Quantum DETECTORS

Xspress 3 Mini

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Technical Datasheet

Many solid-state detectors are not limited by their intrinsic rate capability, but by the readout system connected to them. Xspress 3 was developed to maximize the throughput and resolution of such detectors and remove the bottleneck at the readout stage.

There is a large body of data available to prove the performance of Xspress 3, with 60 Xspress 3 and 30 Xspress 3 Mini units now installed around the world at synchrotrons including the APS, SPring-8, ESRF, Diamond, SSRL, Canadian Light Source, BESSY, PETRA III, MAX IV, CHESS and NSLS-II. Many of these customers have gone on to make multiple purchases, indicating that not only do the specifications on paper and the price justify the outlay, but also that the installation, support and performance of the systems at the beamline offer just what the beamline scientists and users need. With beamtime such an expensive commodity it pays to invest in modern readout electronics which are able to capture as much of the available information as possible, enabling faster experiments with better results.

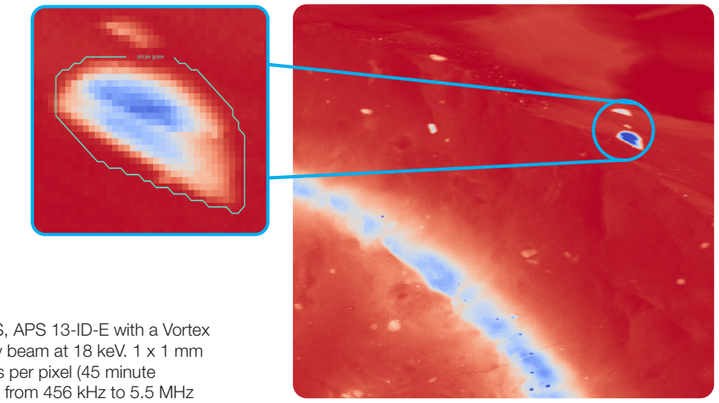
Xspress 3 is now available with the same world leading performance in a compact unit: Xspress 3 Mini.

Benefits

- **30X faster than standard readout technology**
- **>4 Mcps output rate**
- **125eV resolution measured at Mn at 35 kcps**
- **1 or 2 channels per unit**
- **Two or more units can be connected to create a 3+ channel system**
- **EPICS and TANGO drivers**
  - Both in service at synchrotron beamlines
- **Software selectable input range**
- **Ideal resolution and rate at all levels of flux with no user intervention required**

Xspress 3 Mini

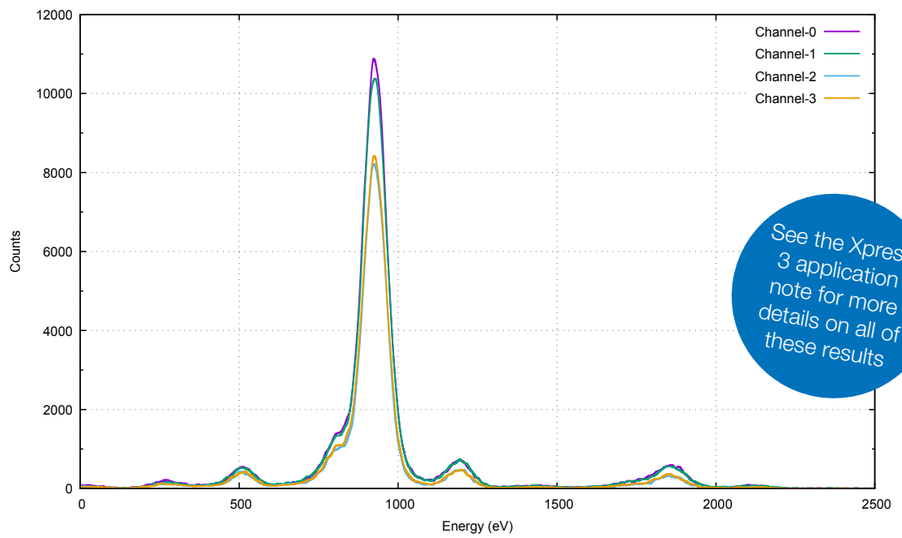
X-ray Fluorescence Mapping (µXRF)



Data collected at GSECARS, APS 13-ID-E with a Vortex ME4 and 2 x 2 micron X-ray beam at 18 keV. 1 x 1 mm area, 2 x 2 µm pixels, 10 ms per pixel (45 minute acquisition). OCR increased from 456 kHz to 5.5 MHz

Low Energy Performance

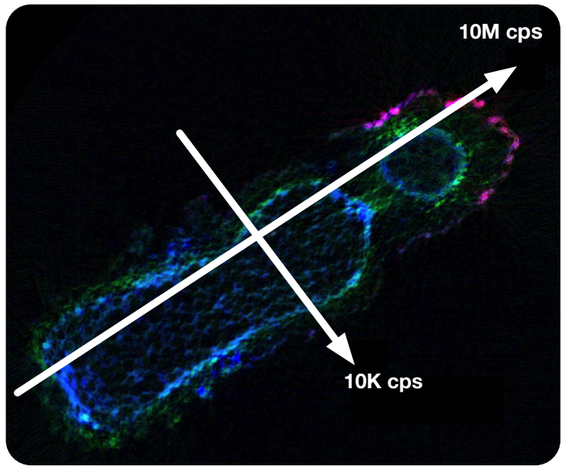
- Xspress 3 pre calibration at SPring-8-BL25SU showed data in the range 900 eV upwards.
- After recalibration Xspress 3 allowed us to see all the fluorescence peaks in the copper oxide on carbon tape sample.
- This included previously undetectable peaks for carbon (277 eV) and oxygen (524 eV).

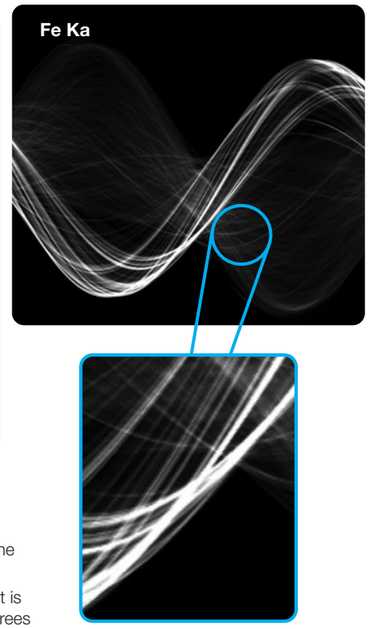


See the Xpress 3 application note for more details on all of these results

Copper oxide on carbon tape with 10s exposure at 300 kcps. The plot is shown on linear scale. Clearly visible are carbon (277eV), oxygen (524 eV), and copper Lα (927 eV).

Fluorescence Computed Microtomography (fCMT)



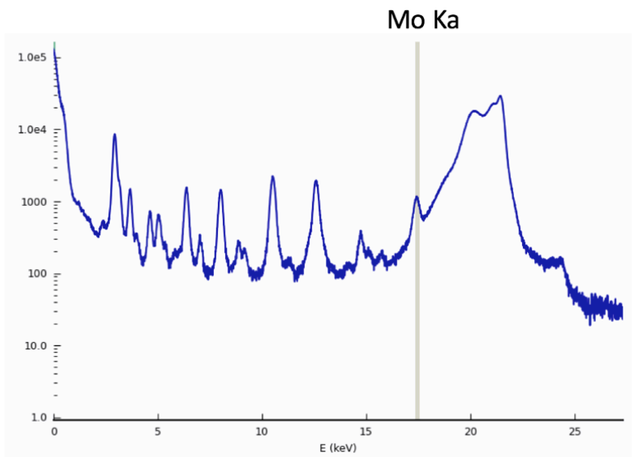


Sample of a root nodule of Medicago (Alfalfa) - Ryan Tappero, Brookhaven National Laboratory.

Research undertaken at Argonne National Laboratory, sector 13-D-E with the support of Mark Rivers, Matthew Newville, and Tony Lanzirotti.

“Sample for fluorescence computed microtomography (fCMT) measurement is large in one direction and small in the other direction such that at θ = 0 degrees we measure, say, 10 kcps and at θ = 90 degrees we measure, say, 10 Mcps. This heroic fCMT measurement was possible with the dynamic range of Xspress 3”

EXAFS



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EXAFS scan with 13 femtograms of Mo with large adjacent scatter peak.

Web: quantumdetectors.com/xspress-3-mini **Email:** info@quantumdetectors.com **Tel:** +44 1235 44 5795

Quantum DETECTORS

Xspress 3 Mini

Two X3M units can be linked to create a 3- or 4-channel system.

Performance

Max. output rate	> 4 Mcps (dependent on detector)
Deadtime per event	< 80 ns
Max. number of time frames	Unlimited (via circular buffer), 12,000 (standard mode)
Max. frame rate	> 24 kHz
ADC bit depth	16
Sample rate	80 MHz (12.5 ns)
TTL channels	2 in, 2 out
Time between frames	< 1 µs
Peaking time (equivalent)	Adaptive (≥ 12.5 ns)

Compatibility

Channel count	1 or 2 per unit (multiple units can be connected to higher channel systems)
Detector input range	-5 V to +5 V, max. 8 Vpp, auto adjusting
Software infrastructure	EPICS and TANGO (full support), LabView

Data Format

Points per MCA	4096
File format	HDF5

I/O

Detector input	LEMO.00.250
Hardware trigger	TTL (x4), LEMO.00.250
Data transfer	Gigabit ethernet (min. Cat 5 or Cat 6 cabling, max. length 100m)
Server	Mini-PC supplied, configured with TANGO or EPICS as required

Configuration

Input range	User customisable, autoset using software
Calibration	Via user-friendly browser based GUI

Dimensions

W	216 mm
D	218 mm
H	44 mm
Power	5 V, <5 A input
Net weight (approx.)	2.0 kg per X3M unit, 1.5 kg per mini-PC