Beamline 20-ID / PNC-CAT

Scientific focus: Materials science and environmental science

Scientific programs: Material science, environmental science, UHV/surface science-MBE growth, and x-ray microbeams

Optics & Optical Performance

- BESSRC high-heat-load monochromator
  - 31 m from source
  - 4–27 keV energy range, Si(111)
  - 6–50 keV energy range, Si(311)
  - 1–2 x 10^{-4} energy resolution ($\Delta E/E$), Si(111)
  - 0.5–1 x 10^{-4} energy resolution ($\Delta E/E$), Si(311)
  - 35 mm offset
  - liquid-nitrogen cooling
  - ~10^{13} ph/sec flux at 10 keV, Si(111)

- toroidal focusing mirror
  - 34 m from source
  - 3–30 keV energy range
  - Rh, Pt coatings (selectable)
  - 2.2–2.7 mrad glancing angle
  - ~400 μm hor. x 100 μm vert. focal spot

- Kirkpatrick-Baez mirrors
  - 3–20 keV energy range
  - 1 μm or 5 μm focal spot (mirror dependent)
  - 4 mrad glancing angle
  - ~10^{12} flux at 10 keV

- tapered capillaries
  - 3–30 keV energy range
  - <0.5 μm focal spot
  - 150 μm beam acceptance
  - 10^{9}–10^{10} ph/sec flux

Experiment Stations

20-ID-A
- white beam first optics enclosure

20-ID-B
- monochromatic beam station
- microbeams
- XAFS

20-ID-C
- monochromatic beam station
- diffraction
- surface science

Detectors

- Microspec WDX wavelength dispersive spectrometer
- ionization chambers
- 13-element and single element Ge
- NaI scintillation
- CCDs
- PIN diodes
- plastic scintillator
- Siemens Hi Star area detector
- Si diodes

Beamline Controls and Data Acquisition

- Sun UNIX with EPICS/VME
- Windows NT with LabView
- SPEC

Beamline Support Equipment/Facilities

- MBE-capable surface XAFS, reflectivity and standing wave chamber (20-ID-C)
- diamond phase plate
- 8-circle psi geometry diffractometer
- microtomography at 2 micron resolution
- Ti-sapphire laser (20-ID-C)

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 x 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