PAUL SCHERRER INSTITUT

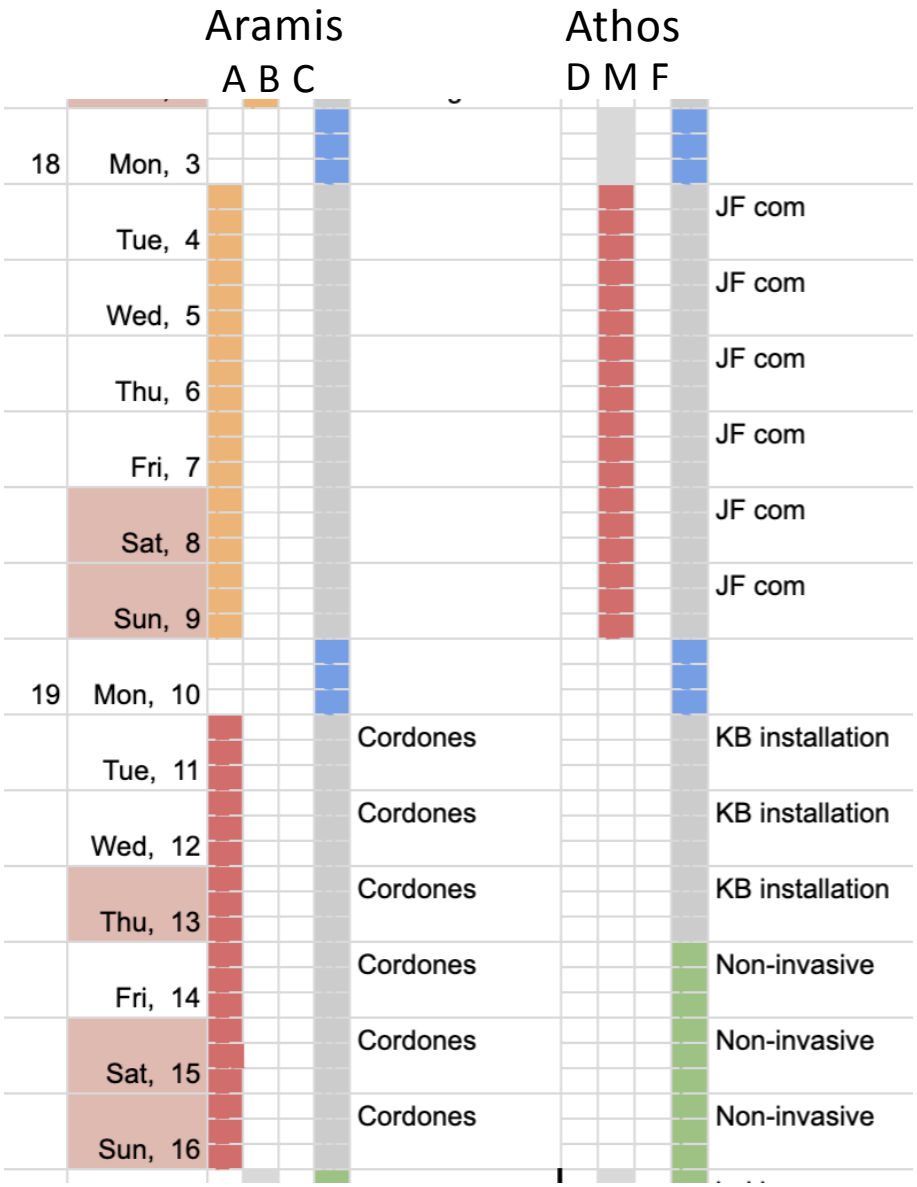
PSI

Alvra in-house beamtime

Sulfur K-edge Spectroscopy

May 4th to 10th, 2021 + User experiment May 11th to 17th

Schedule KW 18 & 19



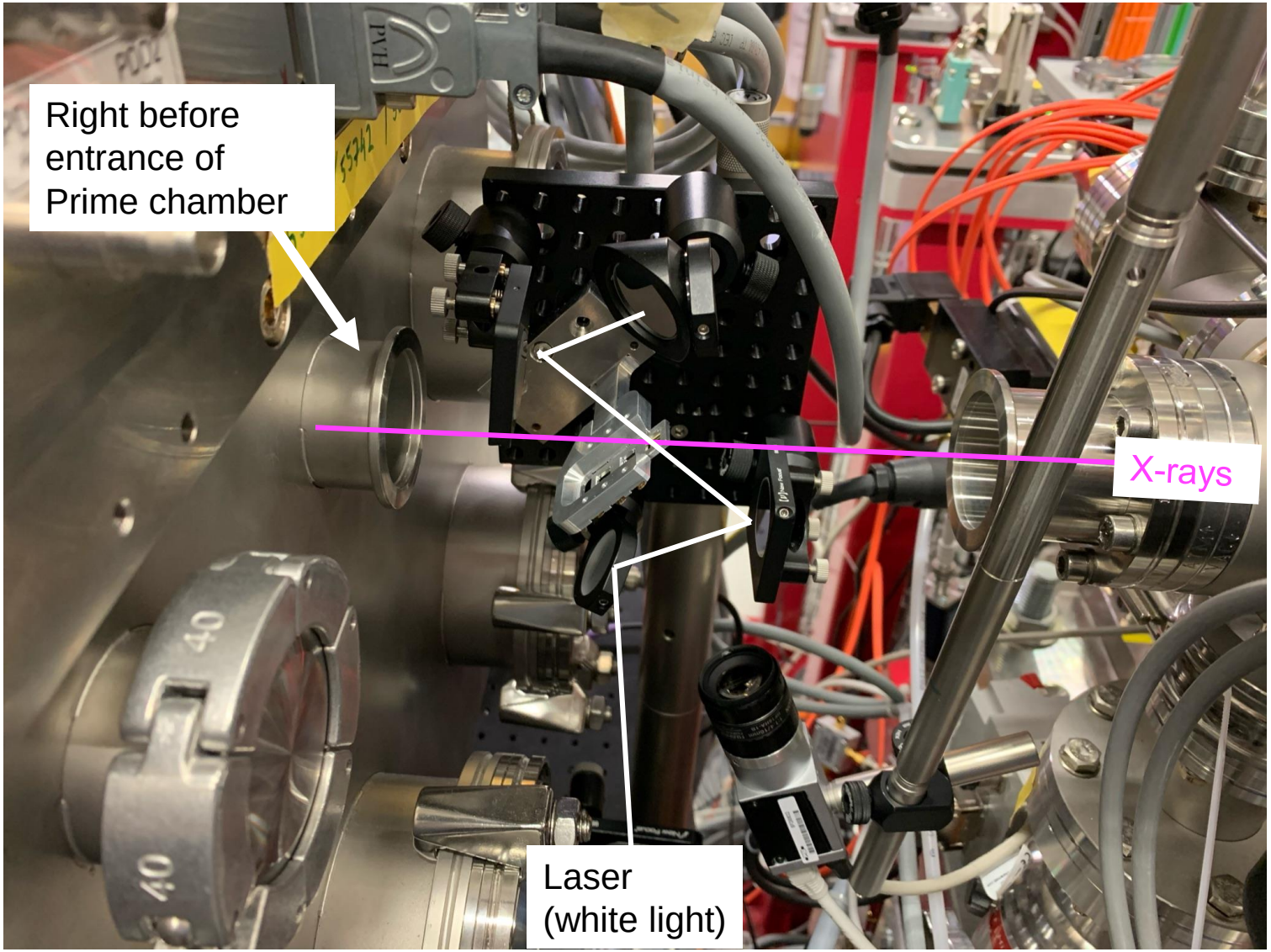
In-house Beamtime Goals

- **Test new spatial timing tool prototype** (1-2 days @high energy)
  - Placed right in front of the prime chamber
  - Compact, in air (for now)
  - Measure long term drifts and compare with PSEN and sample position t0

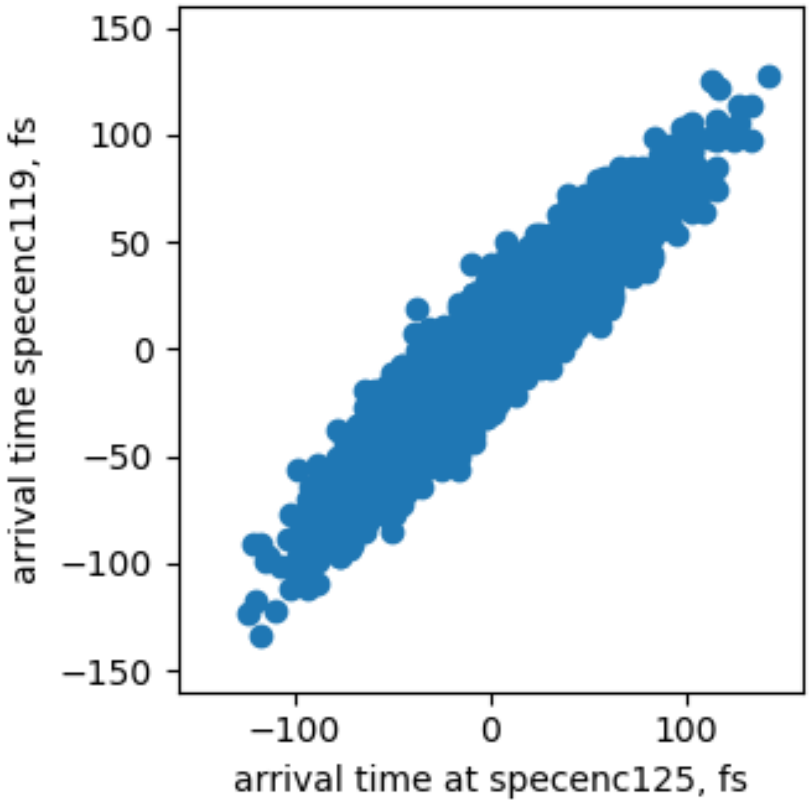
- **Prepare the setup for S K-edge experiments** (~2 days @2.5 keV)
  - "Recommission" InSb monochromator crystal @2.5 keV
  - Test new APD diodes
  - Get good S/N S K-edge spectra on reference sample

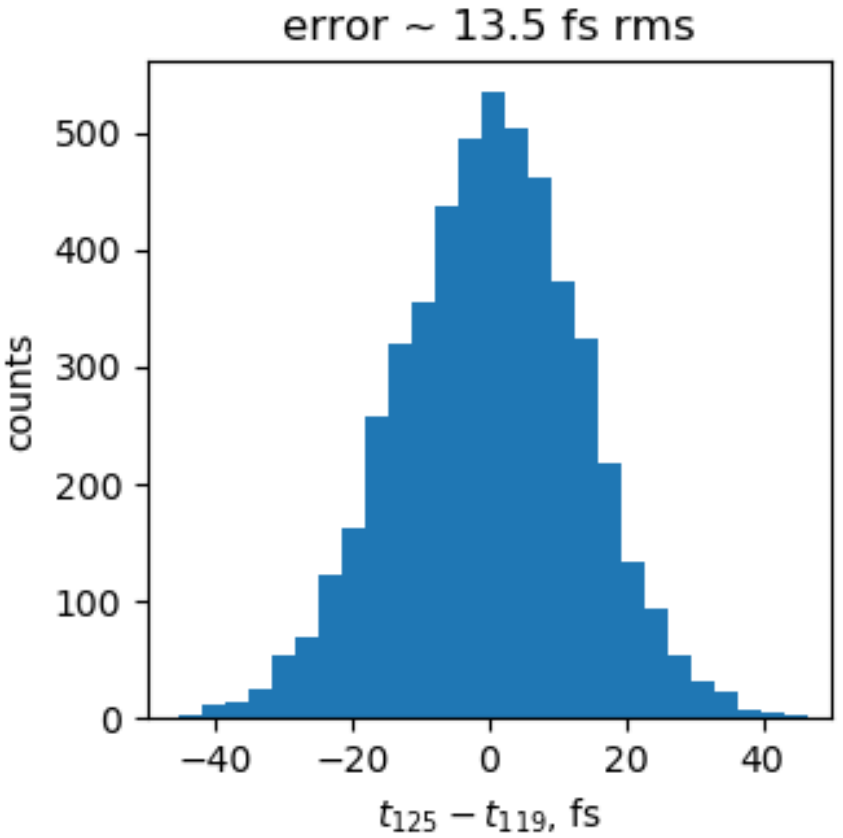
- **Measure S K-edge of Cytochrome c** (rest of the beamtime @2.5 keV)
  - Pump-probe measurement
  - Scientific question: Does the Fe-S bond dissociates in ferric Cyt c?

New Timing tool (Spectral Encoder)

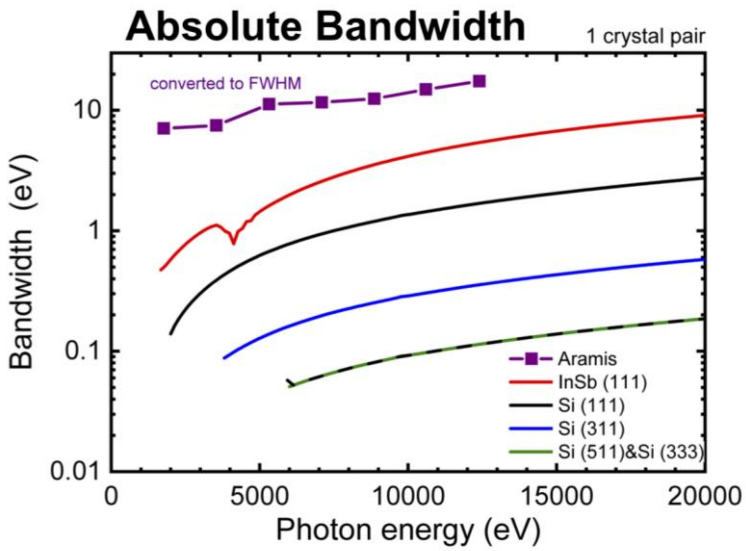


New Timing tool (Spectral Encoder)





InSb(111) vs Si(111) monochromator crystal



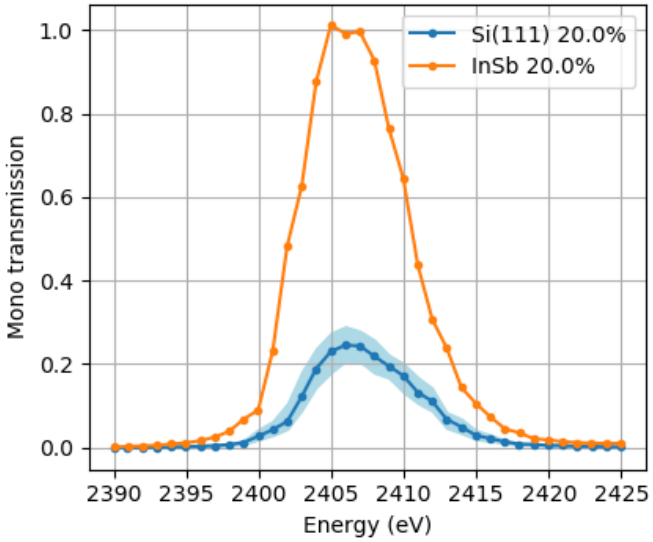
Curve from the optics group:

Si(111) resolution @2.5 keV ~220 meV

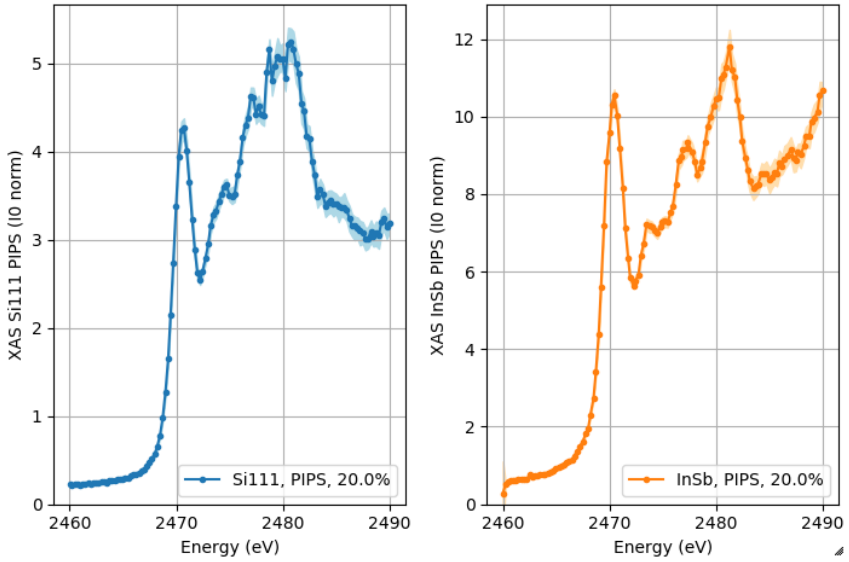
InSb(111) resolution @2.5 keV ~660 meV

Measured this week ($Na_2S_2O_3$, 250 meV steps):

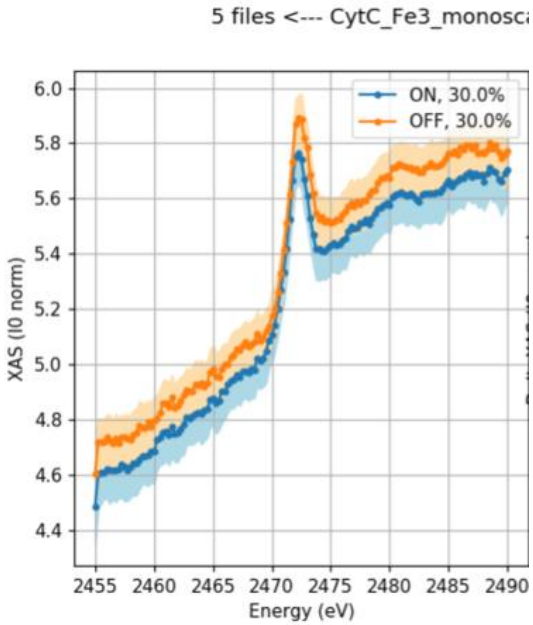
Measured this week (SASE Spectrum)

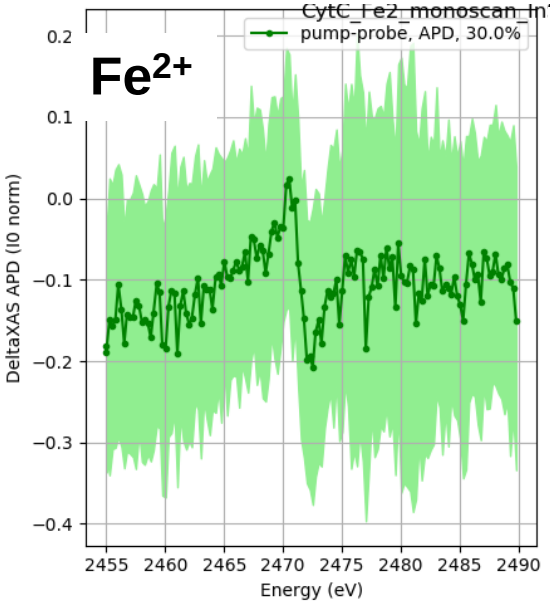


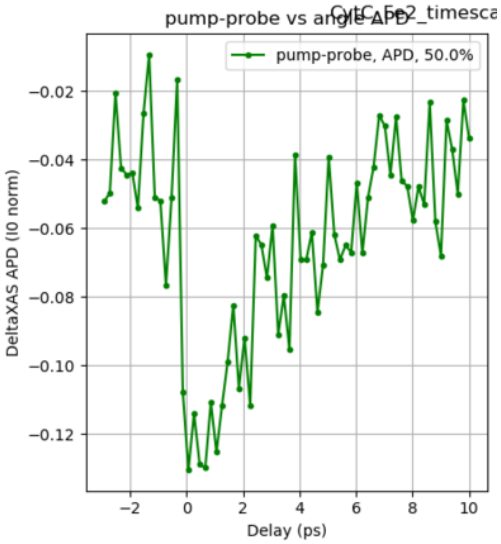
Si(111) $Na_2S_2O_3$ XAS (fluo) InSb(111)

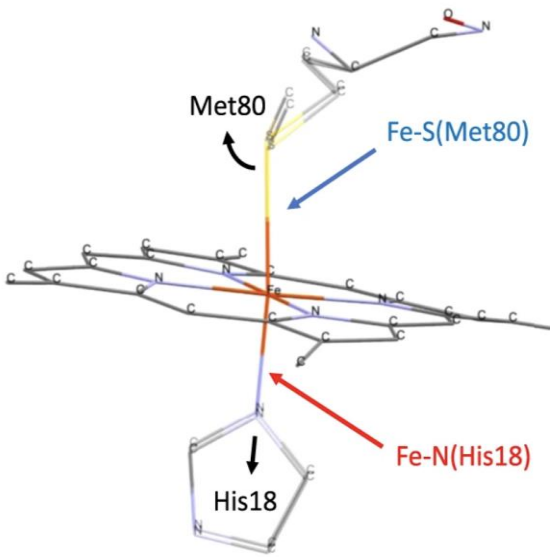


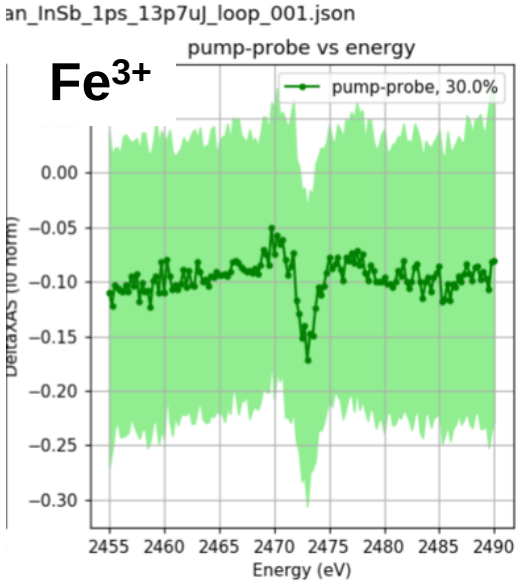
Cyt C – Does the S-Fe^{3+} bond dissociate?

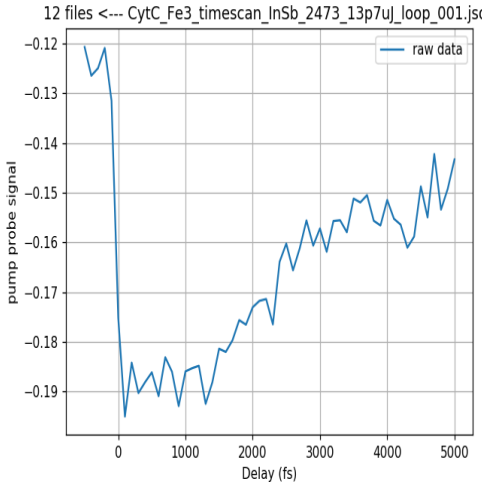






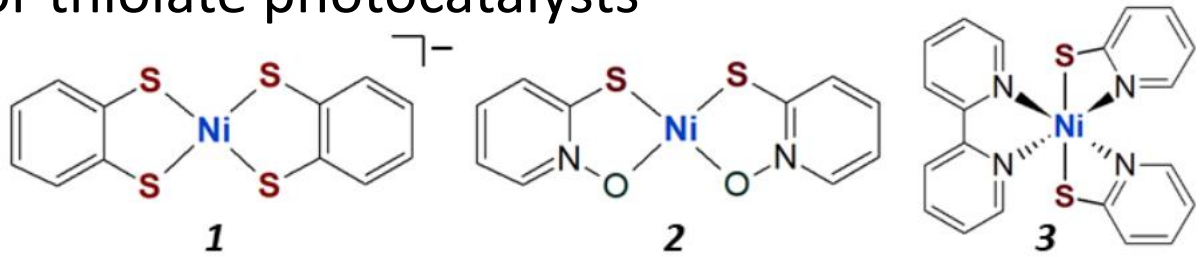


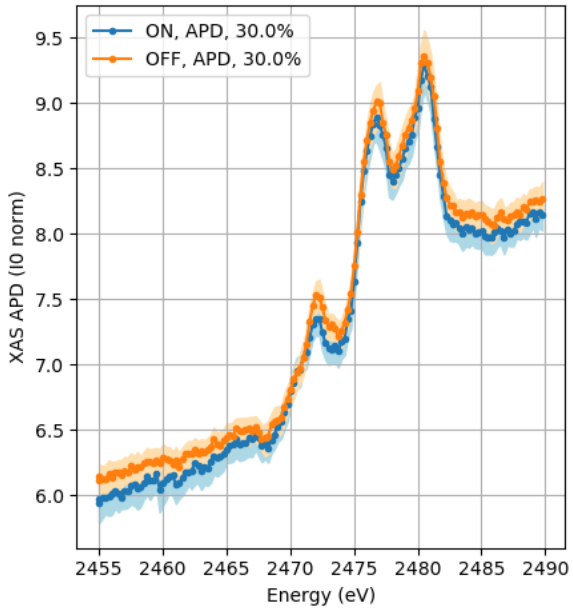




X-Ray Requirements / User Experiment

- **S K-edge experiments** (until May 17th)
  - 2.5 keV, **scanning over 150 eV range!!**
  - High pulse energy (as much as possible, minimum 600 µJ) → max 500 µJ this week
  - Narrow BW if possible (<0.28%) → ~0.32-0.34% this week
  - No need for high compression (25 fs rms)
- **Remote Users**
  - Scanning overnight with no support
  - Ni dithiolene or thiolate photocatalysts




ON, APD, 30.0%
OFF, APD, 30.0%
XAS APD (I0 norm)
Energy (eV)
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
2455
2460
2465
2470
2475
2480
2485
2490