from large unit cells and modulated samples
		Covers the complete range of crystallographic applications
5.3	256 × 230 × 262.3	Compact detector design
	11.5	Low stress on goniometer for best sphere of confusion
		Highest reliability, no chiller maintenance

Best Data Quality

The only detector with mixed mode photon counting and integrating – excels at both weak and strong reflections, ensuring superior data.

Warranty

Three-year warranty, air cooling and no maintenance go hand in hand to deliver a long-lasting, highly reliable detector.

Sensitivity

It can't get any better than photon counting in terms of sensitivity – best possible data for *weak reflections*.

Linearity

No count rate losses for strong reflections due to integrating mode – best possible data for *strong reflections*.

Tailored Active Area

The PHOTON III now comes in sizes matching the needs of your X-ray application perfectly – capture more reflections in just one detector setting.

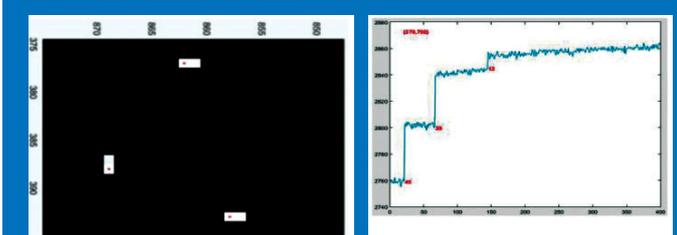
Speed

With a detector frame rate of up to 70 Hz, zero readout dead time and shutterless operation, data are acquired quickly and accurately.



PHOTON III

Photon counting

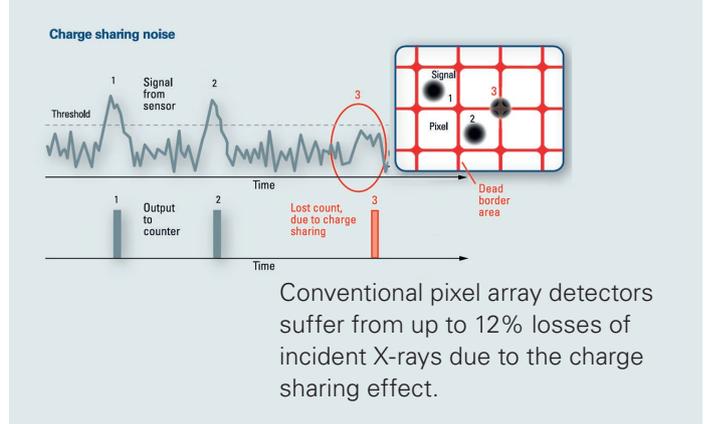


Photon counting, illustrating zero-background and superb point-spread function.

Photon counting in one pixel in a sequence of frames.

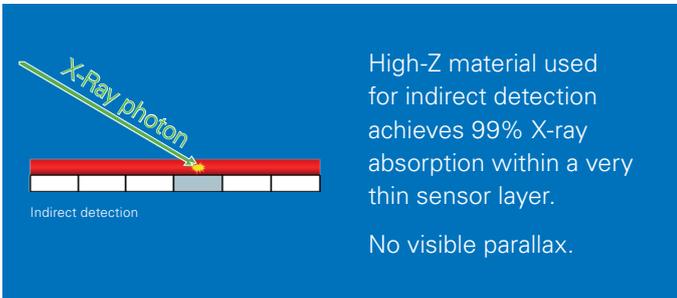
Traditional photon counting detector

Charge sharing noise



Conventional pixel array detectors suffer from up to 12% losses of incident X-rays due to the charge sharing effect.

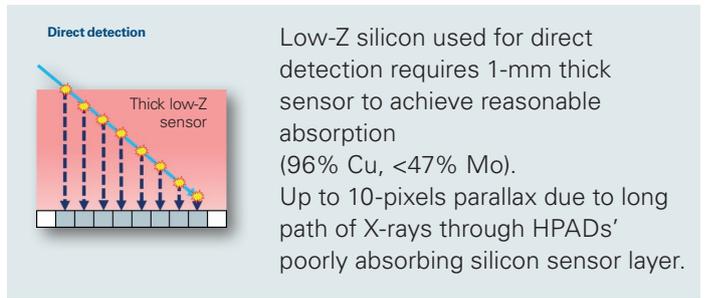
Parallax free



High-Z material used for indirect detection achieves 99% X-ray absorption within a very thin sensor layer.

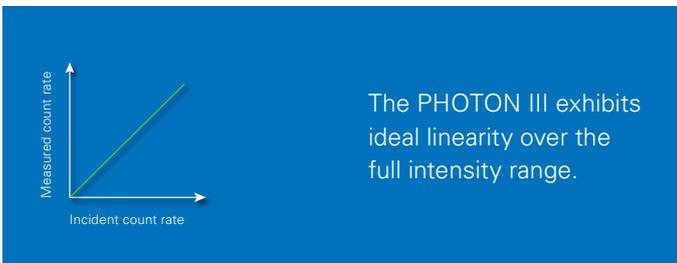
No visible parallax.

Large parallax



Low-Z silicon used for direct detection requires 1-mm thick sensor to achieve reasonable absorption (96% Cu, <47% Mo). Up to 10-pixels parallax due to long path of X-rays through HPADs' poorly absorbing silicon sensor layer.

Ideal linearity



The PHOTON III exhibits ideal linearity over the full intensity range.

Count rate saturation



Traditional photon counting detectors suffer from low linearity and count rate losses.

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