Towards systematic dosimetry on SOLEIL's Proxima 2A beamline

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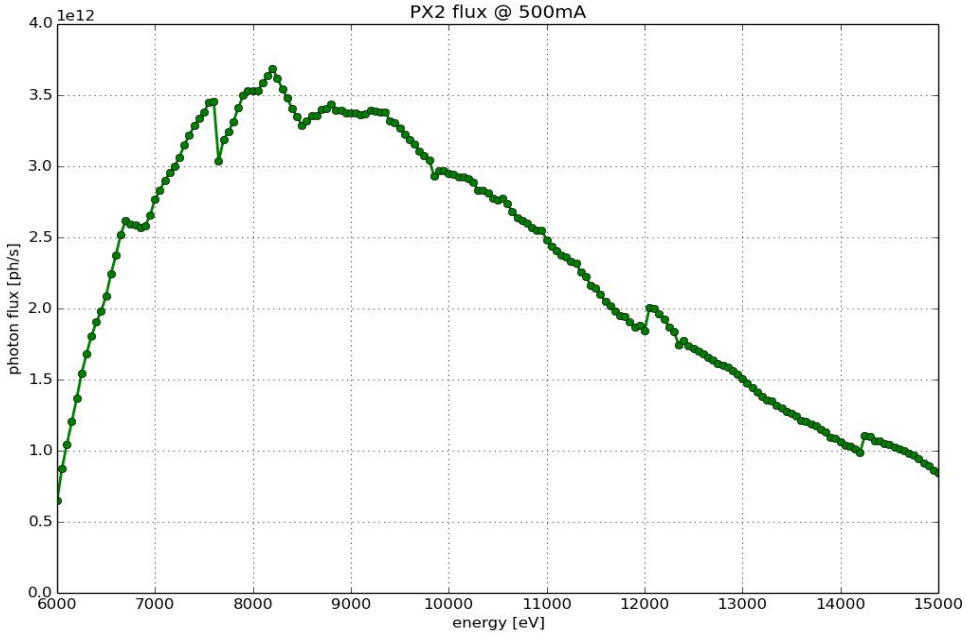
Proxima 2A at SOLEIL

- 10x5 µm beam size (KB focusing)
- 3.6e12 ph/s @ 8.1keV
  - Tunable 6 - 18 keV
- MD2 goniometer with kappa head
- Eiger X 9M detector
- CATS sample changer
- 10k samples per year

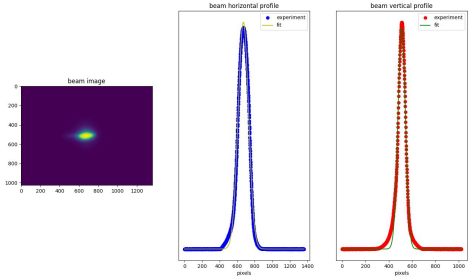


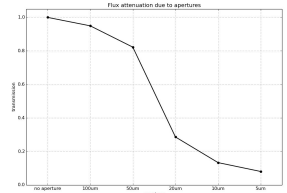
Motivation: look at very MX experiment as a radiation damage study

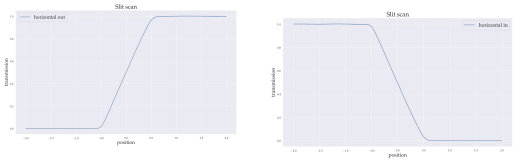
- Dose is the fundamental variable we worry about
- Key parameters determining the dose sample will receive
  - beam -- shape, intensity, energy
  - crystal -- shape, composition
  - sample environment -- shape, composition
- In the following I show how far we have been able to go along those fundamental directions

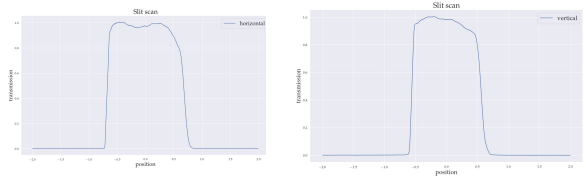
Beam properties

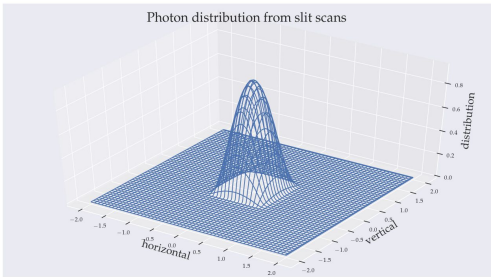
- AXUV 100 calibrated diode at sample position
- High resolution X-ray camera + On axis microscope
  - influence of beamline components on flux at sample
  - slits, filters, apertures, position monitors and monochromator

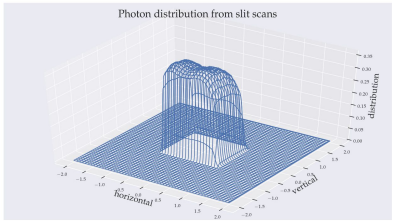


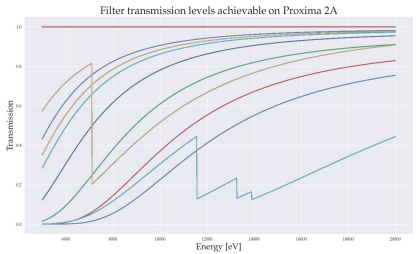






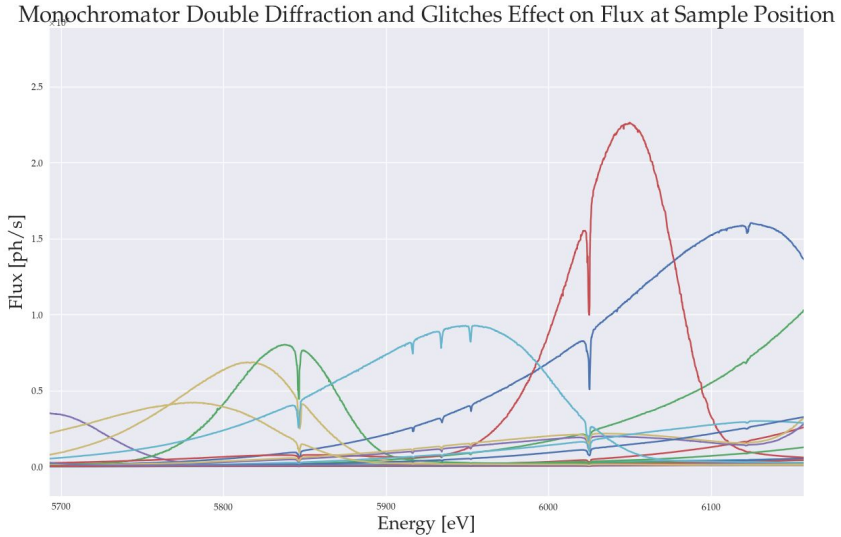


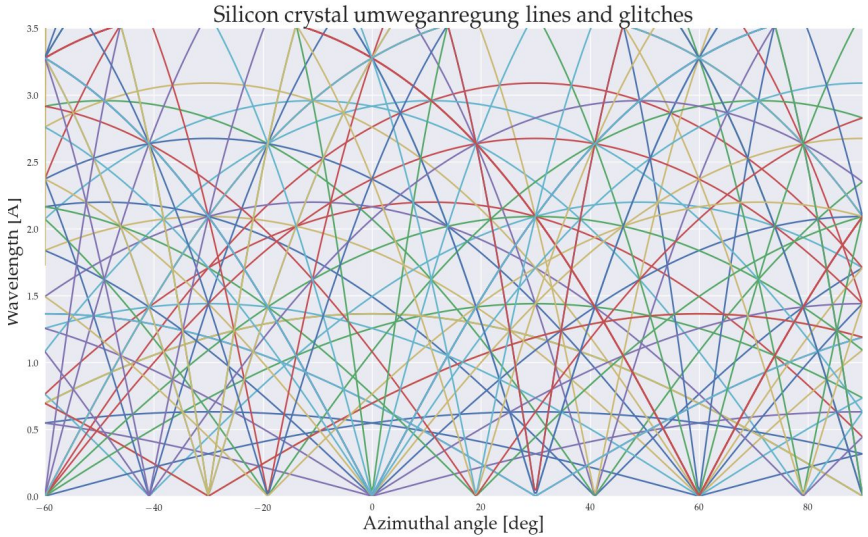




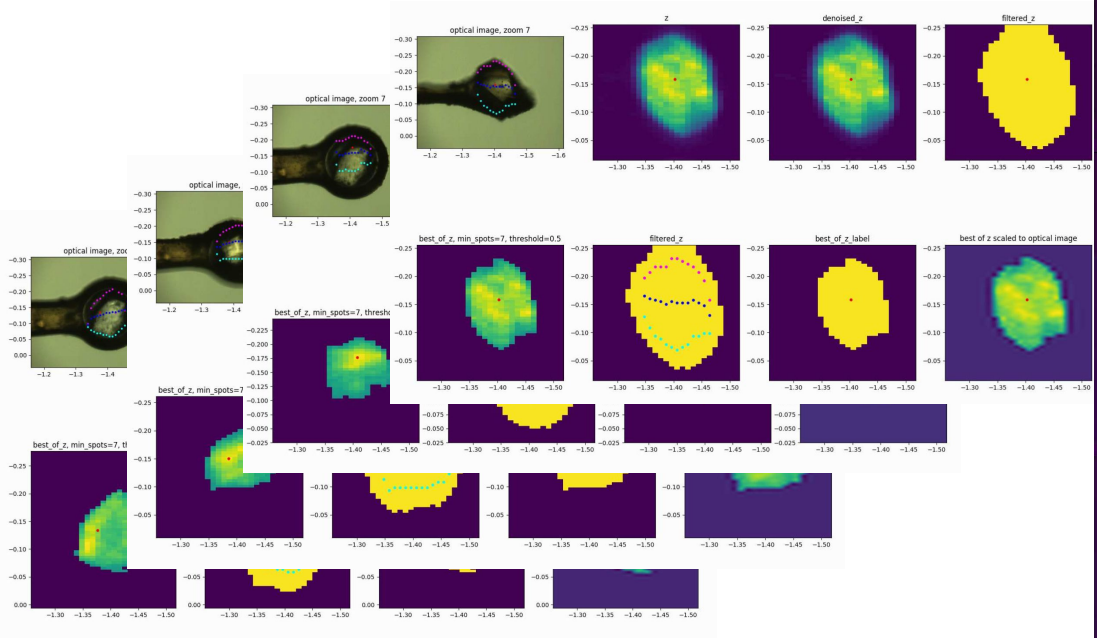
Better look at the monochromator

- Beware of monochromator crystal double diffraction and glitches
  - can be significant at specific energies

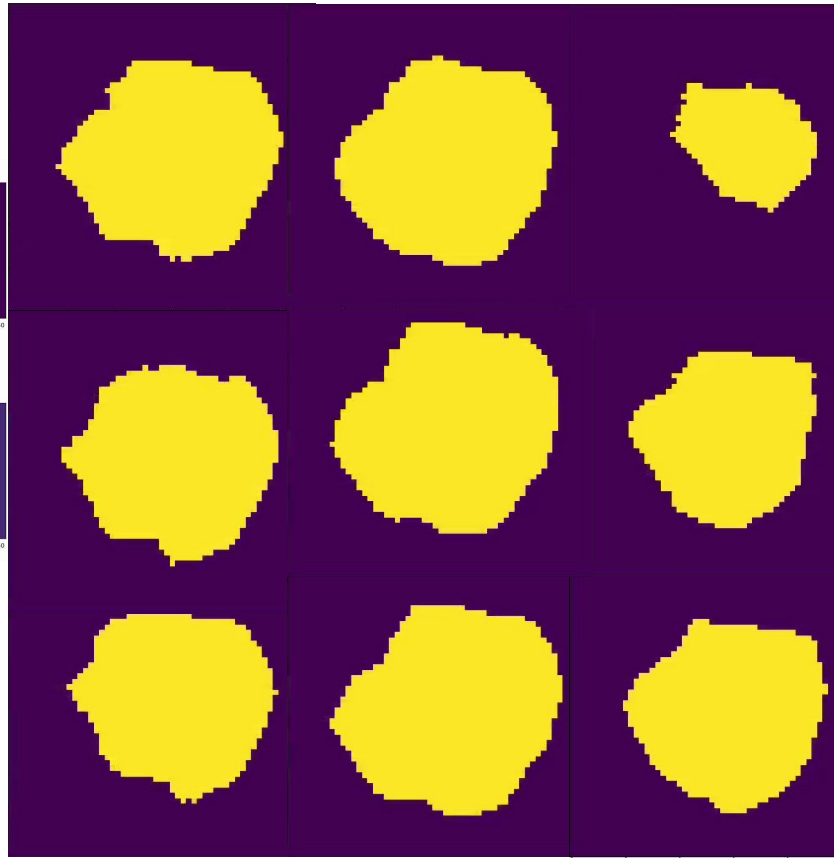




Reconstructing crystal shape



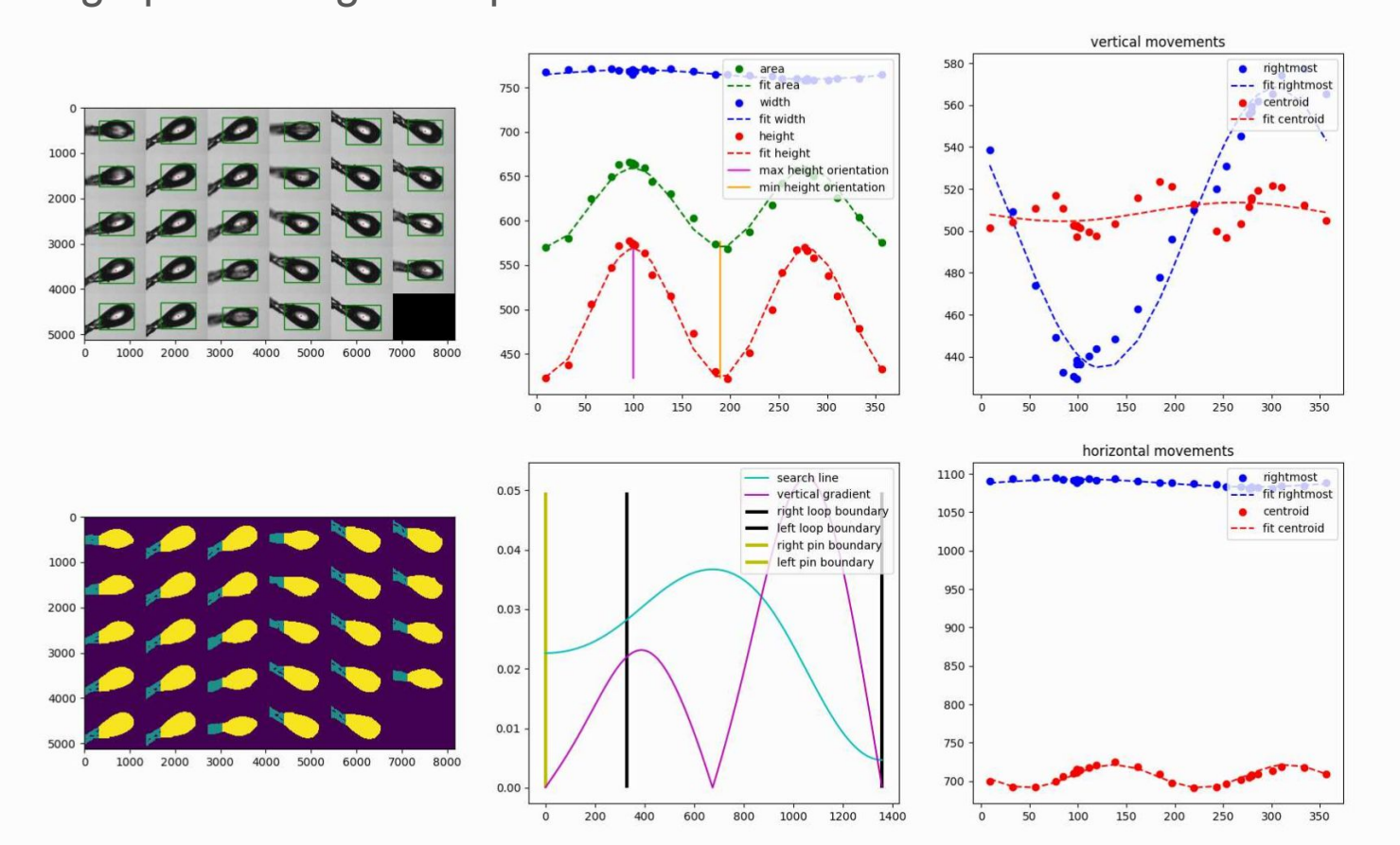
raster scans at four different orientations



reconstructed crystal shape along rotational axis

Reconstructing shape of sample environment

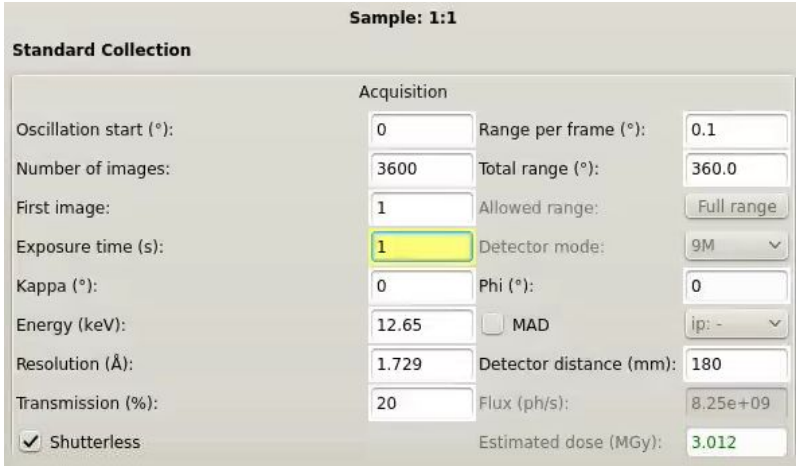
segmenting optical images -- optical based volume reconstruction



Outlook

- sample shape from optical images alone
  - premis: reconstructing sample shape purely from optical images is possible if sample is embedded in transparent medium
  - crystal will be tricky because of refraction -- needs to be taken into account
  - segment out support, mother liquor and crystal -- enhancing current pixel wise segmentation
- introducing dose as an experimental parameter?
  - warning of possibly dangerous combination of parameters

The dose (DWD) in the widget comes from RADDOSE-3D with parameters for 30um cuboid lysosyme crystal with no heavy metals



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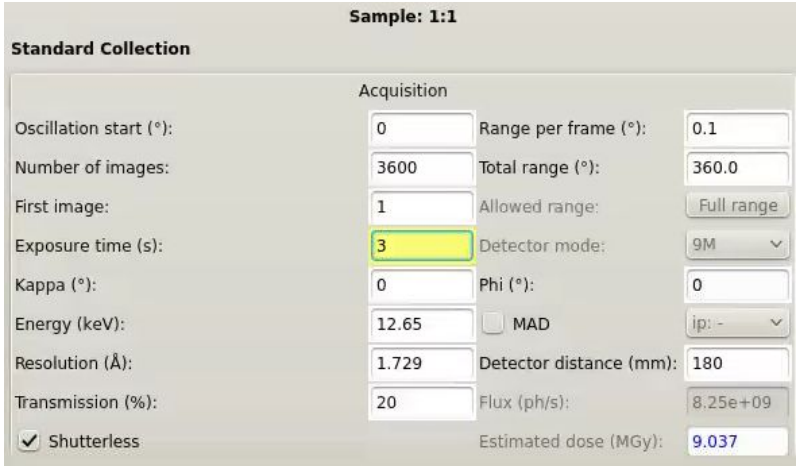

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