SACLA Users' Meeting 2025

Apparatus for X-ray Diffraction and Scattering Experiments at SACLA

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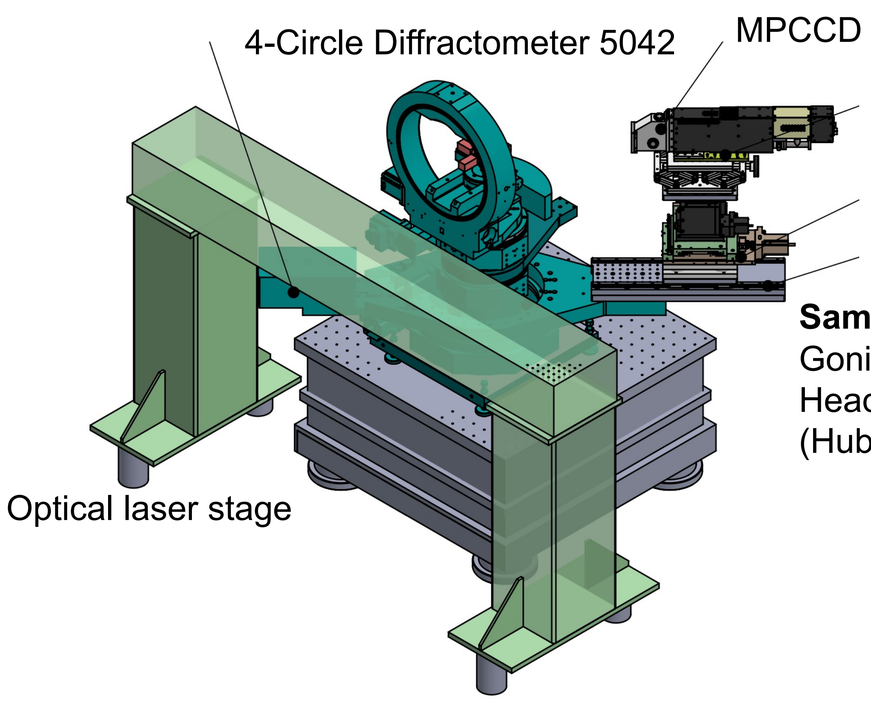
on behalf of SACLA beamline group

X-ray diffraction and scattering experiments at SACLA are primarily performed to investigate the non-equilibrium states of materials. This poster presents a standard setup for X-ray diffraction combined with a synchronized optical laser system. A cryostat, equipped with a transparent window for both optical lasers and X-rays, enables versatile diffraction experiments over a broad temperature range, including temperatures below 10 K. Furthermore, additional apparatus such as a kappa goniometer and PINK-02 are available to accommodate specific experimental requirements.

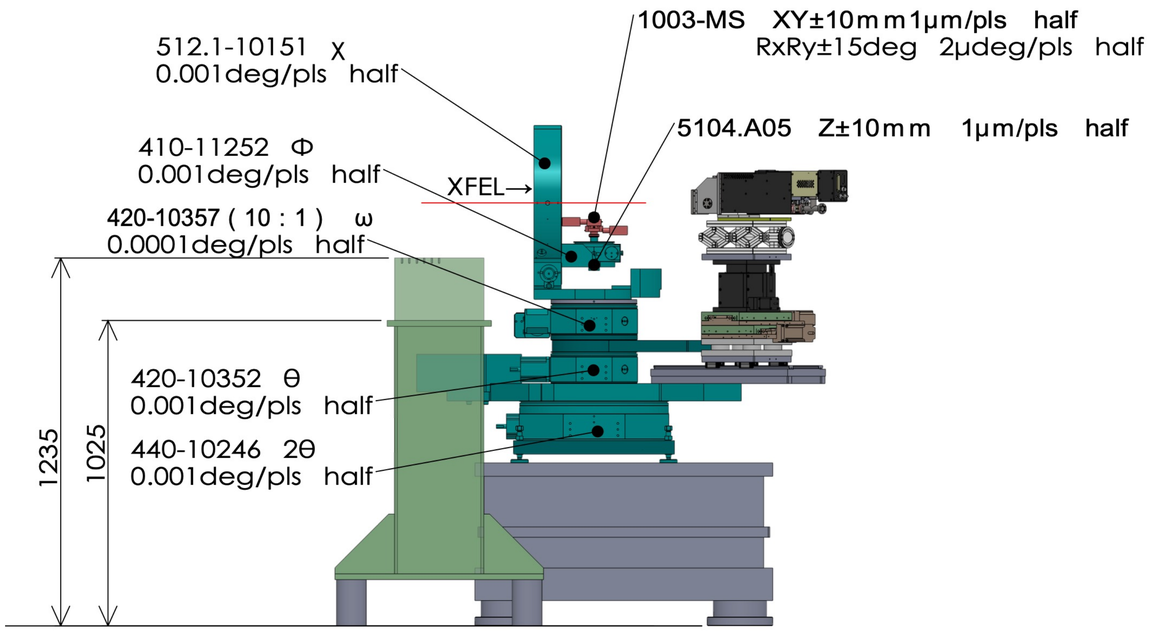
Standard Setup for Pump-Probe X-ray Diffraction

4-Circle Diffractometer (Huber Co.)

https://www.xhuber.com/en/



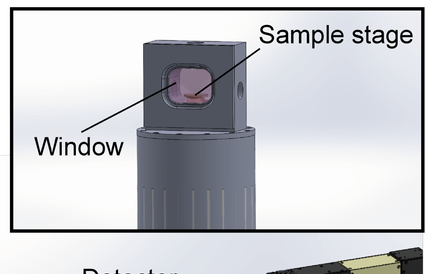
Sample stage:
Goniometer
Head1003-MS
(Huber Co.)

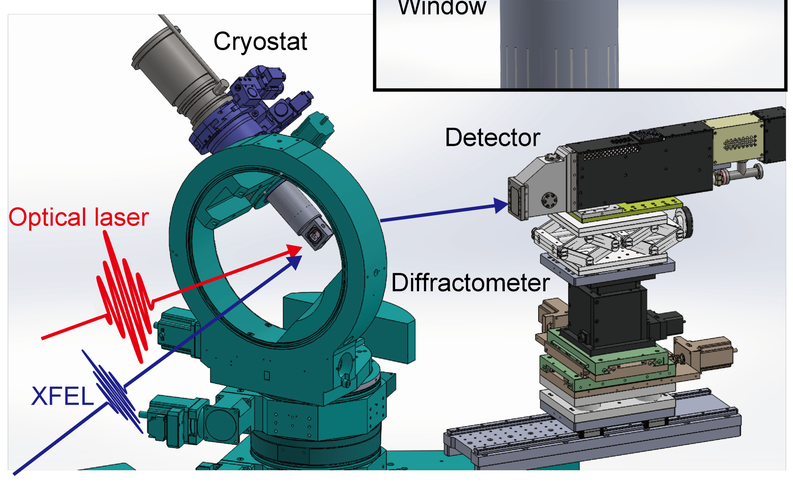


Cooling Systems

Cryostat (down to < 10 K)

- Highly transparent polyimide film as a window material
- Mounted on a standard 4-cycle diffractometer
- There are two types.
  - closed-cycle type (liquid He free)
  - liquid He flow type (low vibration)





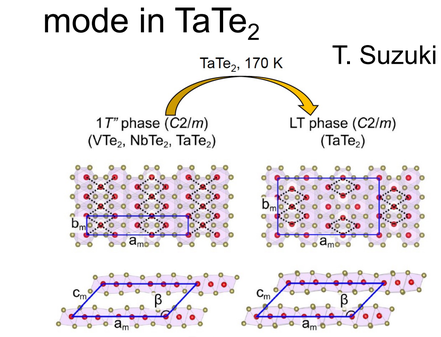
Cryostreams (down to ~ 100 K) are also available.

- liquid N_2 type (Oxford Cryosystems)
- N_2 gas type(Rigaku)

Recent results

Charge-density-wave amplitude mode in $TaTe_2$

T. Suzuki *et al.*, in preparation



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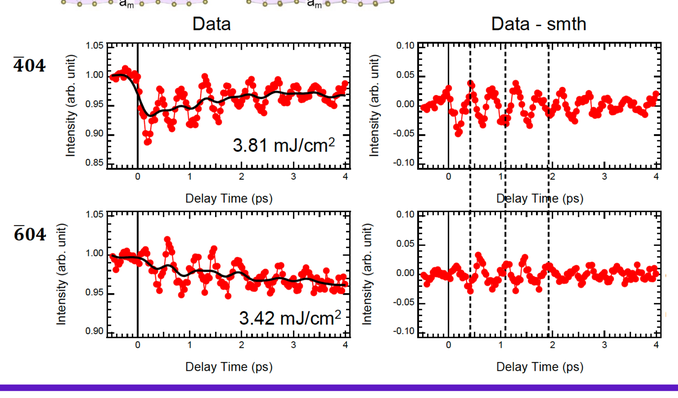
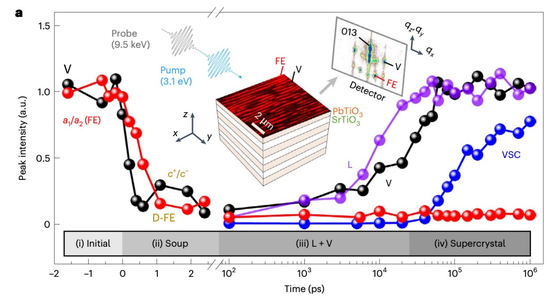
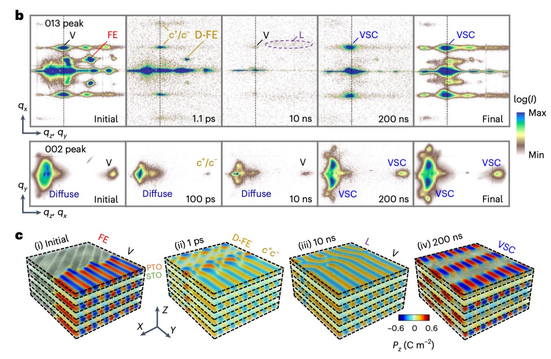
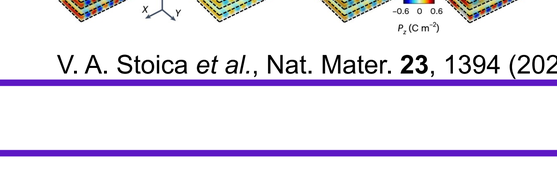


Photoinduced dynamics of the polar supertextures in $SrTiO_3/PbTiO_3$ superlattices





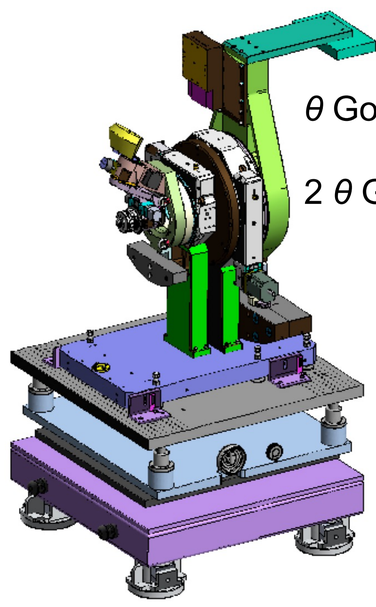


V. A. Stoica *et al.*, Nat. Mater. **23**, 1394 (2024)

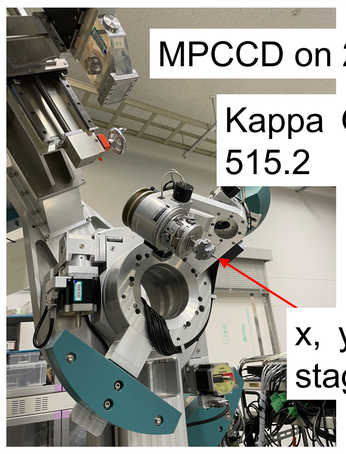
Other Apparatus

https://www.xhuber.com/en/

Diffractometer with Kappa Goniometer (Huber Co.)

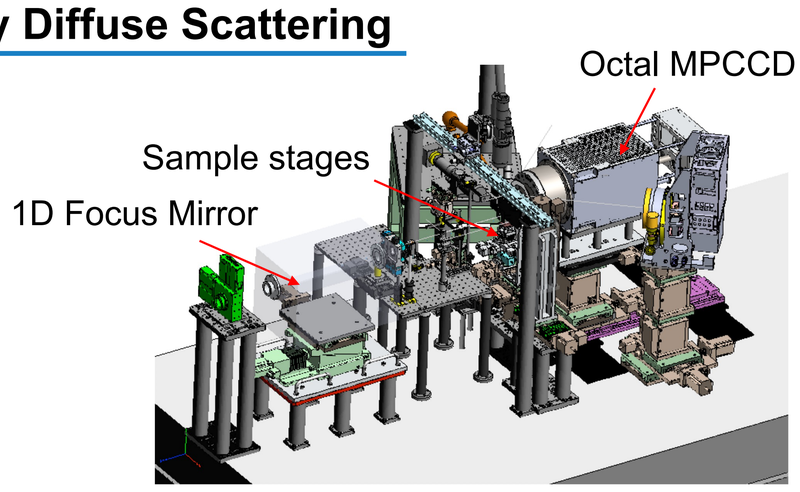


θ Goniometer 420
0.0001 deg/pulse
2 *θ* Goniometer 440
0.0001 deg/pulse



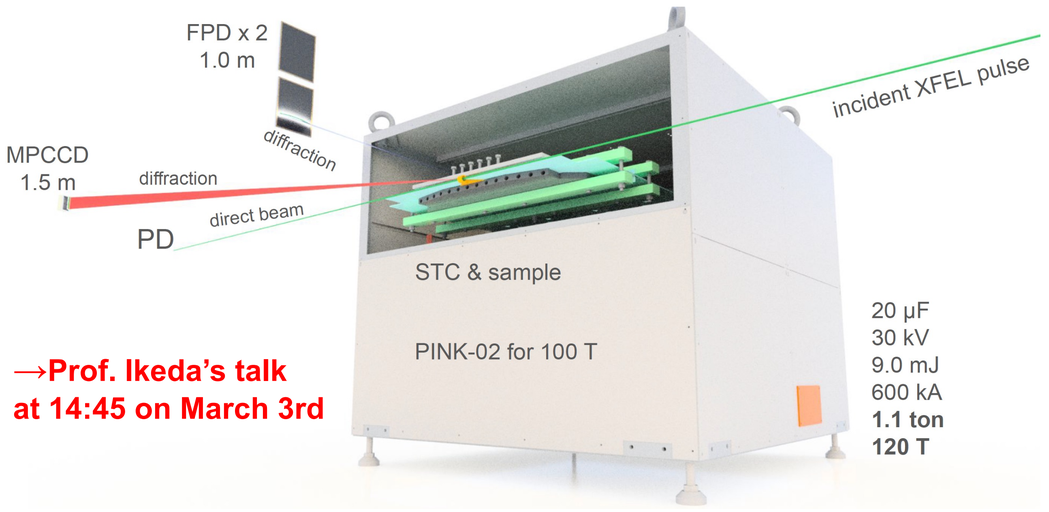
- More freedom around the sample
  Advantageous for optical lasers, cryostreams, and so on
- Vertical reflection geometry
  Accessible to high 2*θ* angles

X-ray Diffuse Scattering



PINK-02

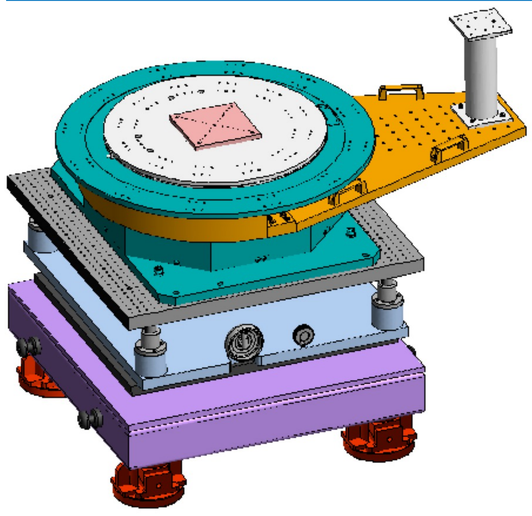
X-ray diffraction under ultra-high magnetic fields
developed under the SACLA Basic Development Program
PI: Prof. A. Ikeda (UEC)



→Prof. Ikeda's talk
at 14:45 on March 3rd

General-Purpose Diffractometer (KOHZU Co.)

https://www.kohzuprecision.com/i/



θ
Size: *Φ* 700 mm
Res.: 0.00004 deg/pulse
2 θ
Arm length: 1000 mm
Res.: 0.00004 deg/pulse