XCS Capabilities for Run 23
LCLS Town Hall

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time-resolved hard X-ray coherent scattering and small angle scattering on condensed matter systems in air.

- Diamond (111) monochromator: 7.5-12keV range
- In air setup.
- 4 circle diffractometer (diffraction in horizontal plane)
- Cryojet: 100-350K
- X-ray Focus: 3-500um

Laser: 800nm, 2\textsuperscript{nd} and 3\textsuperscript{rd} harmonics available. OPA for range: 300-2400nm

- Detector: 4 or 8m configuration
- 0-55 degrees angle
- SAXS measurement
Time-resolved wide-angle scattering, X-ray emission and absorption spectroscopy measurements for the study of photo-excited molecular dynamics in the solution phase.

Sample environment:
- Helium purged sample chamber
- Sample monitoring and cleanup slits
- Horizontal liquid jet driven by HPLC pumps will be used to deliver the sample into the interaction point. Round and flat sheet jets of various sizes are available.

X-ray:
- Higher X-ray energy up to 25keV is available.
- Pink beam with the XCS periscope mirror system
- Scannable monochromatic energy with the CCM Si(111): 6.5 to 25keV

Optical Laser:
- 800/400/266 nm 50 fs Ti:Sapphire fundamental/2\textsuperscript{nd}/3\textsuperscript{rd} harmonic wavelengths
- OPA will be available to cover the wavelength range of 300-2400 nm.
Existing LCLS multi-crystal X-ray Emission Spectrometers

16 crystal energy dispersive von Hamos
4 crystal E. dispersive von Hamos
3 crystal scanning Rowland

K XES of 3d and L XES of 5d Transition Metals
Other capabilities:

- Split & Delay for XPCS: Wavefront splitting design. Energy range 6.5 to 13keV with a delay range from -50ps to 550ps at 8keV.
- Double bunch operation mode for longer delays (~ns)
- Low temperature chamber (~20K): Commissioning in run 22.
- X-ray Pulse picker for single shot or non 120Hz operations.

Detectors:
- Epix10k and epix10k-2m: 135k pixels and 2M pixels with 100um pixel size
- Epix100: 50um pixel size
- Jungfrau 0.5M and 1M: 75um pixel size
Short proposal program

- **Data set collection** 1-2 shifts sufficient to produce data for publication (contingent on having a previous LCLS proposal)

Studies carried out with limited instrument flexibility
Well suited for the **liquid standard config** at XCS - short proposals/rapid turnaround
For samples with well known experiment conditions

**XAS / XANES 3d TM**
**XES** Mn, Fe, Co, Ni, Co, V K-edge spectroscopy
Combined with **WAXS/XSS** 0.3-5 Å⁻¹ q-range

**proposal guidelines**
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https://lcls.slac.stanford.edu/instruments/xcs/standard-configurations