EUROPEAN
SPALLATION
SOURCE

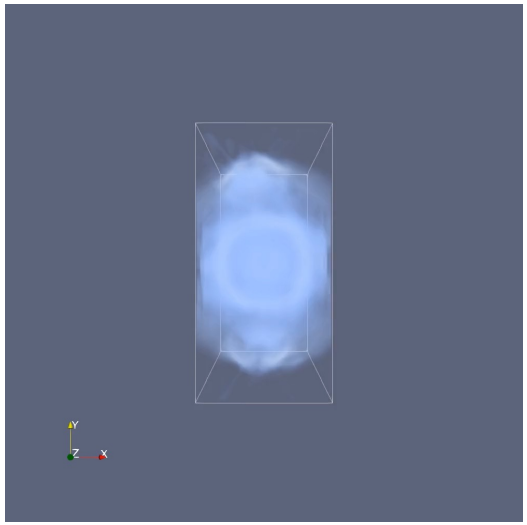
Update ODIN

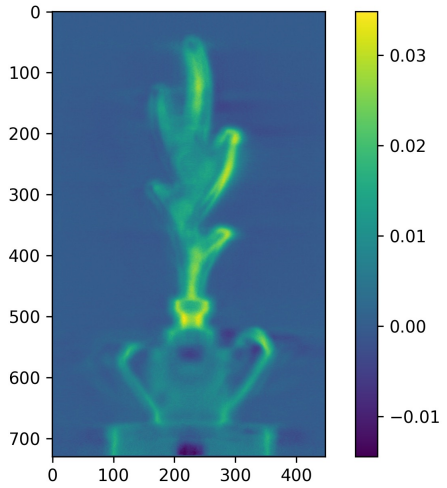
SOEREN SCHMIDT

2023-4-26

ODIN

- YMIR: Tomography reconstruction of light tomography data using Muhrec/pymuhrec



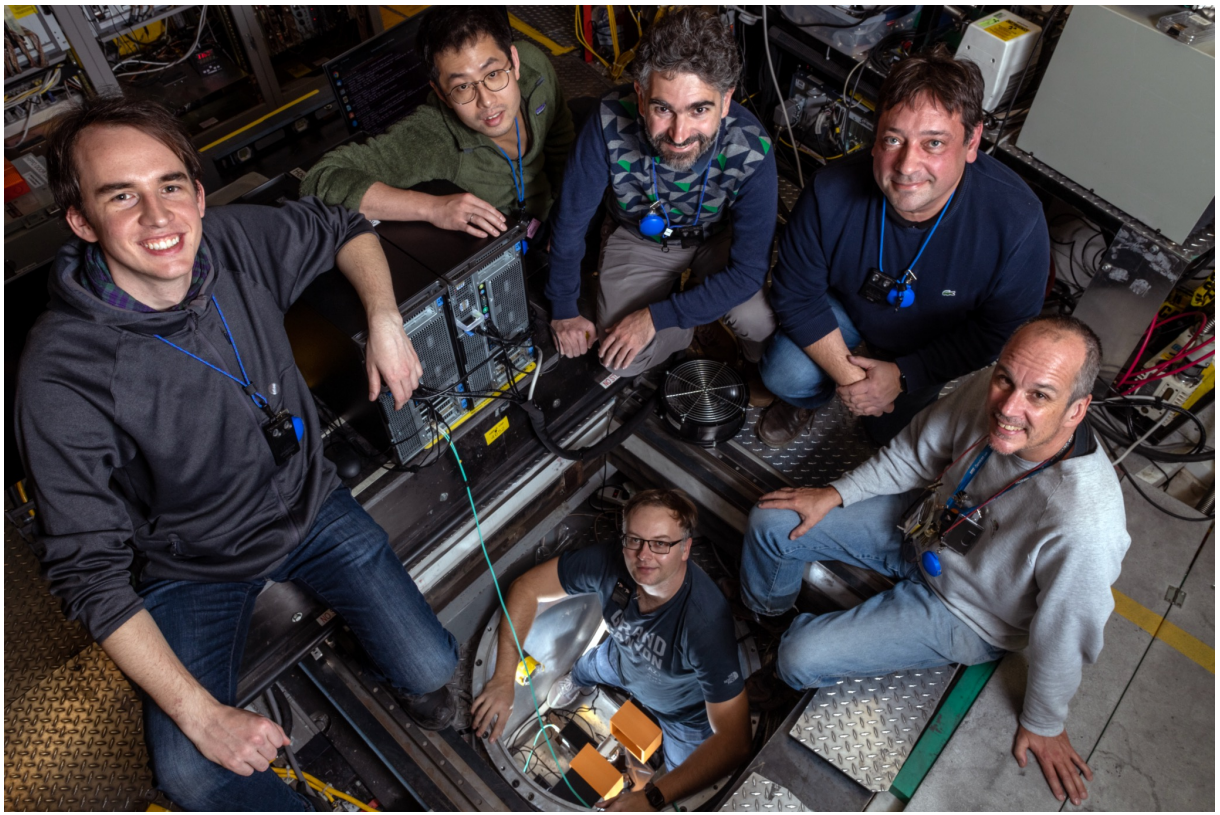


  - Next: Reconstruct light tomography data with pymuhrec on ubuntu 22.04. For a known sample – acquire tomography data at YMIR followed by reconstruction using pymuhrec and feed data back to YMIR for visualization. Milestone to be defined early May.

- Visited with Manuel Morgano the NeXT instrument at ILL in January. Good discussions regarding RX Solutions/XACT for both x-rays and neutrons
- Similar X-ray setup is available LU – to be used for training/testing

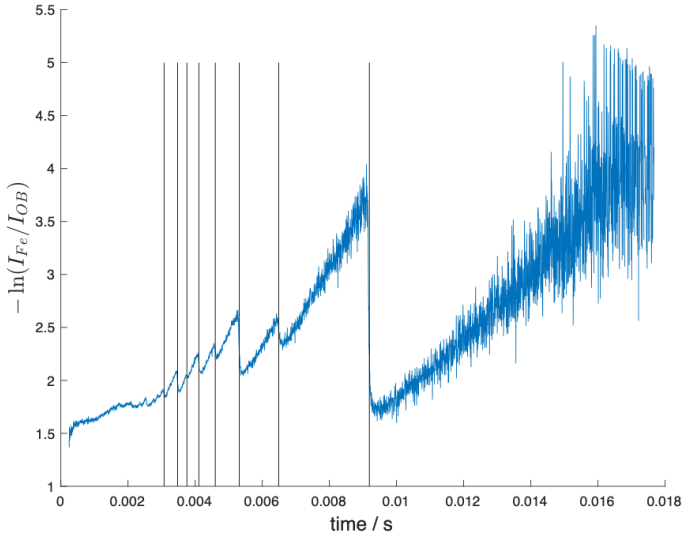
Timepix3 – microscopy setup

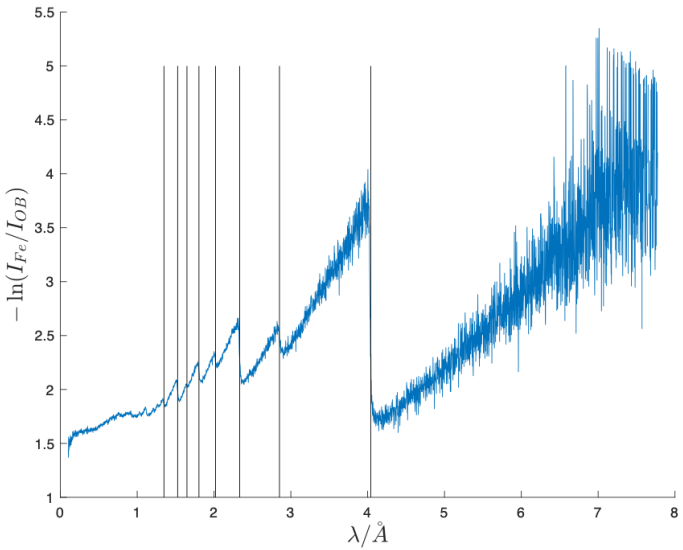
Experiment at LANL/Hippo in Dec 2022



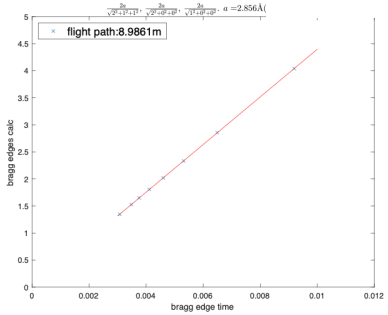
Timepix3 – microscopy setup

Experiment at LANL/Hippo in Dec 2022





Flight path calibration (Fe powder)

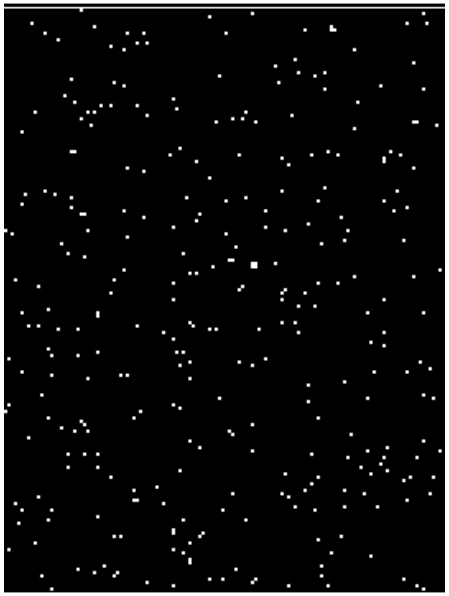


Timepix3 – microscopy setup

Experiment at LANL/Hippo in Dec 2022

Cu oligo crystal

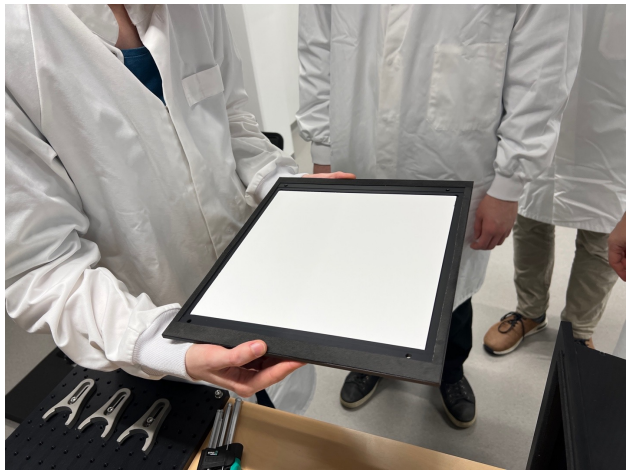
14 x14 mm^2 FoV

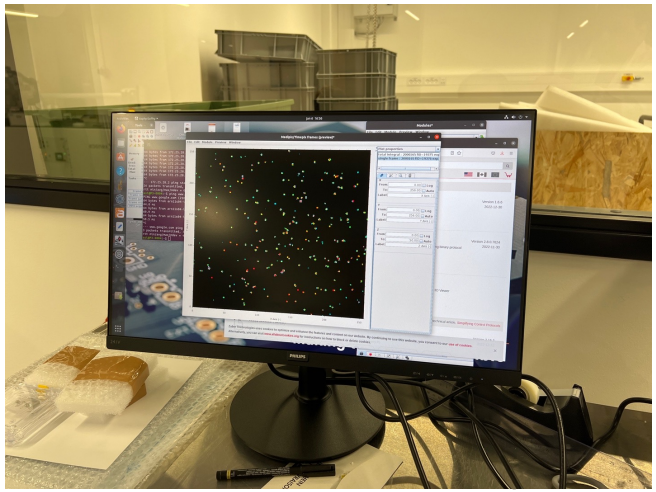


Cropped

Timepix3 – Prep for J-PARC experiment

We did a dry run of assembly at DTU (including a writing brief manuals) of both microscopy and diffraction setups before shipping to J-PARC

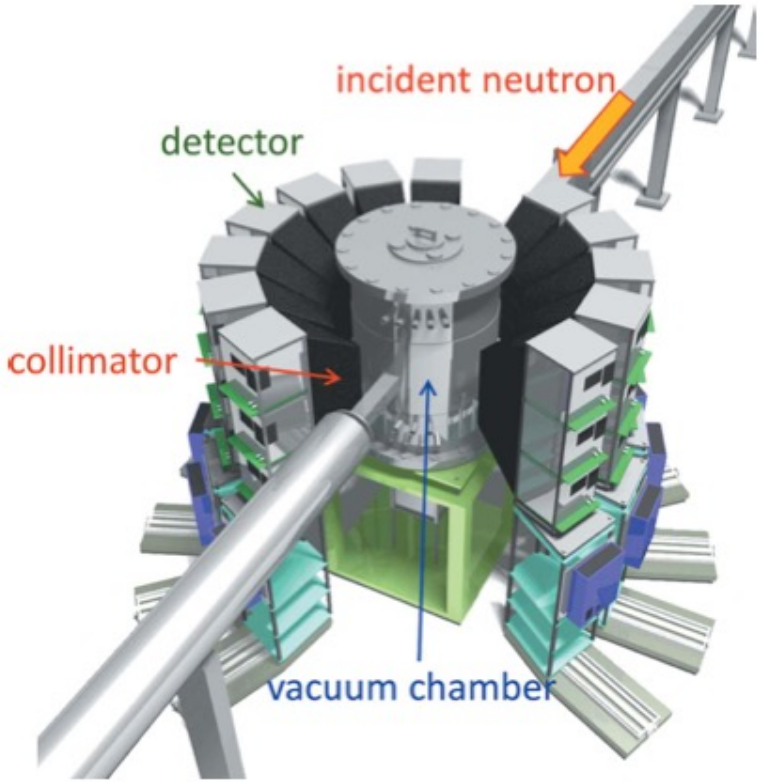




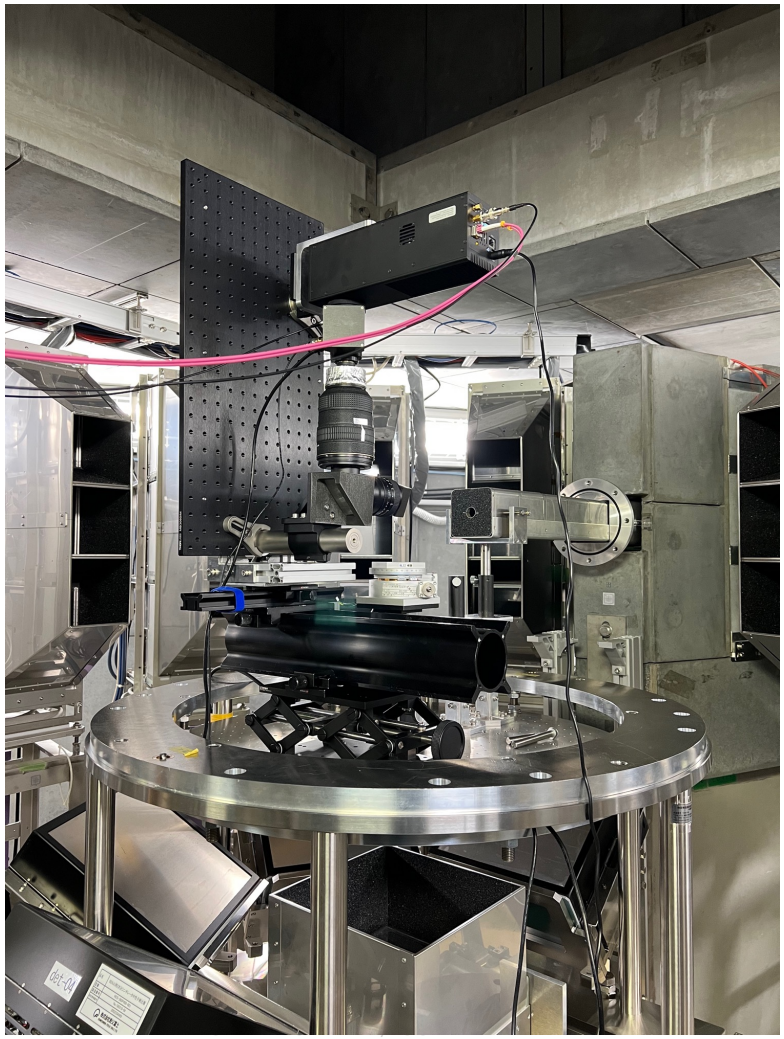
SENJU @ J-PARC

Extreme environment single crystal neutron diffractometor

We always remove vacuum chamber and mount sample environment and additional detectors



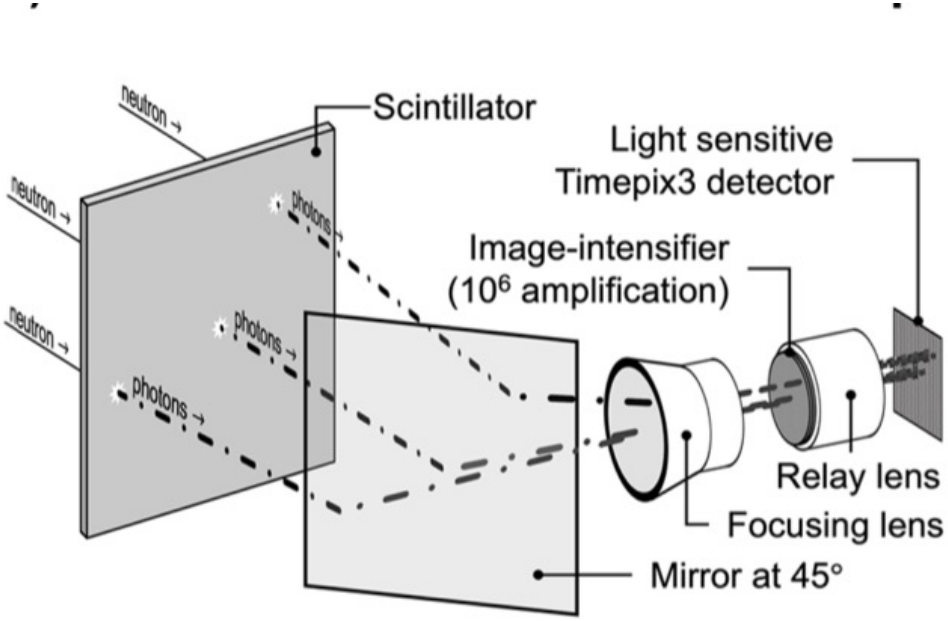
Timepix3 – microscopy setup @ J-PARC



Participants:

- DTU PhD-students
  - Estrid Naver
  - Domenico Battaglia
  - Cedric Holme Qvistgaard
- Luise Theil Kuhn (DTU)
- Miriam Koppel (University of Tartu, PhD student)
- Alex Wolfertz (TUM)
- Mads Bertelsen (DRAM)
- Tobias Richter (ECDC)
- Nicklas Holmberg (ICS)
- Søren Schmidt (PI)

Improvement of neutron ToF neutron imaging detectors



- Improved S/N
- No overlap correction
- Sub pixel resolution
- Portable

A.S. Losko,..., M. Morgano,..., Sci.Rep. (2021) 11:21360.

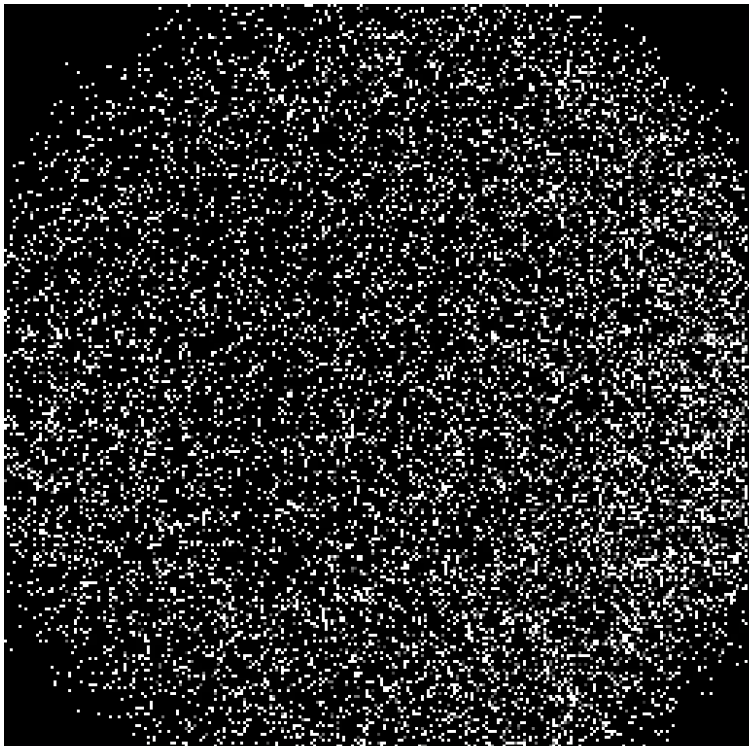
Timepix3

Three levels of data

- Raw data – photons with pixel-wise readout and time of arrival (plus a few other parameters) – we typically archive this in order to optimize convertion to neutron events (still learning)
- CMS of cluster of photons to identify neutron signature and position (neutron events). Individual photon events can also be identfied
- Histogramming neutron events (image stack)

Cu sample (same as measured at LANL)

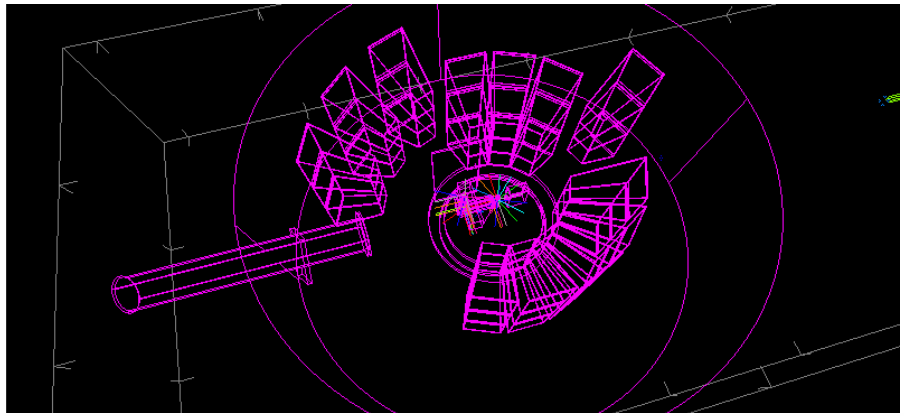
5 x 5 mm^2 FoV

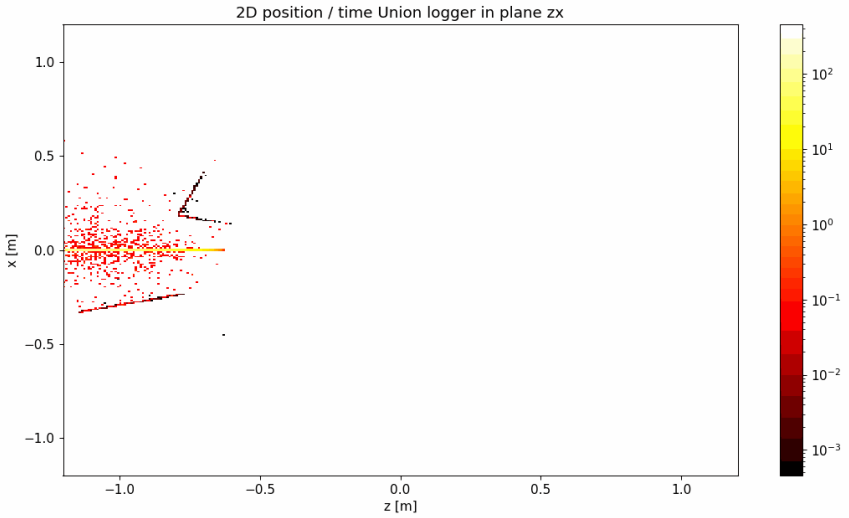


SENJU simulation

Model of SENJU with

- Diffraction detectors
  - LiF active layer
  - Can be moved in and out
- Air scattering
- Sample table and get lost tube
- Here shown simulated with battery

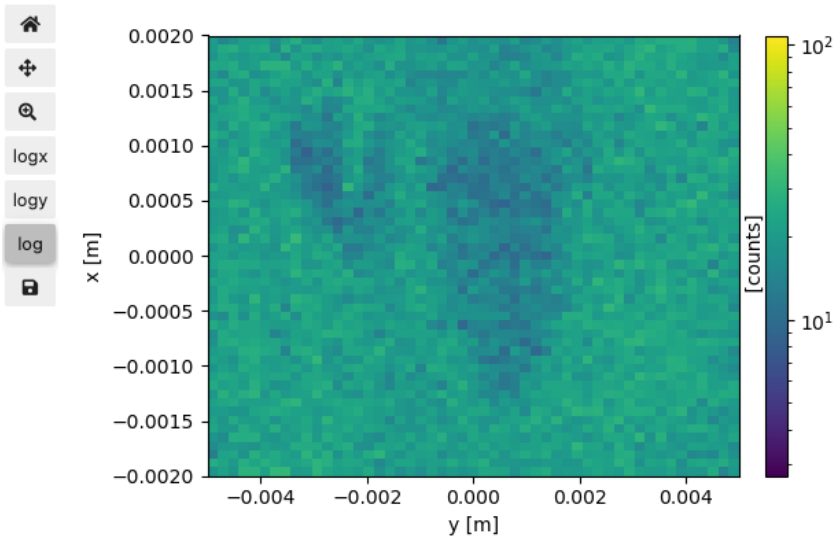


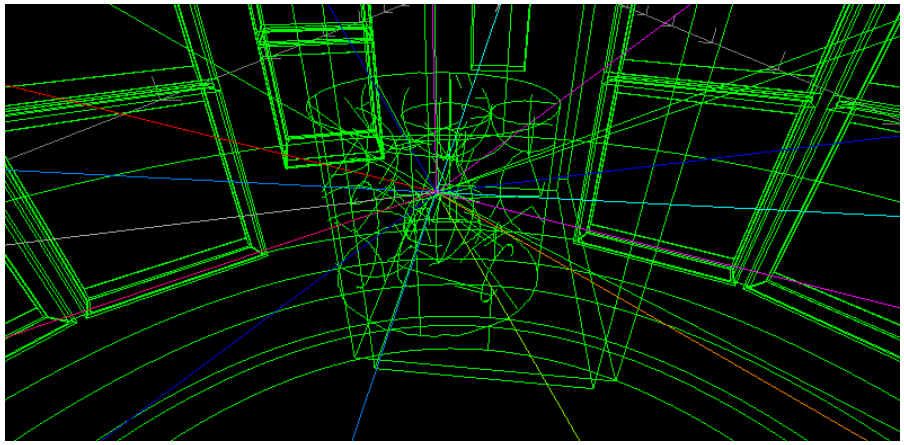


Mads Bertelsen

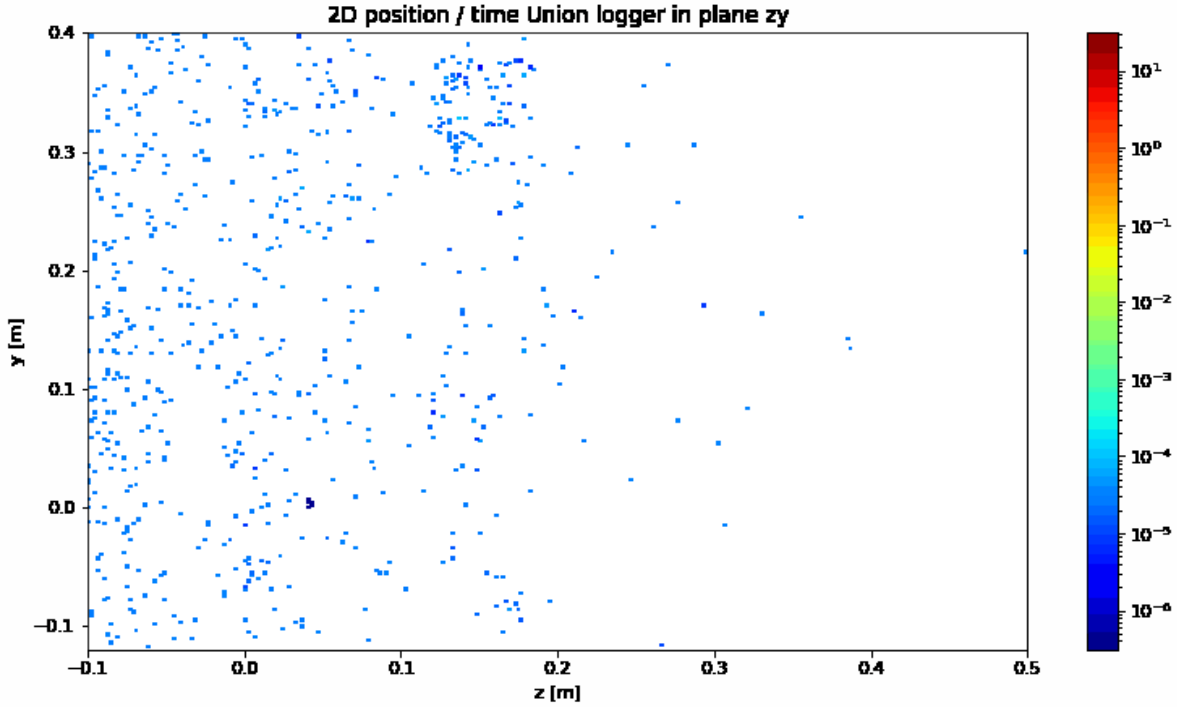
Grain

Transmission data shows different grains depending on wavelength calculated from time of flight





Timepix3 – McStas simulation



Mads Bertelsen

The three initial modalities for ODIN

- Attenuation Tomography
  - Muhrec/pymuhrec – however single point of failure
  - Backup imaging platform(s) with long term support of the core part is needed

- Bragg edge fitting
  - Potentially an “Easy” framework for Bragg edge fitting
    - Full spectrum fit
    - Untextured materials
    - Textured materials – becoming a focus area for the user community

- Polarized neutron imaging
  - Radiography
  - De-polarization tomography (method-wise close to reconstruction of Att. Tomography)

Update BEER

SOEREN SCHMIDT

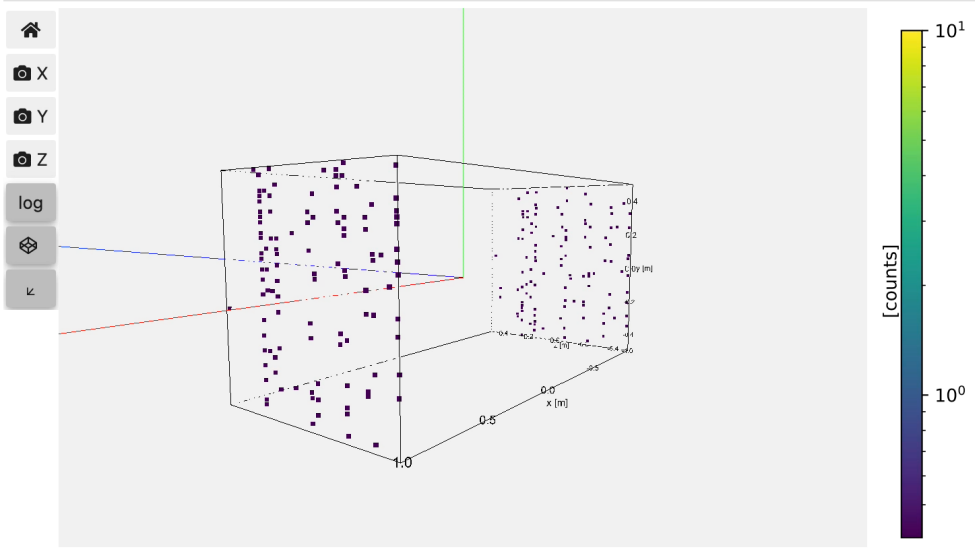
2023-4-26

BEER & McStas

- Jupyter notebook framework for building and running BEER McStas (McStasScript) - Mads Bertelsen

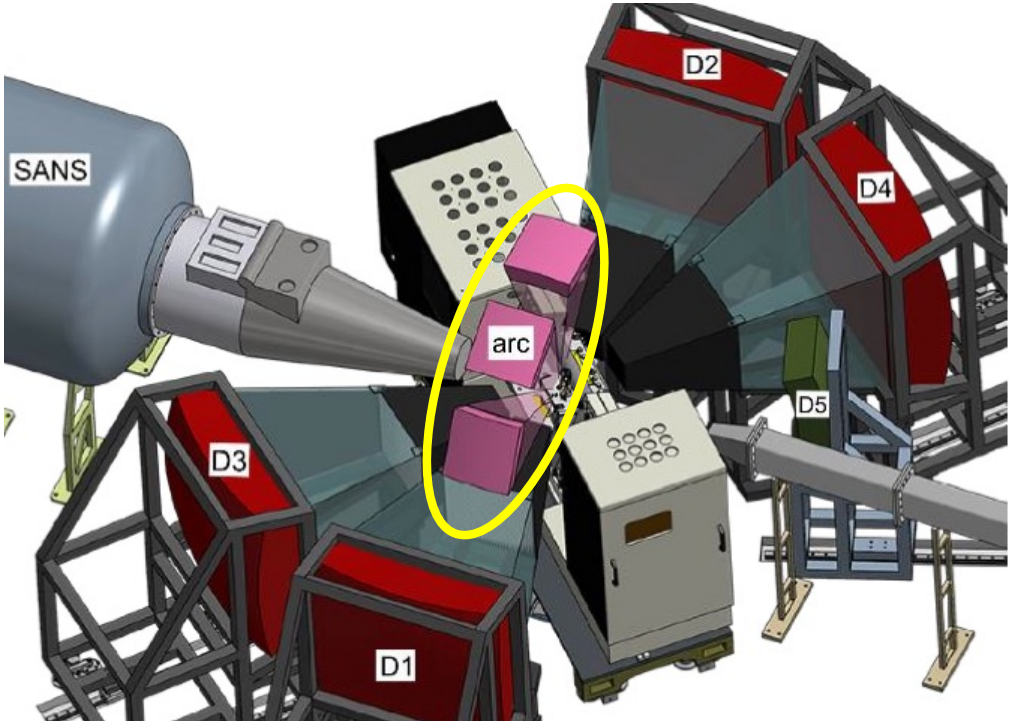
- Next, with BEER Instrument team:
  - Working towards a setup procedure for BEER in modulation mode, but also using pulse-shaping mode in the setup procedure.
  - Outcome: concept for setup procedures and data reduction pipelines (Q1, 2024)

From analyzing notebook:



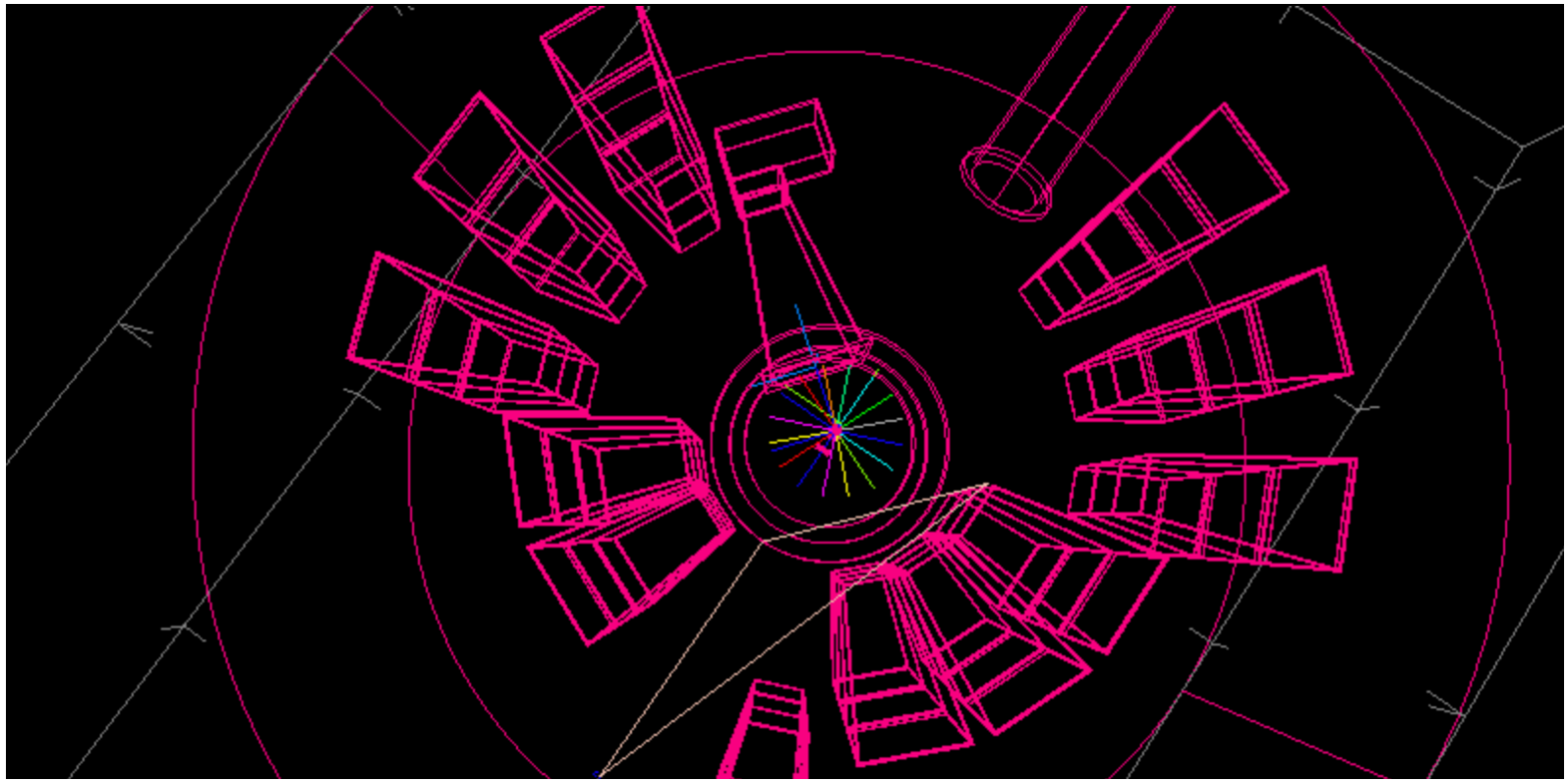
Visualizion: Plopp

Beyond current scope – Texture measurements

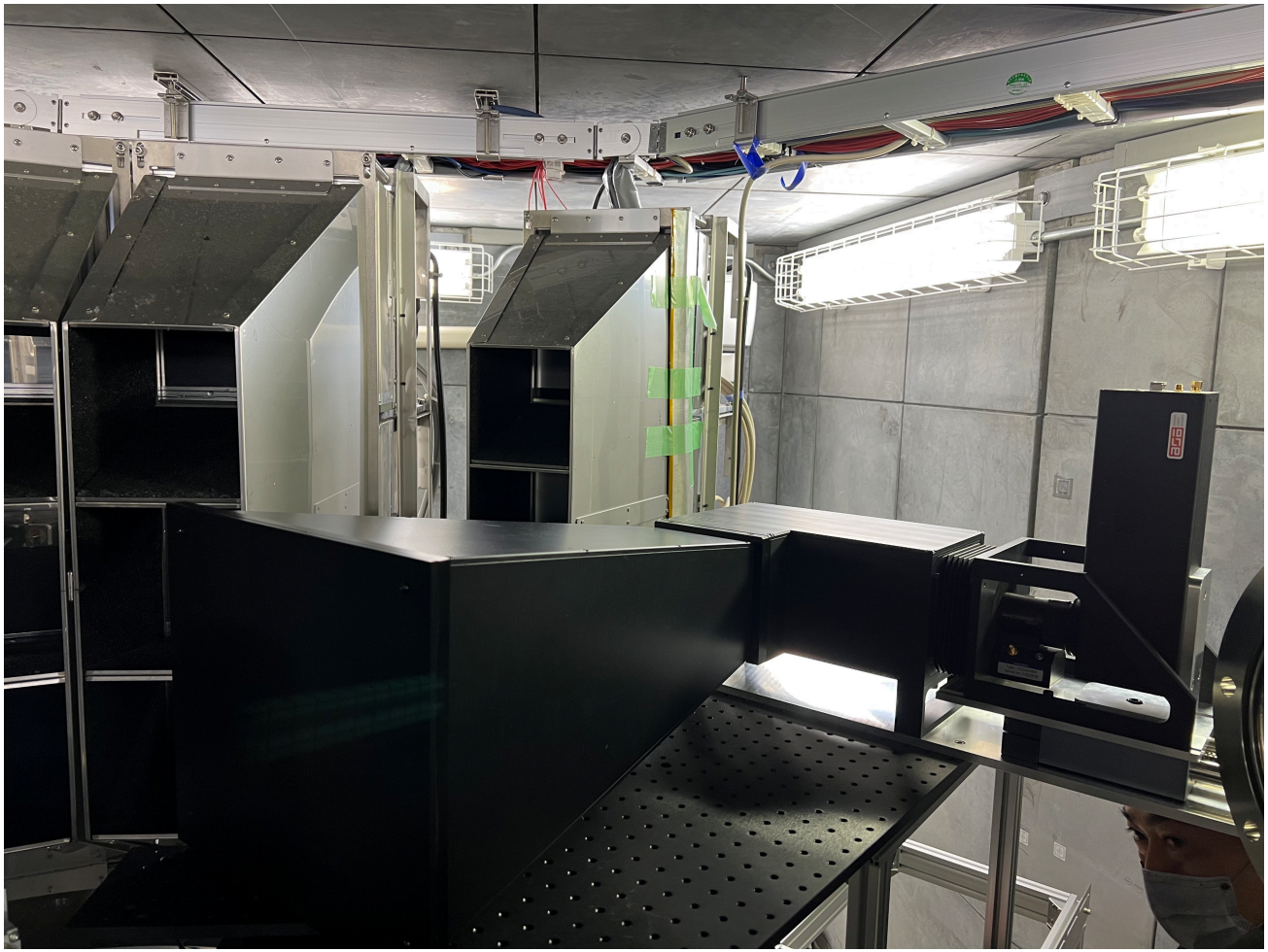


Timepix3 detector

- SENJU with Timepix3

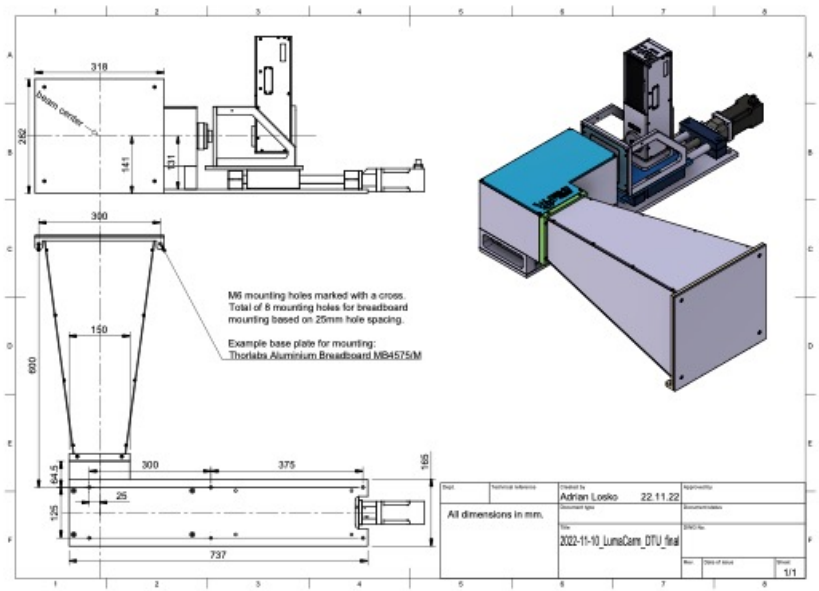


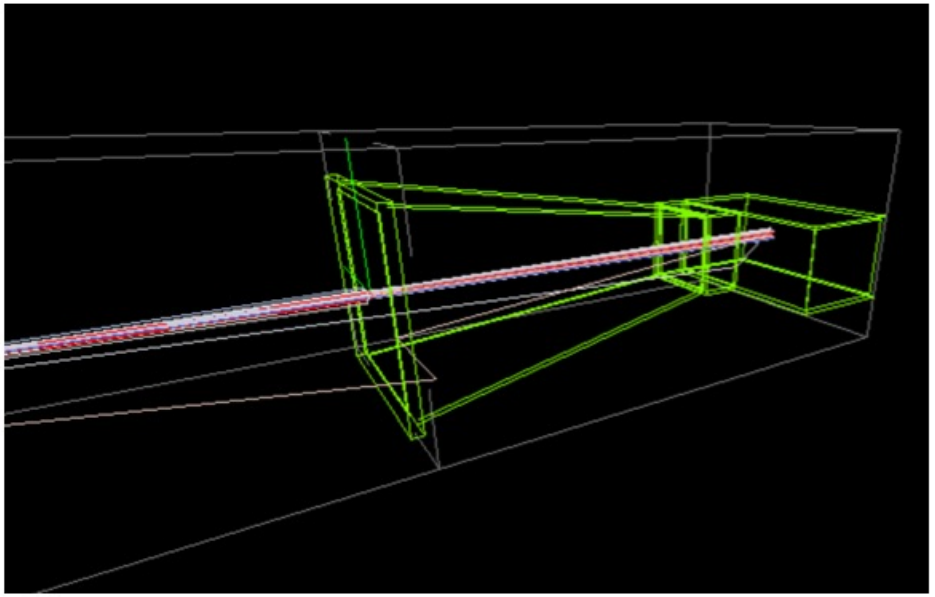
Timepix3 detector – 25x25 cm2 FoV



SOLID Lighthouse

Timepix3 detector – 25x25 cm2 FoV

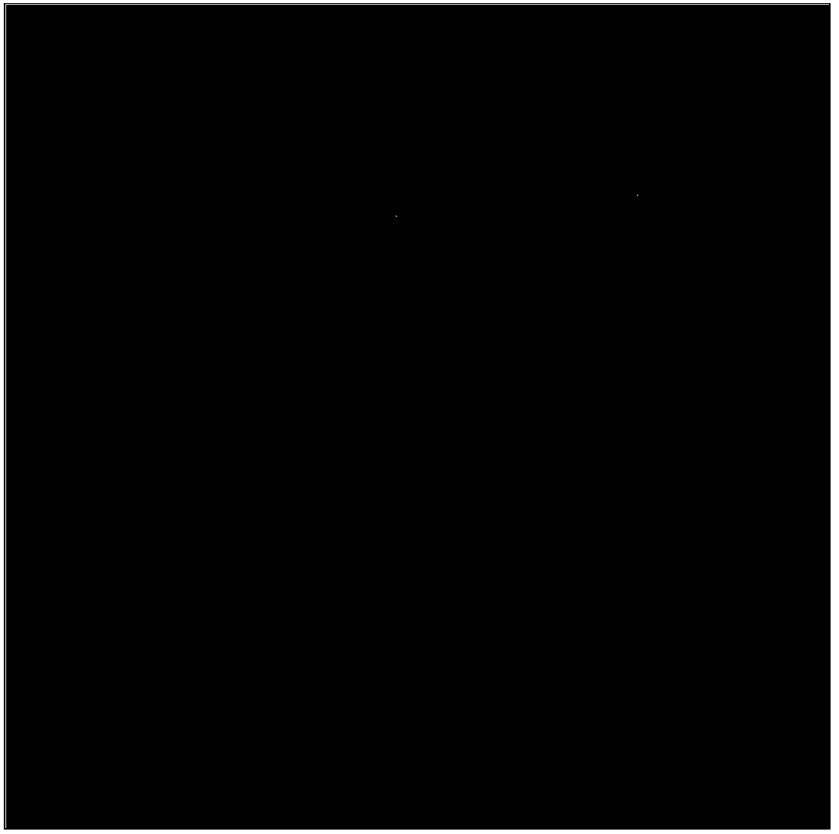




Timepix3 detector – 25x25 cm^2 FoV

Ruby (Al_2O_3) single crystal

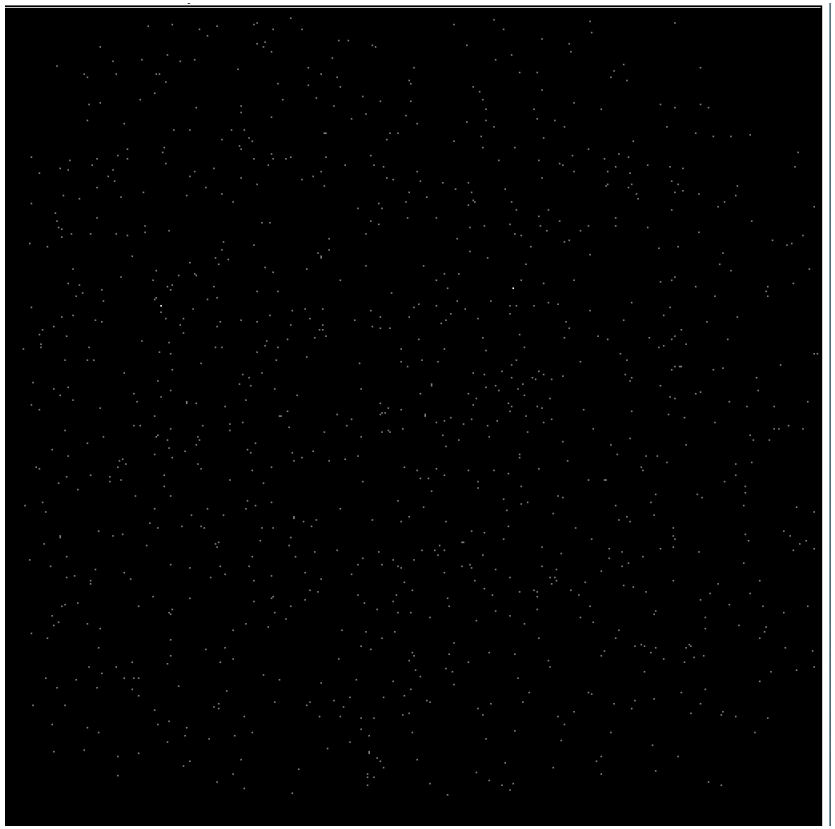
Projections superimposed
with 10 degree step ovr 180 degrees



Timepix3 detector – 25x25 cm2 FoV

Cu sample

Single projection



Finish presentation