

# qRIXS Breakout Session

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LCLS Run 23 Users Town Hall

January 30th 2024

# qRIXS Instrument: Notional timeline

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Users involvement in Early Science, 2-page summary:

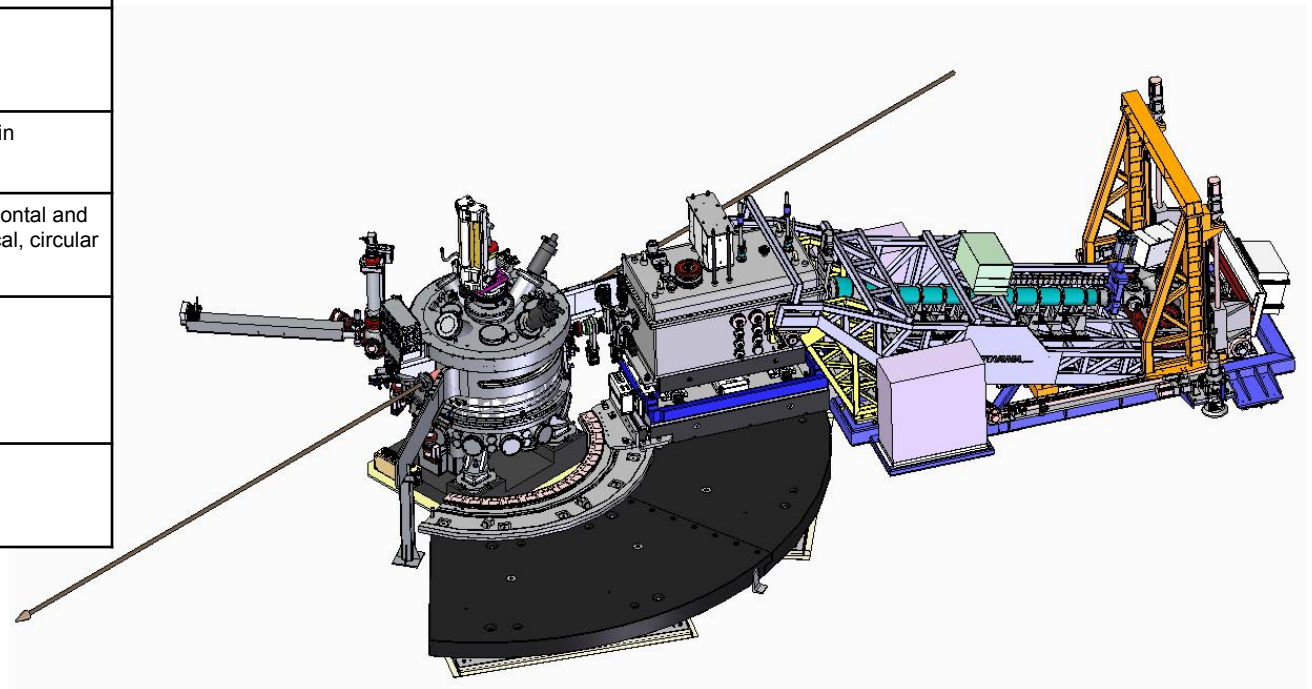
- What is the science case?
- Why is LCLS needed?
- Crucial performance parameters:
  - X-ray energy, scanning
  - Optical wavelength, timing
  - Detectors, diagnostics, sample, etc.
- How many shifts are needed? Signal levels?
- Who needs to participate and what can they contribute?
- Is there theoretical support, what would make the experiment a “success”?

# qRIXS Instrument: Sample Chamber + Spectrometer Arm

X-ray Parameters		Laser Parameters	
Repetition rate (kHz)	33	Repetition rate (kHz)	33
Energy Range (eV)	250 - 1100	Wavelength (nm)	1030 and up to 4 <sup>th</sup> harmonic
Spot Size (um), H x V	10 x 10, min 1000 max	Pulse Duration (fs)	<50 @ 800 nm
Energy per pulse (nJ)	>10	Energy per pulse (μJ)	300
Pulse Duration (fs)	<200	Spot size (μm)	50 min
Beamline Resolving Power	>20,000	Polarization control	Horizontal and vertical, circular
Combined Spectrometer resolving power	10,000 @ 931 eV	Arrival time monitor precision (fs)	<20
Polarization	Linear horiz.		

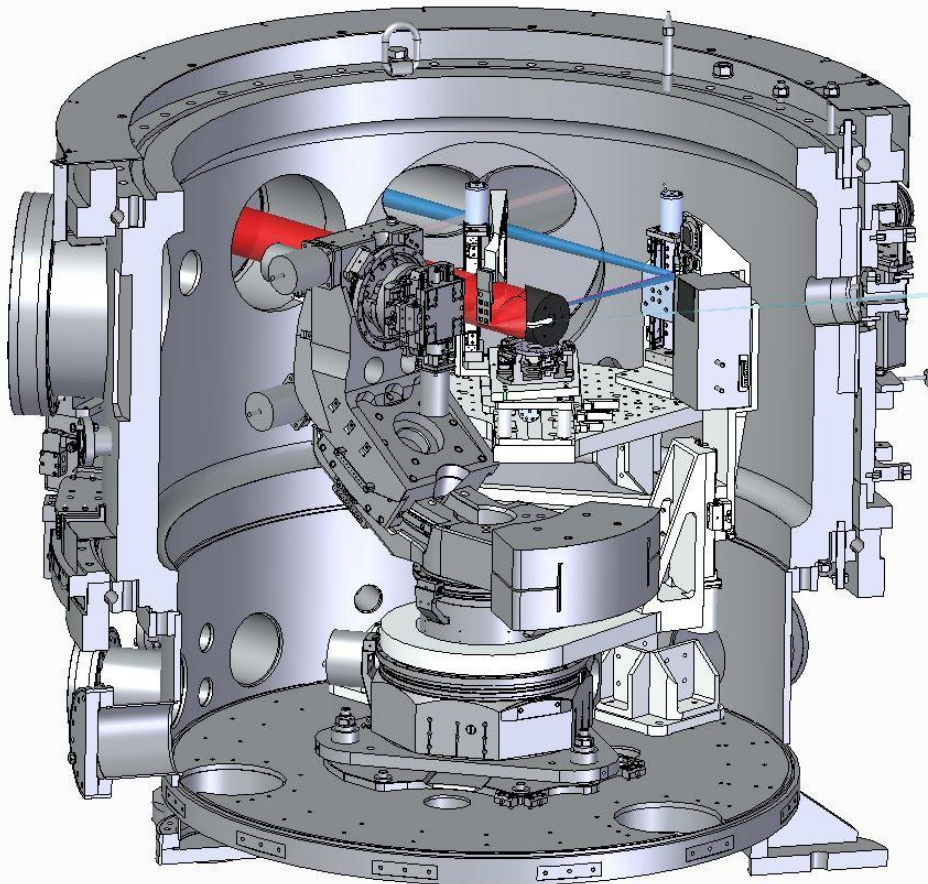
For more details:

<https://lcls.slac.stanford.edu/instruments/neh-2-2/neh-2-2-Capabilities>



# qRIXS Instrument: Sample Chamber capabilities

Techniques: XRD, REXS, XRR, XAS



- In-vacuum diffractometer, 6 degrees of freedom
- Bulk samples and thin films on substrates
- Load-lock chamber
- Sample cooling, ~ 25 K
- Diagnostic paddle for calibration targets, spatio-temporal overlap, etc.
- Laser in- and out- coupling
- Avalanche photodiode detectors for x-ray absorption and diffraction
- Arrival time monitor
- Lasers: 1030 nm
- Overall temporal resolution: ~60 fs

# qRIXS installed

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