

# LAMBDA



## One system, many layouts

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The LAMBDA pixel detector is designed for high-end X-ray experiments, particularly at synchrotron sources. It achieves an extremely high image quality by combining effectively noise-free photon-counting operation with a small pixel size of 55  $\mu\text{m}$ . For fast and time-resolved experiments, LAMBDA can be read out at up to 2000 frames per second with no time gap between images. But speed and resolution are not the only thing LAMBDA excels at, you can find a more information at [www.x-spectrum.de](http://www.x-spectrum.de). Or contact us anytime at [info@x-spectrum.de](mailto:info@x-spectrum.de).

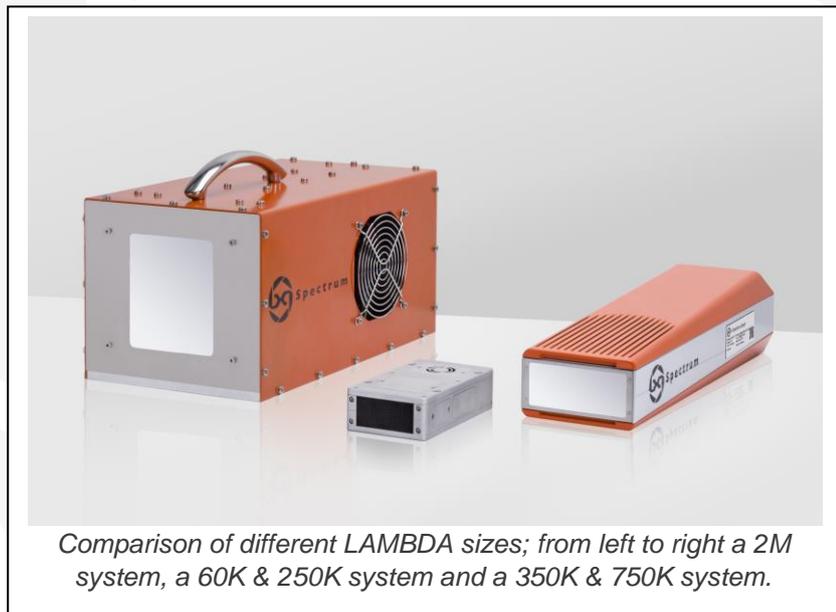
LAMBDA cameras are distinguished by their size. A 60K unit consists of a single Medipix3 chip, 250K systems tile 2x2 chips together, 350K units have 6 chips in a 2x3 arrangement, 750K units feature 12 chips in either 2x6 or 2 times 2x3 arrangement and 2M units have a total of 36 chips as we efficiently combine 3 750K units on top of each other.

Every version of the LAMBDA pixel detector is available with different sensor layers for different X-ray

energy ranges. For hard X-ray detection, the GaAs and CdTe LAMBDA systems replace the standard silicon sensor layer in LAMBDA with a "high-Z" (high atomic number) sensor. This provides high quantum efficiency at high X-ray energies (75% at 40 keV for GaAs, and 75% at 80keV for CdTe), while retaining single-photon-counting performance and our high frame rate of up to 2 kHz. Upon request we also provide LAMBDA versions that can be operated in vacuum.

### Key features:

- Effectively zero noise (photon counting)
- 55  $\mu\text{m}$  pixel size
- Up to 2000 frames per second
- Deadtime-free readout
- up to 1536 by 1536 pixels (85 x 85  $\text{mm}^2$ )
- Energy binning capability



Comparison of different LAMBDA sizes; from left to right a 2M system, a 60K & 250K system and a 350K & 750K system.

# Comparison of key technical data



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## All LAMBDA versions have the following common features:

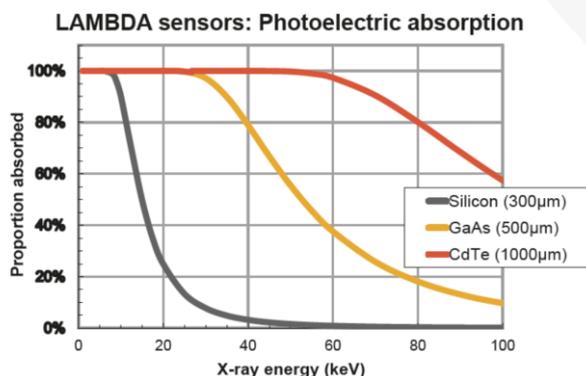
<b>Pixel size:</b>	55 $\mu\text{m}$ x 55 $\mu\text{m}$
<b>Sensor:</b>	300 $\mu\text{m}$ -thick Silicon, 500 $\mu\text{m}$ -thick GaAs or 1000 $\mu\text{m}$ -thick CdTe
<b>Max frame rate:</b>	up to 2000 frames per second in 12 bit mode
<b>Counter depth:</b>	12 bit with zero time gap between images, 24 bit with 1 ms time gap between images
<b>Count rate (w/ corr.):</b>	up to $2.5 \times 10^8$ cts/ $\text{mm}^2/\text{s}$ (at 10% deviation from linear)
<b>Noise:</b>	Photon counting – noise free at 5 keV
<b>Cooling:</b>	Air cooling, water cooled for 2M systems
<b>External trigger:</b>	3.3V TTL

## Depending on the sensor material the following specifications are valid:

	Silicon	GaAs	CdTe
<b>Energy range:</b>	6 - 25 keV	8 - 75 keV	8 - 150 keV
<b>Adjustable threshold range:</b>	4 - 40 keV	5 - 50 keV	5 - 75 keV

## Depending on the size the following specifications are valid:

	Detector pixels:	Sensor area:
<b>60K</b>	256x256	14x14 $\text{mm}^2$
<b>250K</b>	512x512	28x28 $\text{mm}^2$
<b>50K</b>	512x764	28x42 $\text{mm}^2$
<b>750K(Si)</b>	512x1536	28x85 $\text{mm}^2$
<b>750K(other)</b>	512x1528	28x85 $\text{mm}^2$
<b>2M(Si)</b>	1536x1536	85x85 $\text{mm}^2$
<b>2M(other)</b>	1536x1528	85x85 $\text{mm}^2$



We are also able to build detectors of different sizes and/or in different geometries. Upon request detectors can also be made vacuum compatible. Please inquire at [info@x-spectrum.de](mailto:info@x-spectrum.de) for detailed specifications.

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