DECTRIS®

detecting the future

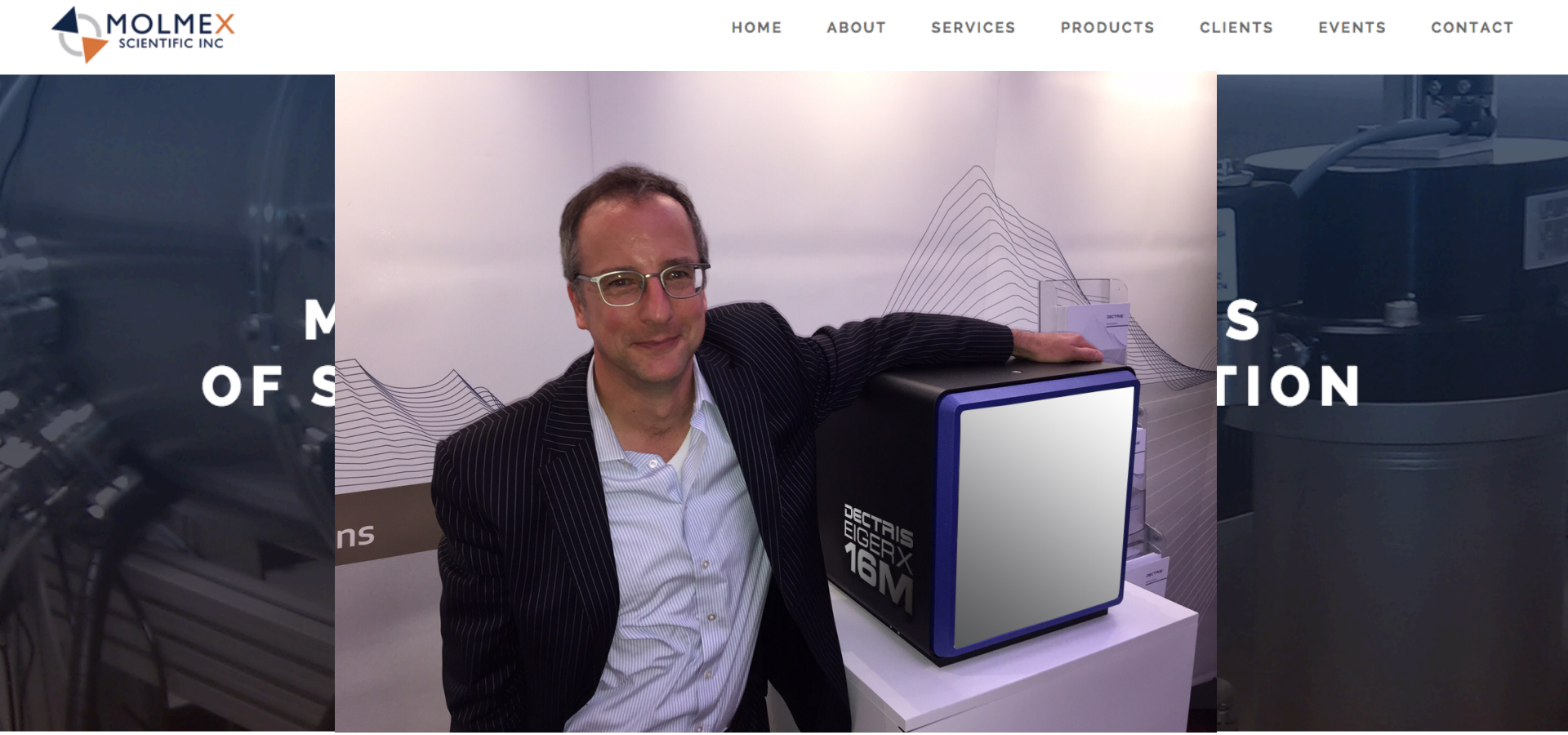
DECTRIS – Products and Roadmap

Clemens Schulze-Briese, CSO

DECTRIS LTS, SRI 2015, July 8th 2015

DECTRIS Ltd.
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Switzerland
www.dectris.com

MOLMEX Scientific Inc. – DECTRIS' Official North America Distributor



DECTRIS product names

Generation	Major performance improvement

e.g. PILATUS3 features instant retrigger technology, etc.



Product Series	Performance
R	Home source and industry
S	High performance synchrotron
X	Ultimate performance for most demanding synchrotron applications





MYTHEN2 X

New opportunities

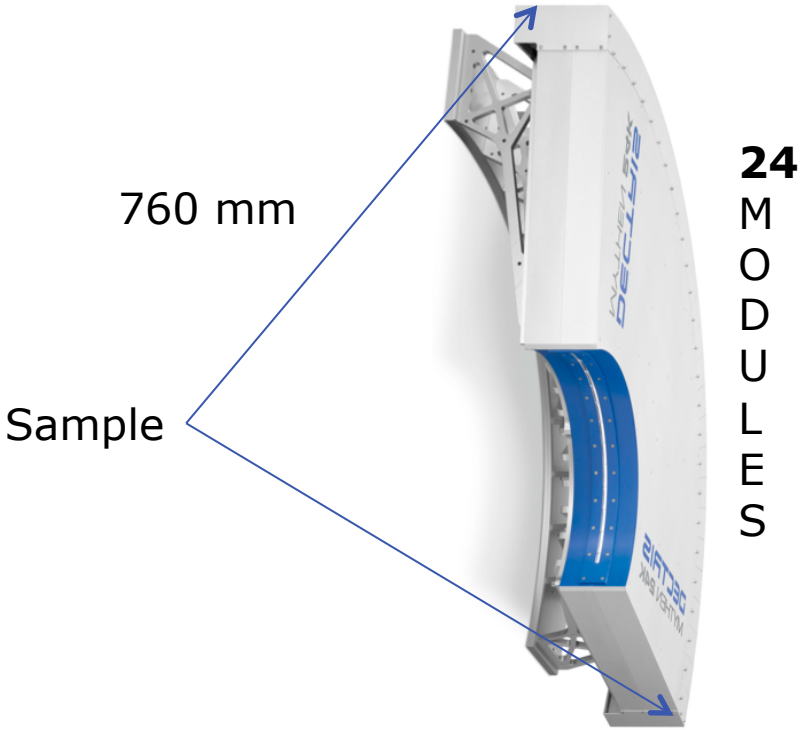
- 1000 Hz frame rate
- 4 mm strip for noise free operation down to 4.5 keV
- 1000 µm sensor for high QE at high energies
- Symmetric & compact design including 640 channel (1D)
- Up to 4 modules per controller
- Lower price

Ideal for time-resolved and high-throughput experiments



MYTHEN 6K and 24K systems

High accuracy and ultimate throughput in XRD and PDF analysis

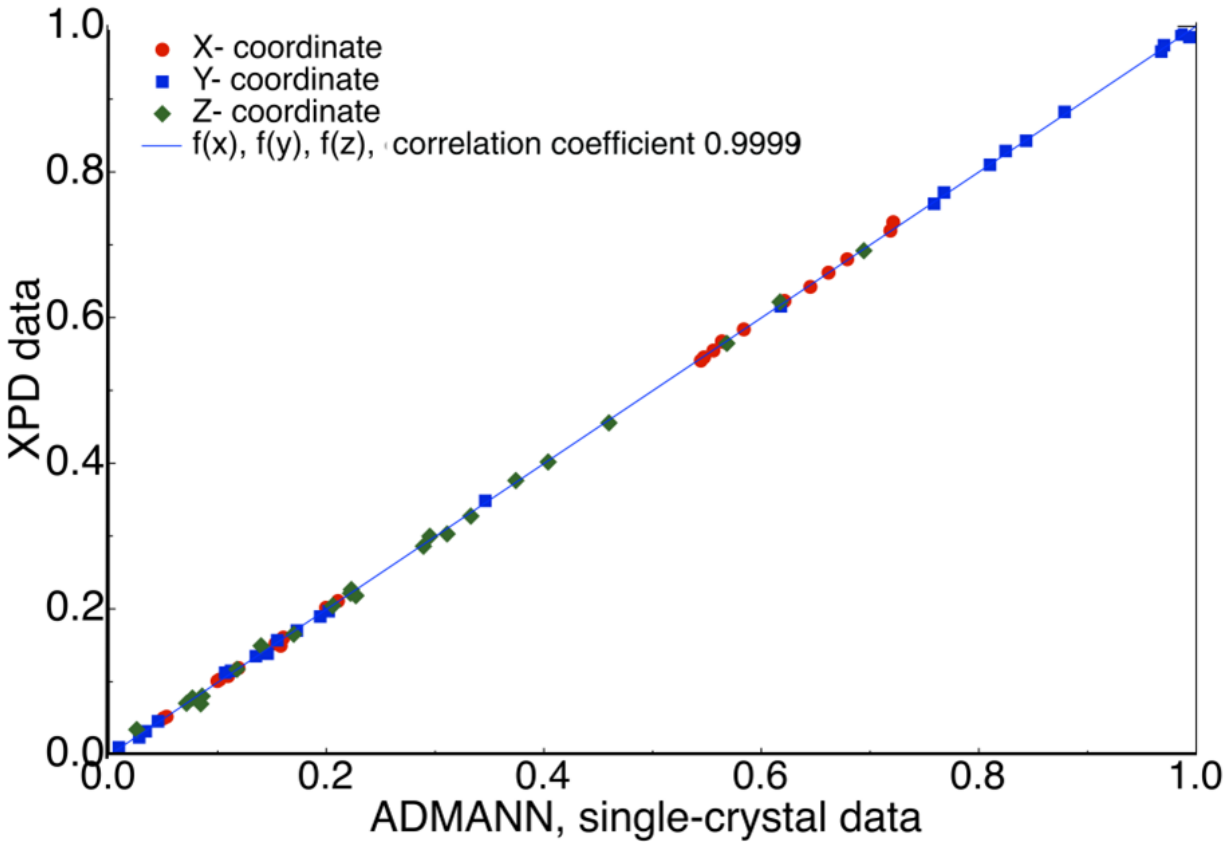


1 strip = 50 µm
=> Resolution 0.00377°
1 module = 1280 strips
=> coverage 4.8° in 2θ
24 modules = 30720 strips
=> coverage 120° in 2θ
Point spread function σ = 0.0012° [1]

Available with 320, 450 and 1000 µm sensors

[1] Bergamaschi, A. *et al* (2010) *J. Synchrotron Rad*. **17**, 653-668

MYTHEN 24K - reference sample



Comparison of D-mannose atomic coordinates (x, y, z) obtained from single-crystal data (ADMANN) and powder diffraction data measured with MYTHEN 24K.

Data collection time: 60 sec.

10 s restraint-free refinement

Šišak Jung, D. PhD Thesis, Laboratory for Crystallography, ETH Zurich

DECTRIS® detecting the future

PILATUS3: Our endeavor in perfecting X-ray counting



- 10^7 phts/s/pixel count rate
- first large area X-ray detector with frame rates > 100 Hz

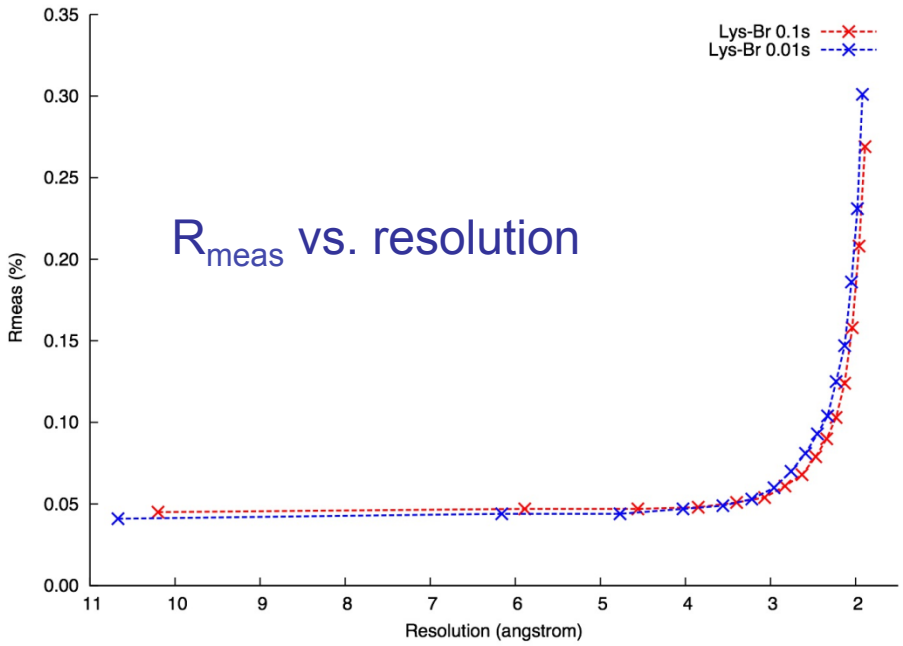
What's new this run

I24, January 2014



diamond

Fast detector (100 frames per second)



R_{meas} vs. resolution

Crystal soaked with 0.5 M NaBr
Two collection regimes

Slow
10% transmission, 0.1 s images
Total duration of experiment 10 minutes

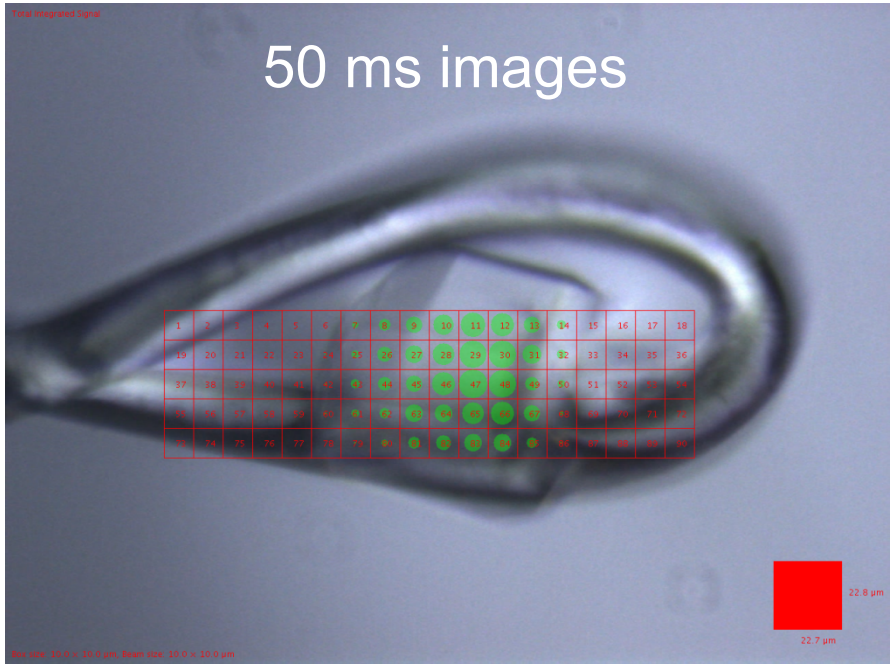
Fast
100% transmission, 0.01 s images
Total duration of experiment 1 minute

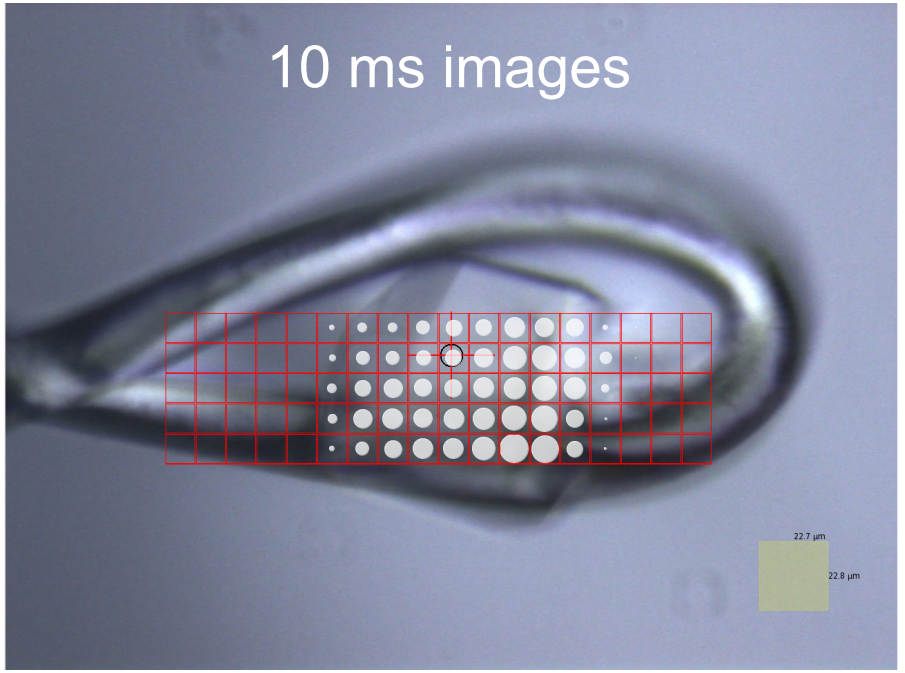
Exposure times as low as 0.01 s can be used for data collection with no reduction in data quality. For well diffracting crystals, reduce the exposure time rather than attenuating the beam.

diamond

Fast grid scans

Wed-H: Serial Micro-Crystallography
R. Owen: New and novel endstation for microfocus MX





Horizontal box size	Min. Exposure time
10 microns	10 ms
20 microns	10 ms
50 microns	25 ms

Exposure times as low as 0.01 s can be used for grid scans with no reduction in positional accuracy.

For well diffracting crystals, reduce the exposure time rather than attenuating the beam

diamond

PILATUS3 – high count rate detector excels in low dose rate operation

Hybrid Photon Counting provides highest data accuracy

Thu-D: Automation in Structural Biology at 12:00
V. Olieric – Native SAD phasing for routine structure determination

IUCrJ
ISSN 2052-2525
BIOLOGY | MEDICINE

Native SAD is maturing

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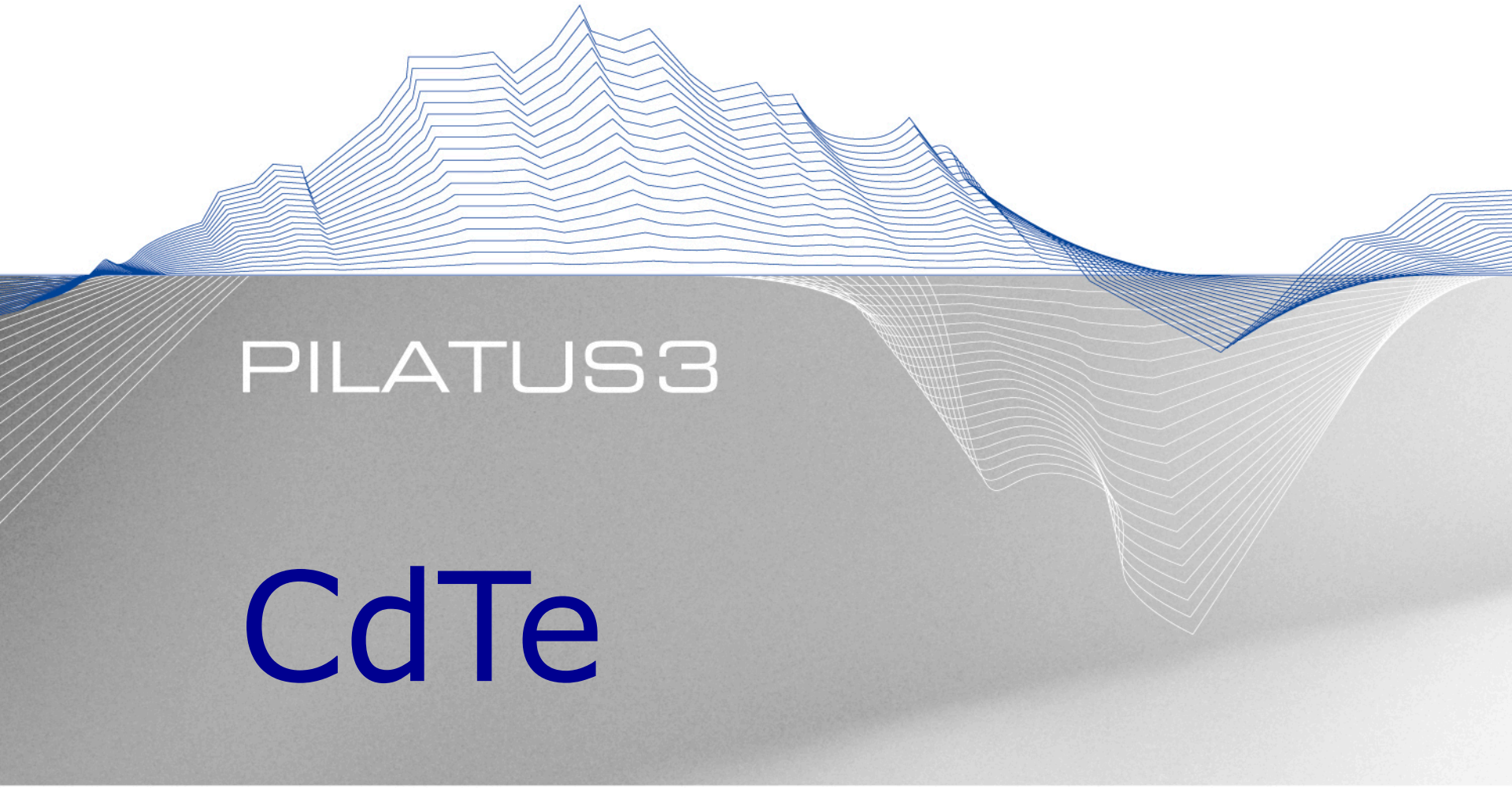
Received 9 March 2015
Accepted 28 April 2015

Edited by Z.-J. Liu, Chinese Academy of Sciences, China

Keywords: native SAD; sulfur SAD; accurate data collection; data multiplicity; radiation damage; new instruments; new data-scaling techniques.

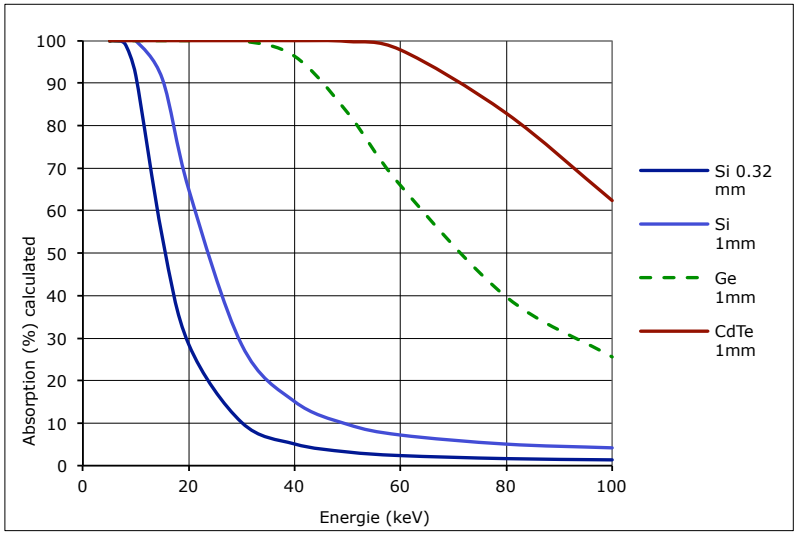
Supporting information: this article has supporting information at www.iucrj.org

Native SAD phasing uses the anomalous scattering signal of light atoms in the crystalline, native samples of macromolecules collected from single-wavelength X-ray diffraction experiments. These atoms include sodium, magnesium, phosphorus, sulfur, chlorine, potassium and calcium. Native SAD phasing is challenging and is critically dependent on the collection of accurate data. Over the past five years, advances in diffraction hardware, crystallographic software, data-collection methods and strategies, and the use of data statistics have been witnessed which allow 'highly accurate data' to be routinely collected. Today, native SAD sits on the verge of becoming a 'first-choice' method for both *de novo* and molecular-replacement structure determination. This article will focus on advances that have caught the attention of the community over the past five years. It will also highlight both *de novo* native SAD structures and recent structures that were key to methods development.

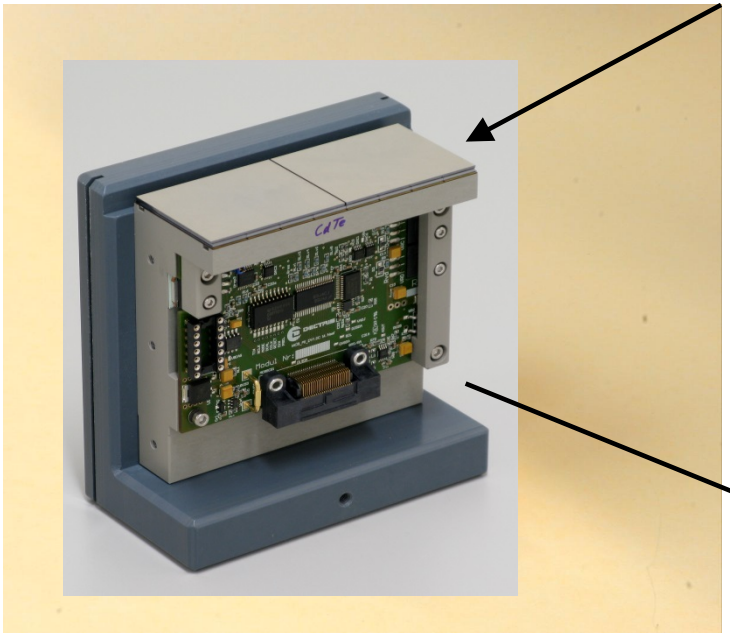

PILATUS3
CdTe

Motivation

Extend product range to high energy applications



CdTe hybrid assembly





Module active area: 83.8×33.6 mm²

487×195 pixels = (~100k pixels)

Pixel pitch 172 mm

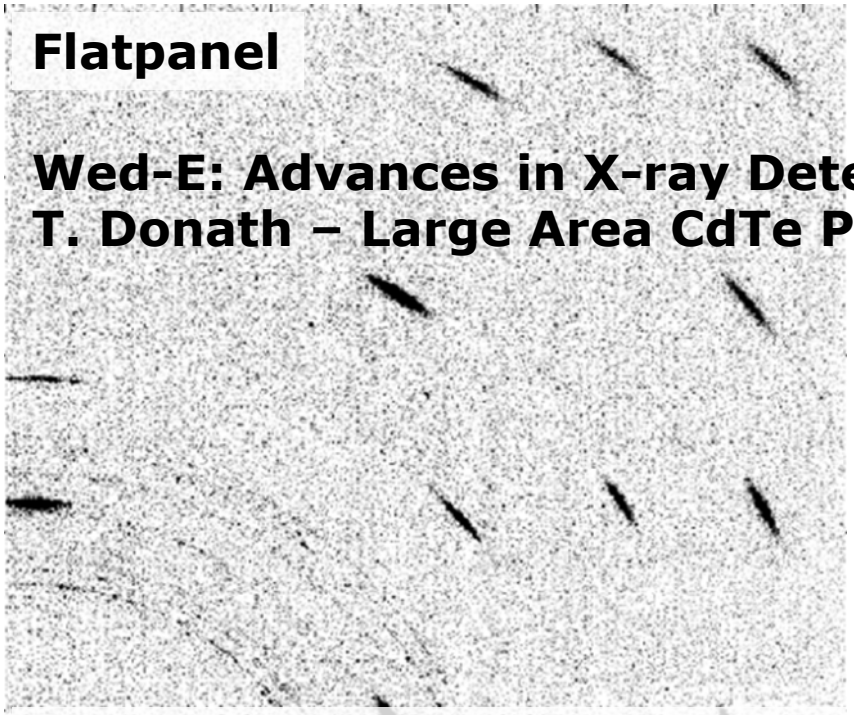
PILATUS3 X CdTe series

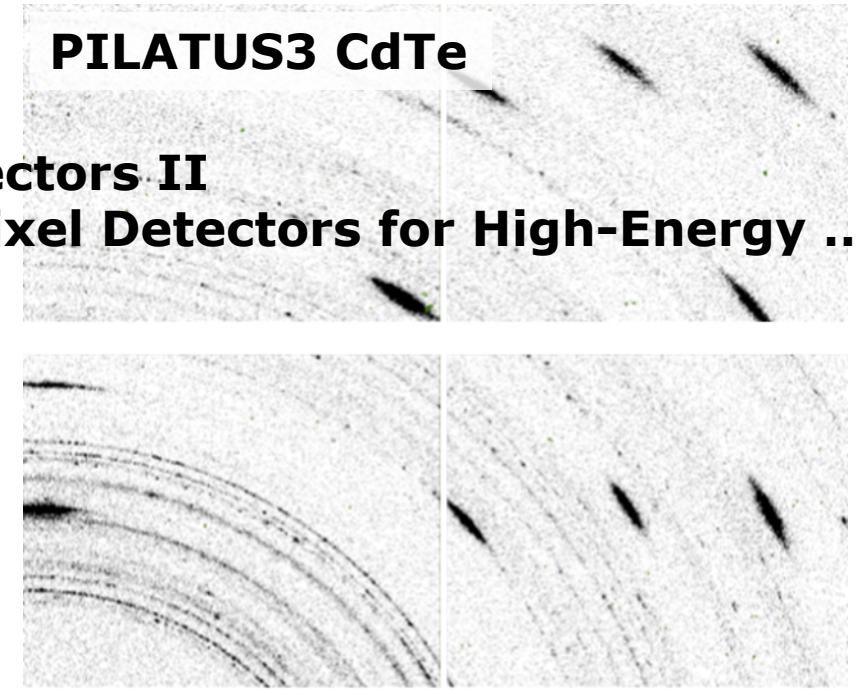
- *Quantum efficiency greater than 80% up to 80 keV photon energy*
- *Noise-free hybrid photon counting*
- *Zero afterglow*
- *Count rate stability better than 1% at 2.5 x 10^6 cts/pixel/s over hours*



254 x 289 mm^2 | 169 x 179 mm^2 | 34 x 254 mm^2 | 84 x 107 mm^2

X-ray powder diffraction





Wed-E: Advances in X-ray Detectors II
T. Donath – Large Area CdTe Pixel Detectors for High-Energy …

Same static powder diffraction pattern of Bn3Sn as recorded with both detectors at photon energy 46.3 keV.

Detectors positioned to cover the same solid angle (same flux) per pixel, same exposure time 100 ms.

Dynamic studies strongly benefit from afterglow-free CdTe detector.

Acknowledgment: M. Di Michiel, G. Vaughan, R. Homs, T. Buslaps (ESRF)

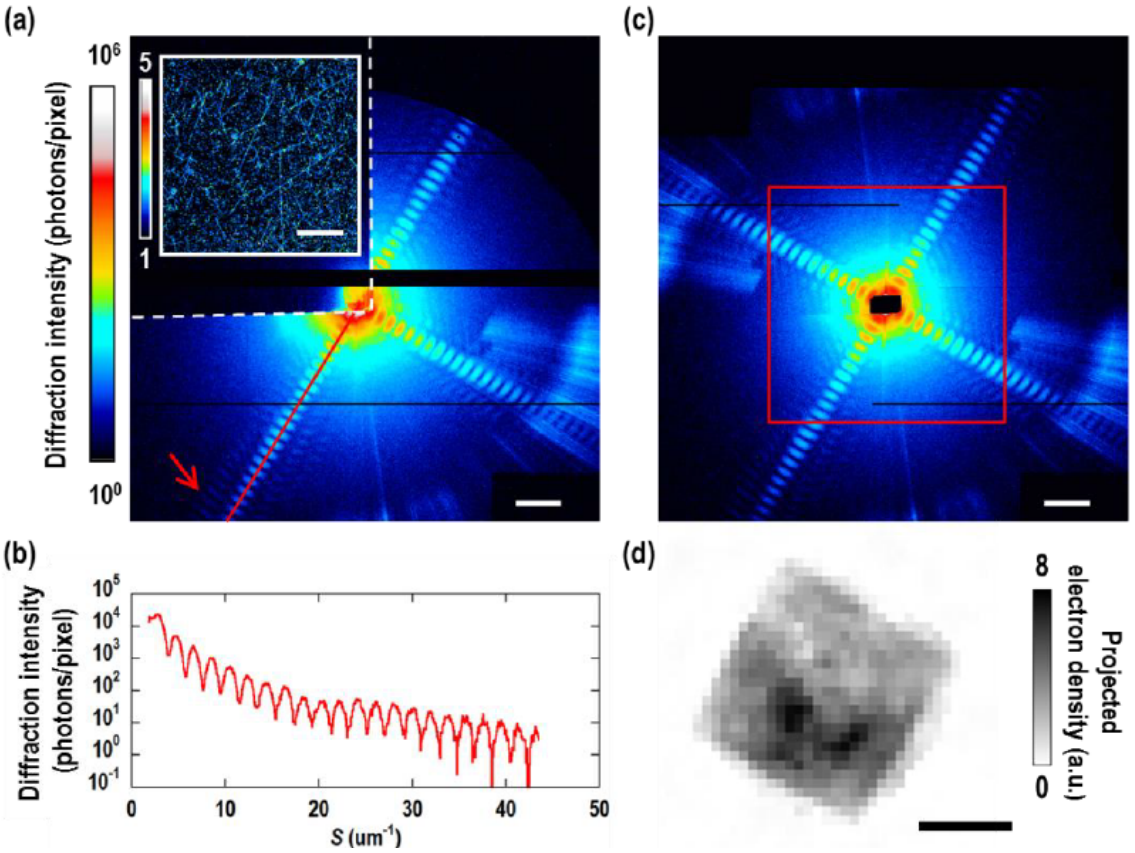

EIGER

EIGER X product line



	Active area [mm x mm]	Pixel array	Frame rate [Hz]	First delivery
1M	77 x 80	1030 x 1065	3000	01/15
4M	155 x 163	2070 x 2167	750	12/14
9M	233 x 245	3110 x 3269	238	10/15
16M	312 x 328	4150 x 4371	133	09/15

EIGER X 1M in CXDI



8 keV, $4 \cdot 10^9$ phts/s/14 µm pinhole

1200 frames collected in 10 s frames (800 Hz autosummation)

- Contrast comparable to single shot XFEL data
- C_{sym} = 99.2%

Cu_2O CXDI data by courtesy of Y. Takayama, RIKEN Spring-8, JP

DECTRIS® detecting the future

End-of-life policy



DECTRIS provides support and keeps the spare parts available for its products for

5 years after the last system has been shipped

e.g. for PILATUS 6M until Sep 2019

We will publish a list on our web-site for all EOL products. In the future, announcements will be made 4 to 6 months before the last-time-buy.

PILATUS 100K
last time buy



For more information, please come to our booth

or order now at

www.dectris.com/P100K

DECTRIS®

detecting the future

Thank you for your attention!

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