Beamline 13-ID / GSECARS-CAT

Scientific focus: Geosciences, environmental science, and soil science

Scientific programs: High-pressure diffraction in diamond-anvil cell, high-pressure diffraction in multi-anvil press, microspectroscopy and XRF microprobe, microcrystal diffraction, surface diffraction, and x-ray absorption fine structure spectroscopy

Optics & Optical Performance

- VG double-crystal monochromator
  - 29 m from source
  - Si(111) crystal
  - cryogenic cooling
  - +50 mm offset
- vertical focusing mirror
  - 45 m from source
  - Si substrate
  - Pt, Rh, Si coatings
  - internal water cooling
  - Kirkpatrick-Baez geometry
  - 0–5 mrad grazing angle
  - 6:1 to 3:1 demagnification
- horizontal focusing mirror
  - 47 m from source
  - Si substrate
  - Pt, Rh, Si coatings
  - internal water cooling
  - Kirkpatrick-Baez geometry
  - 0–5 mrad grazing angle
  - 7:1 to 3:1 demagnification
- small Kirkpatrick-Baez microfocusing mirrors

Experiment Stations

13-ID-A

- white beam first optics enclosure

13-ID-B

- white beam second optics enclosure

13-ID-C

- white or monochromatic beam station
- x-ray absorption fine-structure spectroscopy
- XRF microprobe
- microspectroscopy
- microcrystal diffraction
- surface diffraction

13-ID-D

- white or monochromatic beam station
- multi-anvil press high-pressure diffraction
- diamond anvil cell high-pressure diffraction

Detectors

- Canberra 16-element Ge detectors (two)
- Bruker 2K and 1500 CCD detectors
- Canberra single-element Ge and Si(Li) detectors
- Princeton Instrument visible light CCD cameras (four)

Beamline Controls and Data Acquisition

- Windows NT workstations running EPICS with VME
- SPEC, IDL, Bruker SMART and GADDS
- Princeton Instruments WinView and WinSpec

Beamline Support Equipment/Facilities

13-ID-C

- Newport general-purpose diffractometer

13-ID-D

- diamond-anvil cell with laser heating
- two-circle diffractometer
- 1000-ton multi-anvil press w/ DIA and T-cup tooling

- Laser Raman system in support laboratory

Insertion Device Source Characteristics (nominal)

source	Undulator A
period	3.30 cm
length	2.47 m
effective K_{max} (at minimum gap = 10.5 mm)	2.78
energy range 1st harmonic	2.9 - 13.0 keV
energy range 1st - 5th harmonics	2.9 - 45.0 keV
on-axis peak brilliance at 6.5 keV	9.6×10^{18} ph/sec/mrad²/mm²/0.1% bw
source size at 8.0 keV Σ_x Σ_y	 359 μm 21 μm
source divergence at 8.0 keV $\Sigma_{x'}$ $\Sigma_{y'}$	 24 μrad 6.9 μrad