

*Pioneering New Horizons in Science*

# **TOYAMA**

*XFEL Monochromator*



[www.toyama-en.com](http://www.toyama-en.com)

# XFEL Double Crystal Monochromator

## Double Crystal Monochromator at SACLA

SACLA is a compact 8GeV X-ray Free Electron Laser facility operating at short wavelengths down to 0.6Å. It is located on the SPring-8 site in Japan. Toyama worked with the SACLA project team to develop the Double Crystal Monochromator shown here.

The Monochromator is one of the most important components in the XFEL BL-3 beamline being used to tune the photon energy of the beam.

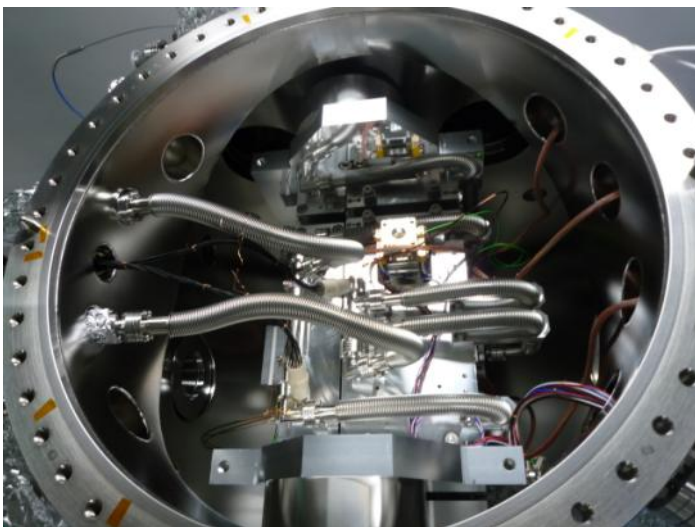
It has very precise positioning technology and is designed for the UHV environment. The compact design has ultra high stability against vibration, maintaining a very stable crystal position, and time dependence.

## Features

- UHV compatible design, ultimate pressure <math>< 5 \times 10^{-8}</math> Pa
- Compact design
- Achieved 3.7°- 30° Bragg angle (Rotation range: -1°-30°)
- Granite mount to minimise low-frequency vibration
- Crystal cage mounted on rigid drive shaft for high stability
- Stability of pitch angle of crystal <math>< 0.5 \mu\text{rad}/\text{hour}</math>
- Stability of pitch angle of crystal <math>< 1 \mu\text{rad}/24\text{hours}</math>
- Size of crystal 90(L) x 30(W) x 40(H)mm
- Water cooling system for first and second crystals



SACLA BL-3 XFEL Monochromator



Water cooling arrangement

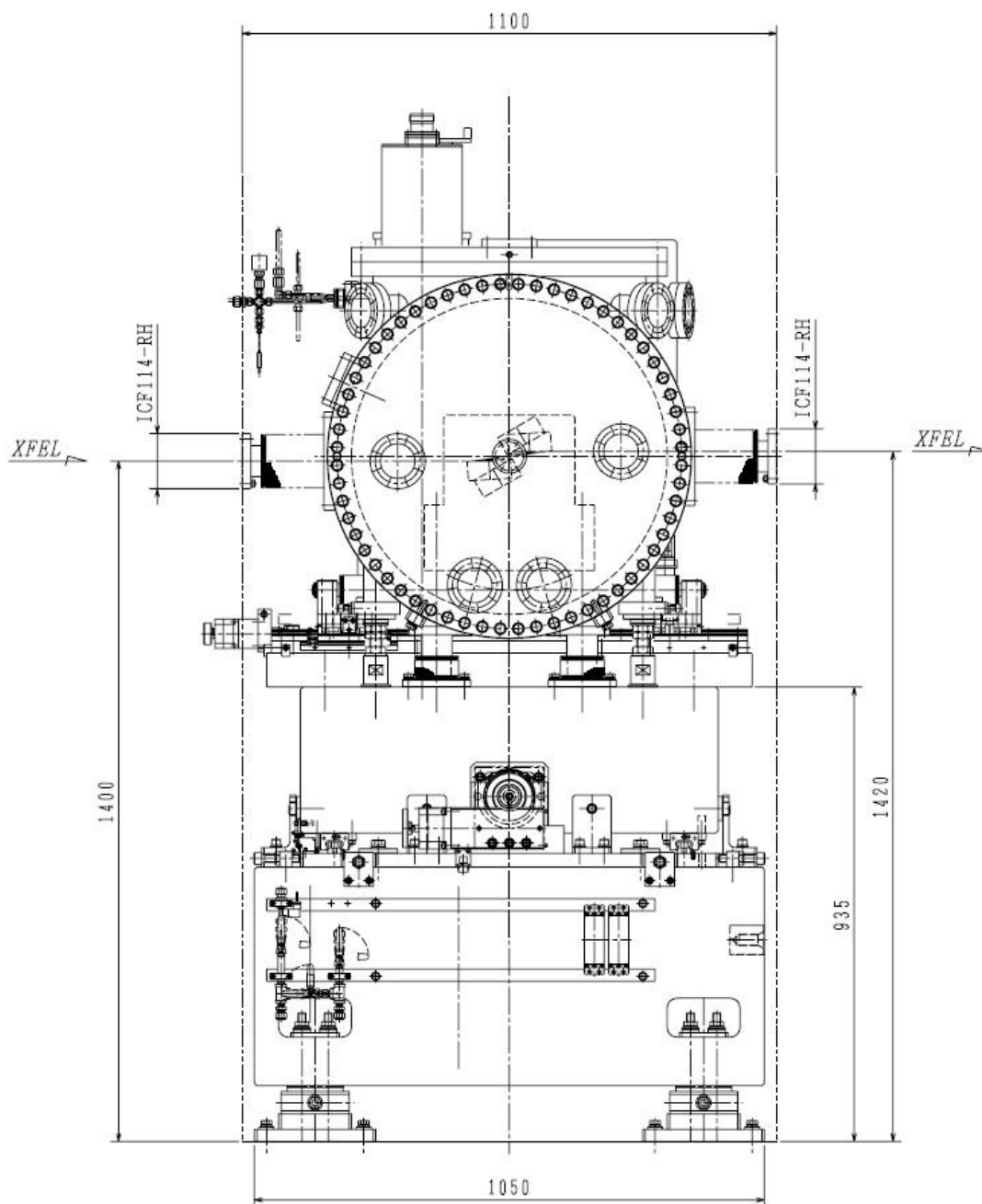


First and second crystal mechanism

# XFEL Double Crystal Monochromator

## Specification

	Axis Name	Drive Range	Repeatability	Encoder	Drive System
Main Axis	Bragg angle range $\theta$	-1 to 30 deg	1 $\mu$ rad	-	Remote control
First Crystal	Vertical translation $\Delta Z1$	$\pm 1.0$ mm	10 $\mu$ m	Available	Remote control
	Pitch adjustment $\Delta\theta 1$	$\pm 0.5$ deg	0.1 $\mu$ rad	Available	Remote control
Second Crystal	Roll adjustment $Ty2$	$\pm 0.5$ deg	1 $\mu$ rad	Available	Remote control
	X Translation	60 mm	0.1 mm		Remote control
	Z Height adjustment	$\pm 15$ mm			Manual



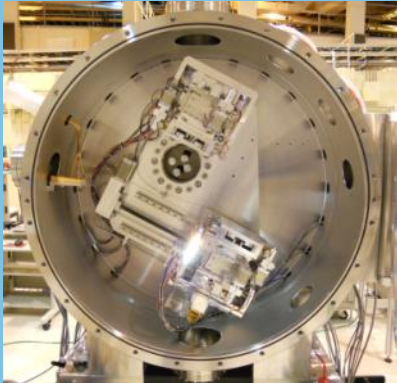


# Other areas of Toyama expertise

## Synchrotron Applications

Toyama has developed an extensive range of components and systems for synchrotron beamlines and front ends including:

- Soft and Hard X-ray Monochromators
- Mirror Systems
- Slits
- High heat load front ends
- Beam Monitors
- End stations such as Ellipsometers, Reflectometers and Diffractometers



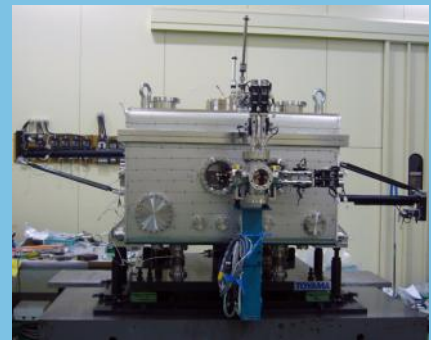
Hard X-ray DCM



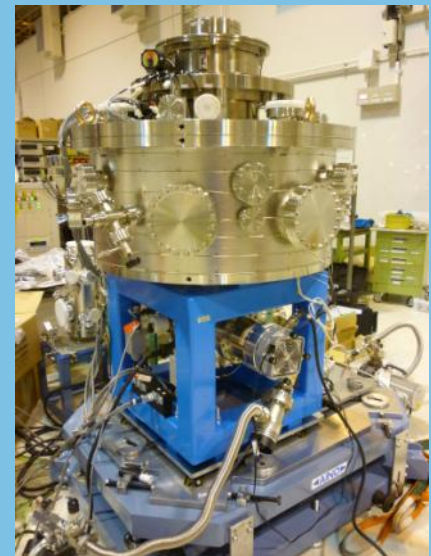
Liquid nitrogen cooled mirror system



Cooled slit



Soft X-ray VLSPGM



Diffractometer



FIB-TOF-SIMS

## Analytical Instruments

Toyama has developed analysis equipment for measuring low levels of atmospheric contamination and for surface analysis. Instruments include:

- Jet-REMPI—Jet Cooling Resonance Enhanced Multi-Photon Ionisation Mass Spectrometer
- LICA-MS—Laser Ionisation Compact Analyzer Mass Spectrometer
- FIB-TOF-SIMS—The Focused Ion Beam Time-of-Flight Secondary Ion Mass Spectrometer

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