

Diamond Light Source

facility flash update

Nicola Tartoni

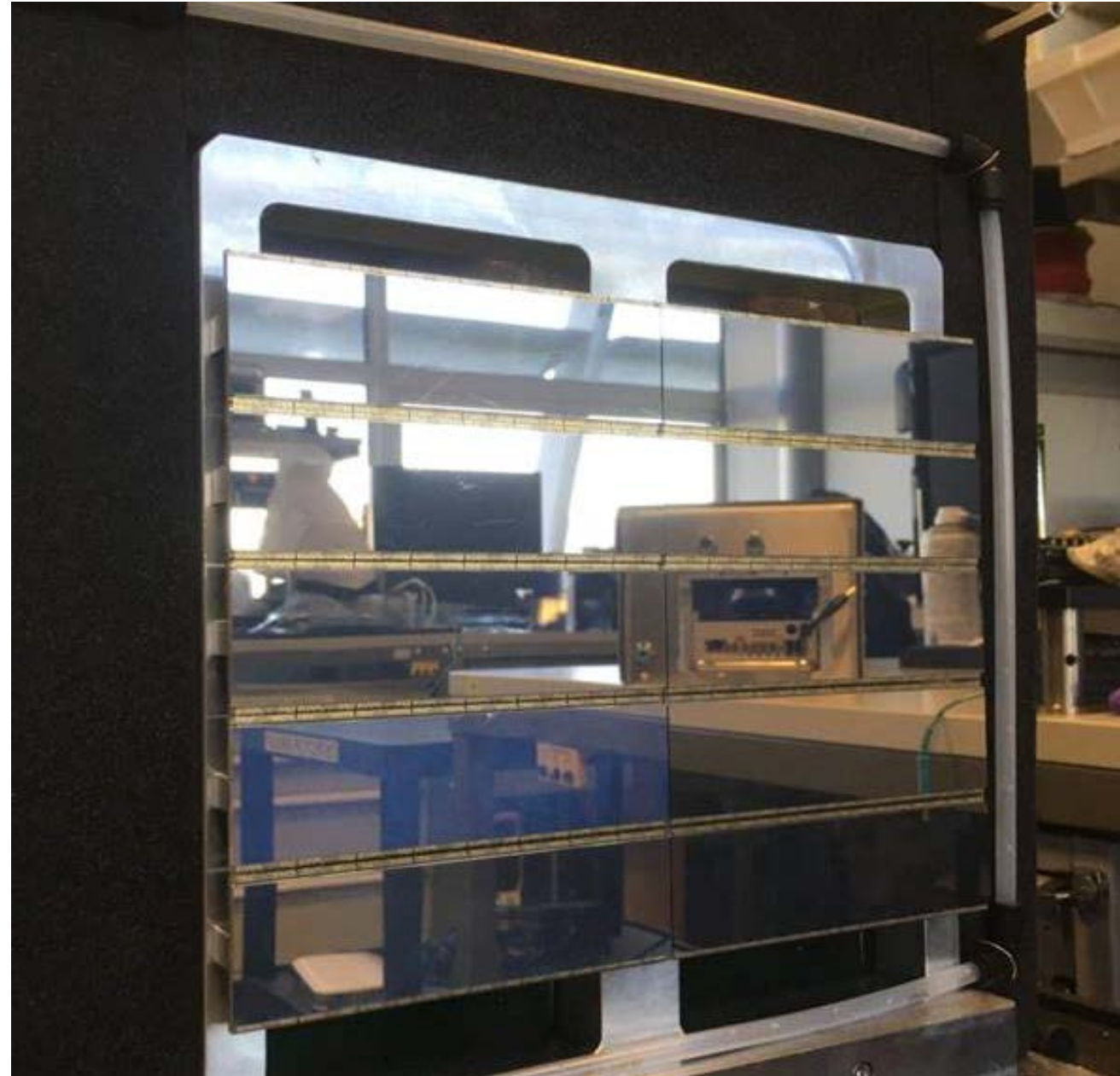
Head of the detector group at Diamond Light Source

TRISTAN10M

area detector for time resolved experiments

Major characteristics of Tristan10M

Detector size	23cm x 17cm
Number of modules and format	10 modules arranged in a 5x2 matrix
Number of pixels	10millions
Pixel size	55 μ m
Mode of operation	Data driven
Notional accuracy of the time stamp	1.56ns
Data format	List of events in an HDF5 file



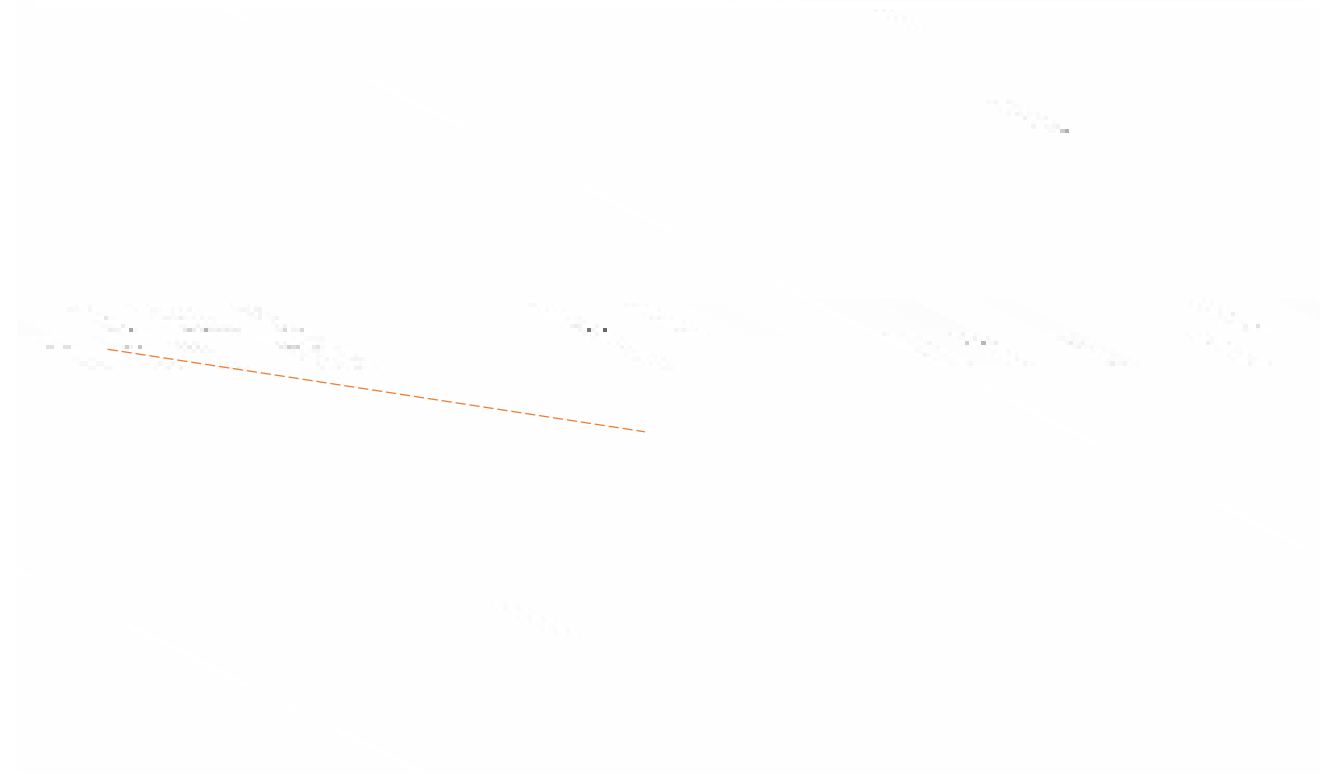
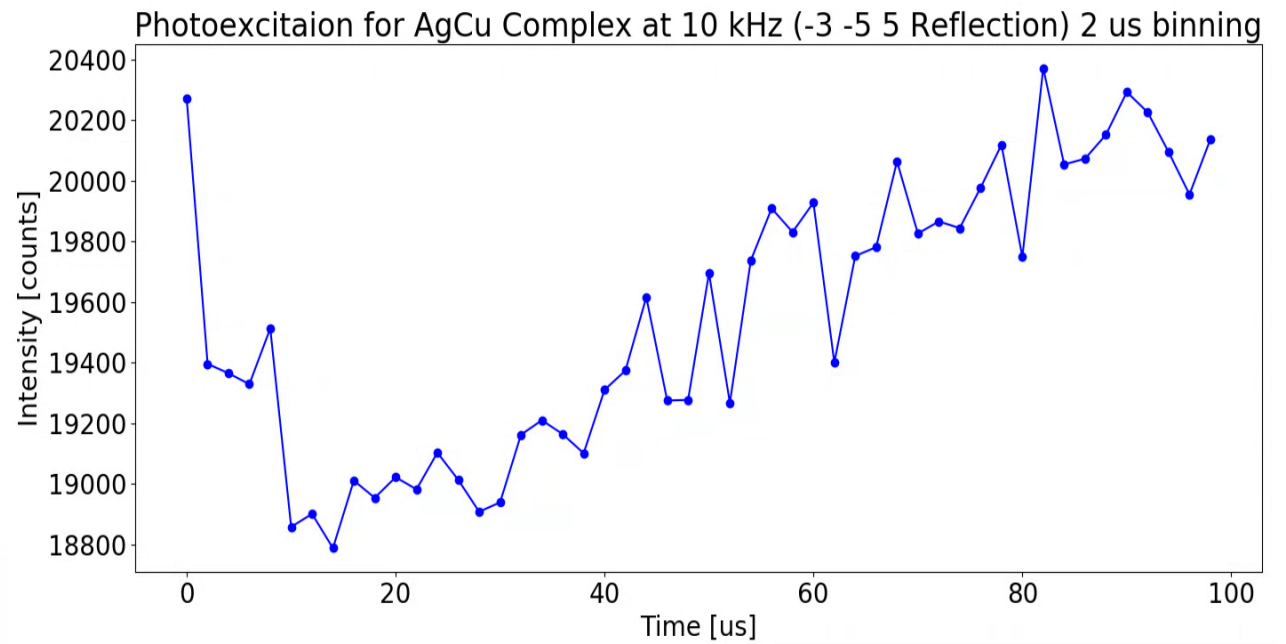
USER EXPERIMENTS SO FAR

Time resolved crystallography

- September 2019 with Tristan1M (single module)
- September 2020 with partly populated Tristan10M

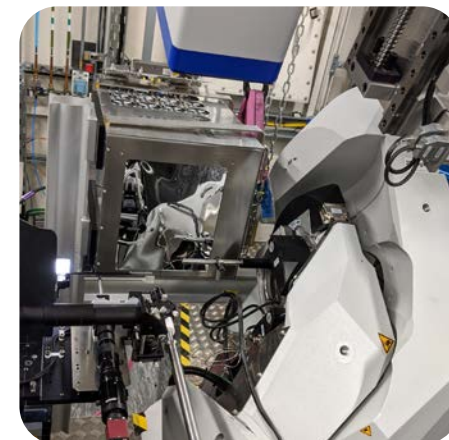
Diffraction X-ray tracking

- August 2019 and December 2019 with Tristan1M

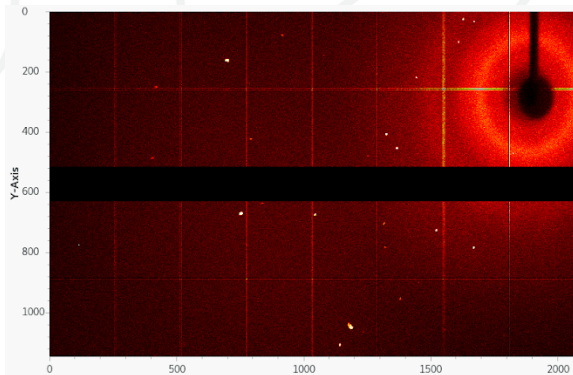
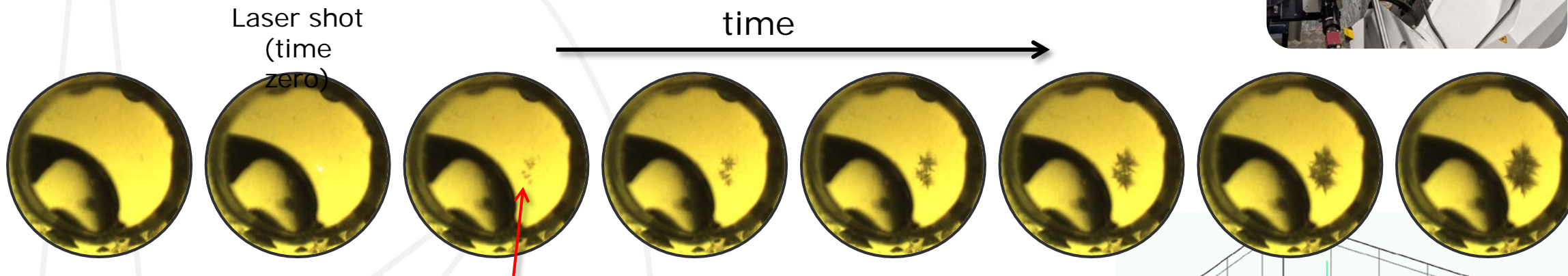


I19 Tristan (2 modules) – Laser Induced Nucleation

(Slide courtesy Mark Warren)

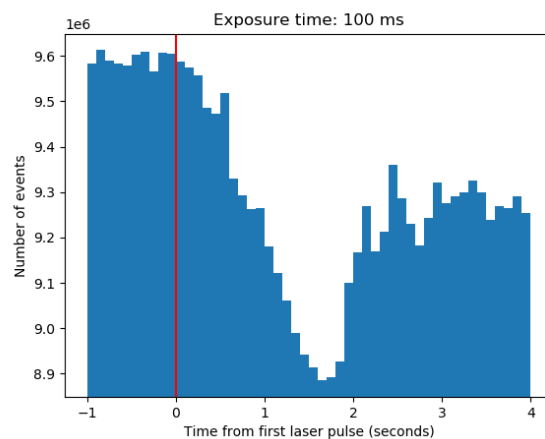


- The aim of this proposal is to observe the dynamics of crystal nucleation from solution, on the **microsecond timescale** for the first time, using non-photochemical laser-induced nucleation.

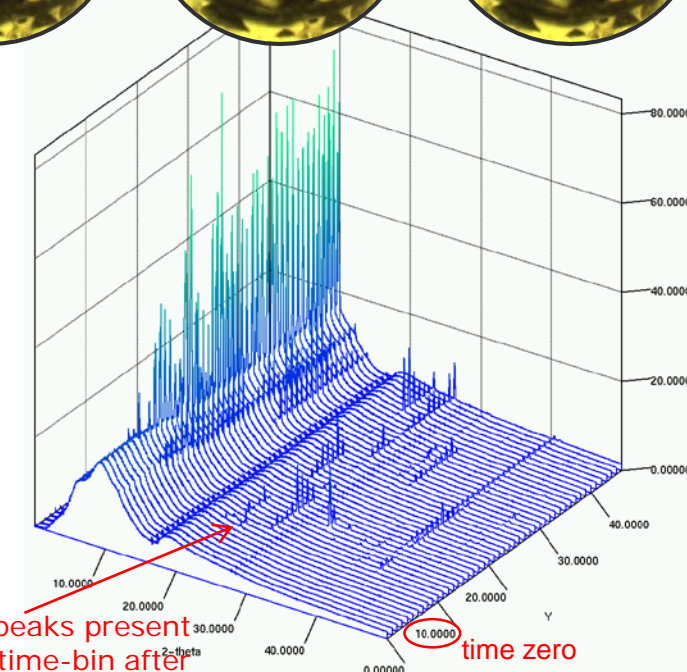


Tristan image of diffraction from laser induced nucleation.

Formation of crystals

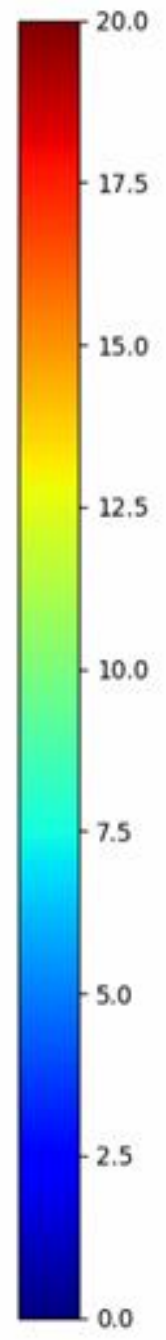
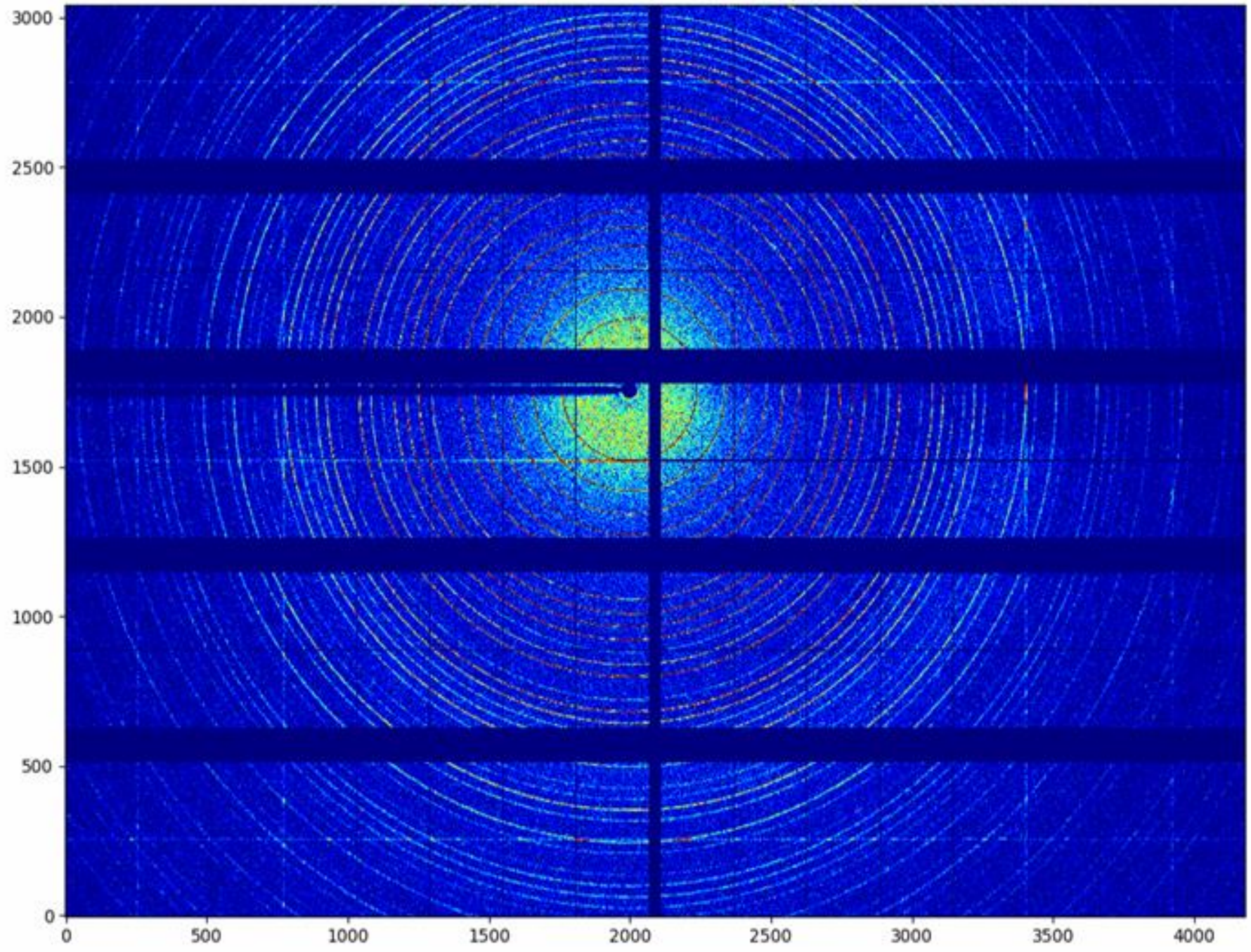


Histogram of events after single laser shot (red line) with 100 ms binning.



Diffraction peaks present within first time-bin after single laser exposure

Intensity image

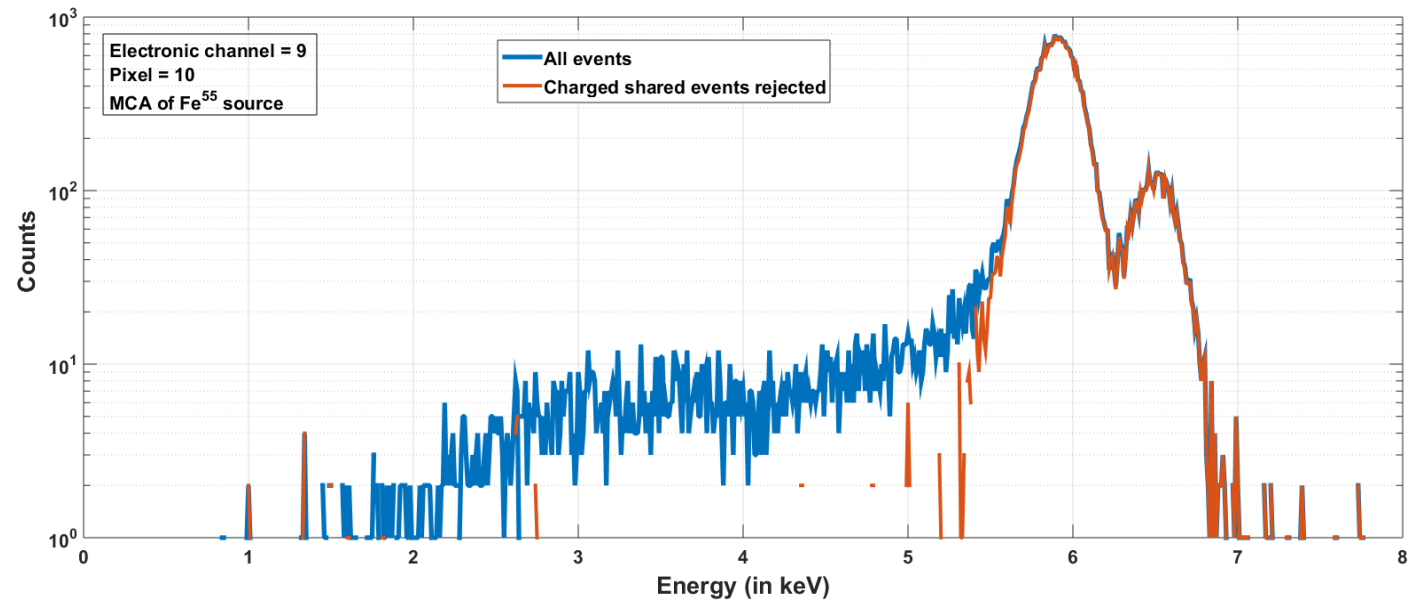


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XSPRESS4

digital pulse processor for spectroscopy detectors

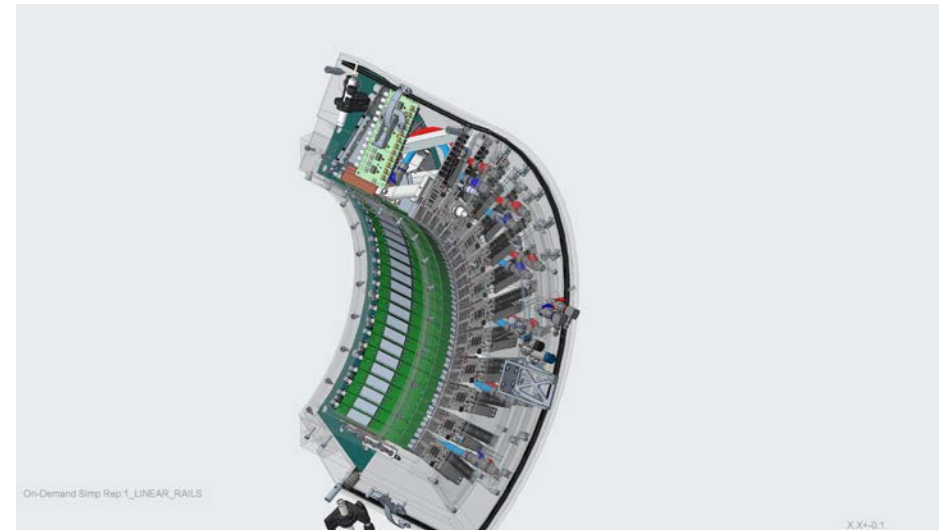
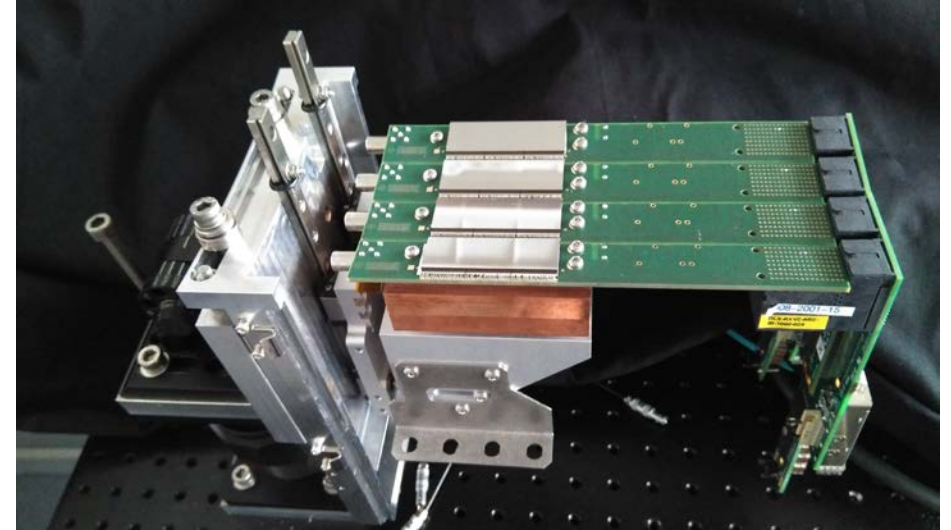
- System developed to correct the cross-talk
- In use at I20 and B18 XAFS beam lines
- Possible real time charge sharing rejection
- Possible use of time stamp and list mode of operation for quick XAFS



ARC-DETECTOR

PDF detector at the beam line I15-1

- **Medipix3 read-out ASIC**
 - small pitch
- **Schottky CdTe sensors**
 - improved duty cycle
- **Optical link for DAQ and control**
 - reduced complexity and weight at the detector head



Other

Small pitch Ge detectors for X-ray spectroscopy

- Activity started a few years ago at Diamond
- Two publications *IEEE Trans. Nucl. Sci.*, vol. 62, no. 1, pp. 387-394, Feb. 2015. and *IEEE Trans. Nucl. Sci.*, vol. 67, no. 8, pp. 1952 – 1961, Aug. 2020
- Currently working on this activity in collaboration with Soleil

DAQ software Odin and HDF5-VDS

- Applied to a number of detector systems Excalibur, Tristan, Eiger, Percival (collaboration with DESY)

Timepix4 just started

Thank you!