

# Beamline 19-ID / SBC-CAT

**Scientific focus:** Macromolecular crystallography

**Scientific program:** Structural biology

## Optics & Optical Performance

- 6–20 keV standard spectral range
- 0.08 mm hor. x 0.04 mm vert. FWHM focused beam size
- Rosenbaum-Rock monochromator #1
  - high-resolution double-crystal sagittal focusing
  - 1st crystal, Si(220), liquid-nitrogen cooled
  - 2nd crystal, Si(220), 10 mm wide (stabilized at 25°C, sagittally bent)
  - 7:1 demagnification
  - 6.5°–38° Bragg angle range
  - 35 mm beam offset (nominal)
  - motorized tune, twist, & roll control (4 mm range, 50 nm resolution)
- Rosenbaum-Rock monochromator #2
  - 1st crystal, Si(111), liquid-nitrogen cooled
  - 2nd crystal, Si(111), 10 mm wide, (stabilized at 25°C, sagittally bent)
  - 7:1 demagnification
  - 6.5°–38° Bragg angle range
  - 35 mm beam offset (nominal)
  - motorized tune, twist, & roll control (4 mm range, 50 nm resolution)
- Rosenbaum-Rock vertical focusing mirror
  - 11:1 demagnification
  - Zerodur plane mirror substrate
  - 1020 mm x 100 mm x 38 mm
  - 2 Å rms roughness
  - 1 µrad surface figure error
  - Pt, none, Pd coating stripes (35 mm wide ea.)
  - two motorized, encoded supports for angle and height adjustments
  - dynamic, independent bending mechanism at both ends
  - aberration correction via elliptical bending

## Experiment Stations

### 19-ID-A

- white beam first optics enclosure

### 19-ID-C

- white beam optics enclosure

### 19-ID-D

- monochromatic experiment station
- kappa goniostat for macromolecular crystallography

## 19-ID-D cont'd

- guard slits
- filter/shutter
- detector support and positioner

## Detectors

- SBC2 3k x 3k CCD
  - built by ANL-ECT
  - 210 mm x 210 mm active area
  - 1.8 sec readout

## Beamline Controls and Data Acquisition

- Multiprocessor SG1 workstation, plus two UNIX workstations for data acquisition
- Three HP workstations running EPICS, VME for beamline and detector control
- PMAC motor controller, software by ANL-ECT
- GUI for beamline control & data acquisition, detector control by ANL-ECT

## Beamline Support Equipment/Facilities

- Rosenbaum-Rock miniaturized kappa goniostat
- high-magnification alignment cameras (two)
- Rosenbaum-Rock high-precision detector support and positioner
- liquid-nitrogen cryosystem sample cooler

## Insertion Device Source Characteristics (nominal)

|  |  |
|--|--|
| source   | Undulator A  |
| period   | 3.30 cm  |
| length   | 2.47 m   |
| effective $K_{\max}$<br>(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<br>at 6.5 keV                      | $9.6 \times 10^{18}$<br>ph/sec/mrad <sup>2</sup> /mm <sup>2</sup> /0.1% bw |
| source size at 8.0 keV<br>$\sum_x$<br>$\sum_y$             | 359 µm<br>21 µm  |
| source divergence at 8.0 keV<br>$\sum_{x'}$<br>$\sum_{y'}$ | 24 µrad<br>6.9 µrad  |