

20-KHZ DIRECT ELECTRON DETECTORS

*“It’s among the **highest resolution protein structures** ever solved with electrons, and the AMBER’s large array size has made this possible.”*

Dr. Robert Bücker, Dwayne Miller’s group, Max Planck Institute for the Structure and Dynamics of Matter, Hamburg

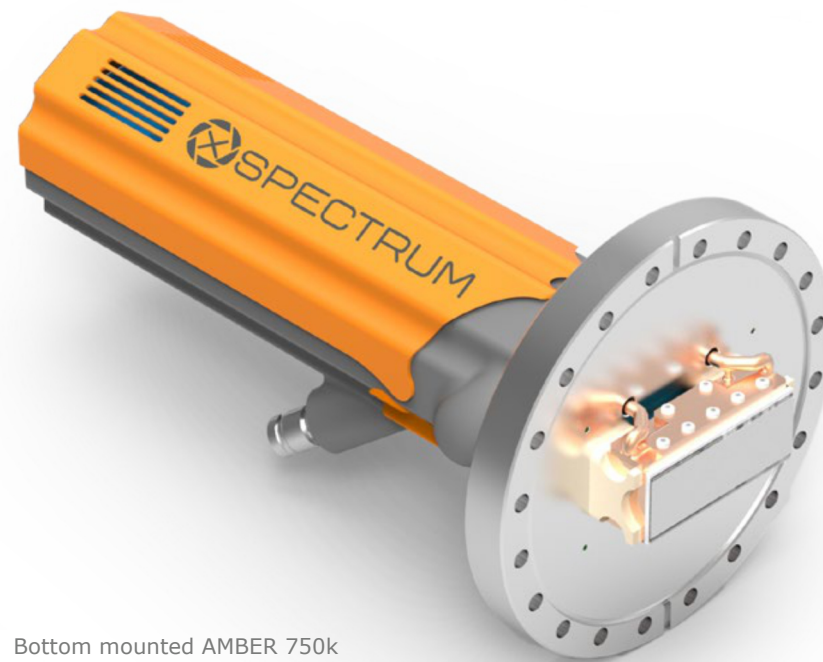
Increase your research possibilities with this field tested & proven **direct detection** camera. Take the full advantage of Medipix hybrid pixel technology, such as **20 kHz frame rate**, $55\mu\text{m}^2$ pixel, **charge summing mode**, 2 energy thresholds, energy binning capability and **shutterless operation**. Our cameras are available in a **wide range of configurations**, including bottom-mounted on axis large-area detectors, as well as smaller, side-mounted retractable designs. Depending on your set up & conditions we can provide an instrument with a **variable active area** and **different sensor materials**.

Our latest development is a multi-detector system that allows **up to 4 separate 65k pixels detector heads** to be connected to a single read out electronics board by cables.

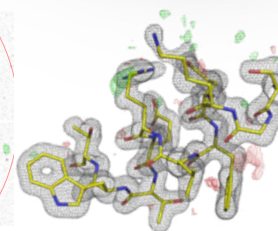
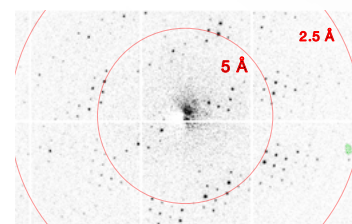
Locate them **anywhere inside of the microscope** and perform different **measurements simultaneously**.

We offer cutting-edge cameras with **open source software** for a **reasonable price**.

We will gladly assist you in making your next discovery!



Bottom mounted AMBER 750k



Detail of granulin structure at 1.55 Å, obtained using serial electron crystallography - courtesy of Dr. Robert Bücker, MPI, Hamburg

Bücker et al., bioRxiv, doi:10.1101/682575 “Serial protein crystallography in an electron microscope”

HYDRA: special design with 4 detector heads

Cyrill von Hehn
Junior Sales Manager
sales@x-spectrum.de
P +49 40 8998 89 104
M +49 157 31 71 14 72

Jing Cao
Production Engineer Electron Microscopy
jing.cao@x-spectrum.de
P +49 40 8998 89 111

MAIN FEATURES

- Direct electron detection – zero noise above selected threshold
- 55 μm^2 pixel
- Up to 20 kHz frame rate (full frame)
- Dead-time free readout (shutterless operation)
- 2 adjustable energy thresholds
- High dynamic range (up to 16,777,216 counts/pixel)
- Charge summing mode – know the exact position of each electron's arrival
- Radiation hardness

POSSIBLE APPLICATIONS ARE

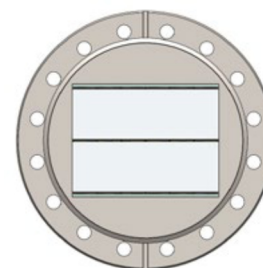
- Electron diffraction/Backscatter Diffraction
- Crystallography (Protein, Pharmaceutical, etc.)
- CryoEM
- STEM/4D STEM
- SEM
- Ptychography
- Pump and probe experiments
- Catalysis (Zeolites and MOFs)
- Low Energy Electron Microscopy
- In-situ Electron Imaging
- Angular Resolved Spectroscopy

STANDARD MODELS OVERVIEW

Model name	AMBER 60K	AMBER 250K	AMBER 750K	AMBER 1.5M	AMBER 2M
Pixel matrix	256 x 256	512 x 512	512 x 1536	1024 x 1536	1536 x 1536
Active area (mm ²)	14 x 14	28 x 28	28 x 85	56 x 85	85 x 85

TECHNICAL SPECIFICATIONS

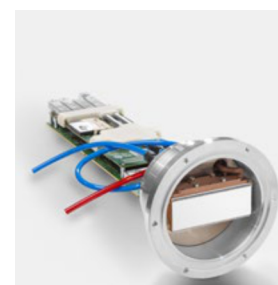
Sensor material range	300/500 μm Si 500 μm GaAs 1mm CdTe
Maximum frame rates (full frame)	20 kHz (1-bit), 4 kHz (6-bit), 2 kHz (12-bit), 0.99 kHz (24-bit)
Read out time	0 ms (1-bit, 6-bit, 12-bit), 1 ms (24-bit)
DQE at 60 keV (Si sensor)	1 at Zero frequency/0.45 at Nyquist*
MTF at 60 keV (Si sensor)	>0.62 at Nyquist (depends on mode)*
Software interface	Open-source hardware library, python interface
Data format	HDF5/Nexus
Trigger functionality	Triggering & gating
Designs	Bottom mounted, side mounted, fixed & retractable



1.5M on DN160 flange



Latest development: HYDRA with 3 detector heads



Straight bottom mounted AMBER 750k



Angled bottom mounted AMBER 750k

* J.A. Mir et al., arXiv:1608.07586 [physics.ins-det] "Medipix3 Demonstration and understanding of near ideal detector performance for 60 & 80 keV electrons"