

## METROLOGY and TEST beamline

### SOLEIL staff:

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### Areas of applications, instrumentation and methodologies used

Beamline dedicated to the metrology and characterization of X-ray optical components and detectors. Development of new techniques together with the related instrumentation. Also valuable as a general purpose beamline to prepare, test and set up a wide range of experiments.

METROLOGIE meets the needs of SOLEIL beamlines, Optics Group and Detectors Group, its two partners (CEA-DAM and LNE), the CNRS/Thales-TRT joint research unit and SOLEIL users.

- Source: Bending Magnet.
- Two branches operating simultaneously:
  - Soft X-ray branch [30 to 1800 eV] and hard X-ray branch [100 eV to 40 keV in monochromatic operation mode, with access to the white or pink beam].
- Spectral resolution: 1000 to 10000 depending on the energy range.
- Beam size: from a few hundred microns in focused mode, to several usable millimeters in non-focused mode.
- Flux:
  - Soft X-ray Branch:  $10^9$  to  $10^{12}$  photons/s on sample, depending on the energy range.
  - Hard X-ray Branch: Few  $10^9$  photons/s/mm<sup>2</sup> in monochromatic to  $10^{14}$  photons/s/mm<sup>2</sup> in white beam operation mode.
- Experimental stations: Two-axis high vacuum goniometer on each beamline branch. Additional equipment on the Hard X-ray branch, including an Optical Table provided with various motorized positioning systems for carrying out experiments at atmospheric pressure, and a deep X-ray photolithography (LIGA) exposure station (CNRS/Thales-TRT).

### Major disciplines

- Analysis of the photometric parameters of optical components: surface reflectivity - grating and multilayer diffraction efficiency - filter transmission.
- Detectors characterization and calibration: photosensitive devices - scintillators – optical relays.
- Development of optics and diagnostics for X-ray beam spatial and spectral settings.
- Wavefront sensing (Hartmann and Interferometry), Adaptive X-ray Optics, X-ray phase metrology and X-ray phase imaging.
- Primary X-ray source as calibration standard - Measurement of Material optical constants (LNE).
- Characterization of X-ray and Plasma Diagnostics to be implemented on the future MegaJoule Laser (CEA-DAM).
- Deep X-ray Photolithography (LIGA).