

BL26B1/B2 RIKEN Structural Genomics I&II

BL26B1 & B2 have been developed as RIKEN Structural Genomics Beamline I & II for high throughput protein crystallography (HTPX). The function of the beamline is to collect diffraction data of a large number of protein crystals for structural analysis. In the experimental hutch, an automatic sample changer developed at BL26 is installed to improve the throughput of the experiment. Cooperating with the sample changer, the beamline scheduling software executes the successive data collections without any user intervention. The beamline design is based on the SPring-8 standard optics for the bending magnet, which is simple and remote controllable. Two type X-ray detectors (IP and CCD) can be automatically switched according to the experimental schedule.

Area of research

Structural genomics research based on single crystal X-ray diffraction

Keywords

Scientific field

Structure biology, High throughput, Biological crystallography, MAD

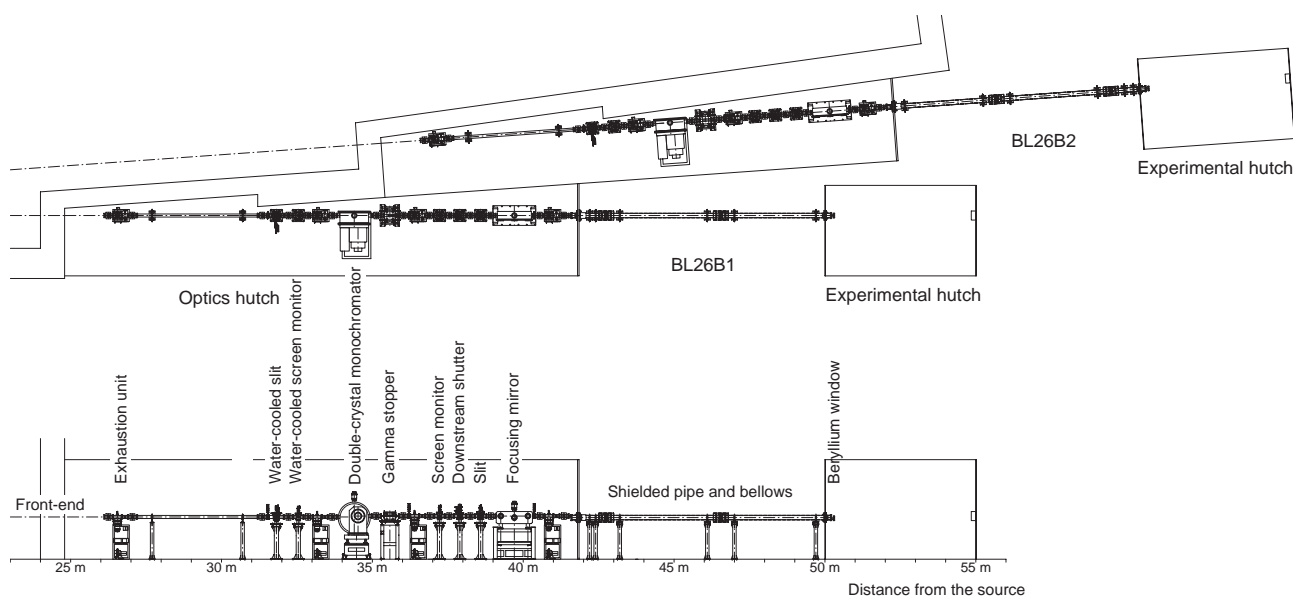
Equipment

Mosaic CCD, Imaging plate, Sample changer, Automatic operation

Source and optics

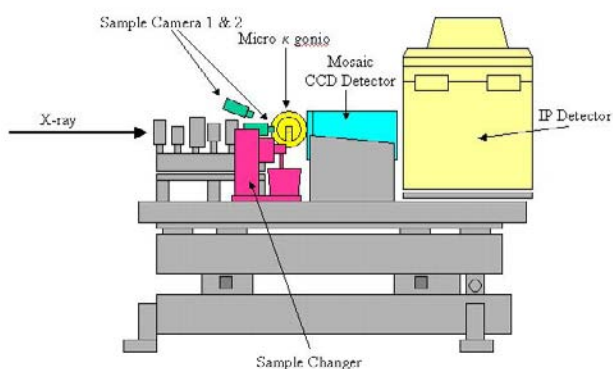
The optics of the beamline consists of standard bending magnet components. A fixed exit Si double crystal monochromator followed by a two dimensional focusing mirror is installed in the optics hutch. A fin-cooling system with the circulation of chiller water is adopted for the first crystal of the monochromator. Available energy range is from 6 to 17 keV that is suitable for MAD experiment using anomalous scattering of heavy atoms. The design of the

mirror is the vertically bent cylinder of 1 meter length and glancing in downward direction. The mirror focuses the beam at the experimental hutch with the glancing angle of 3.7 mrad. The surface is Rh-coated for cutting off the high-energy components. The energy resolution of the monochromatic X-ray is 10^{-4} and the photon flux at the sample position is 10^{11} photons/sec at 12 keV monochromatic.



Schematic view of beamlines

Experimental stations



Schematic view of equipments in experimental hutch

Experimental stage

The experimental stage is the base of the optics equipments such as 4-blade slits, 10 kinds of selectable absorbers, shutter unit, and sample goniometer as well as CCD and IP detectors. All axes are remote controllable so that the operating software is able to carry out the optics tuning and detector switching automatically.



Experimental stage

Goniometer

The κ goniometer having a compact design allows changing crystal orientation for effective data collection. The smallest camera distance available is 140 and 175 mm for CCD and IP detectors, respectively.



Micro κ goniometer

Sample changer

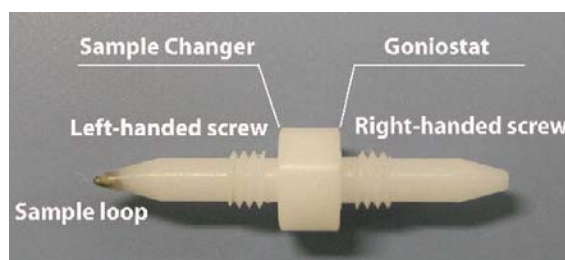
The automatic sample changing system is the key component of the HTPX. The system consists of the sample changer robot, XY stage for sample tray, and LN₂ supplying system. The system is customized to use the specially designed sample pins and sample tray developed at BL26.



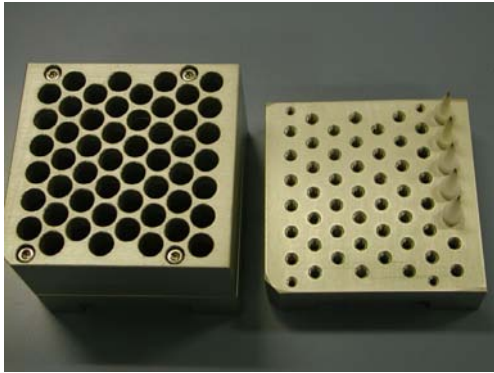
Sample pick up position



Sample mount position

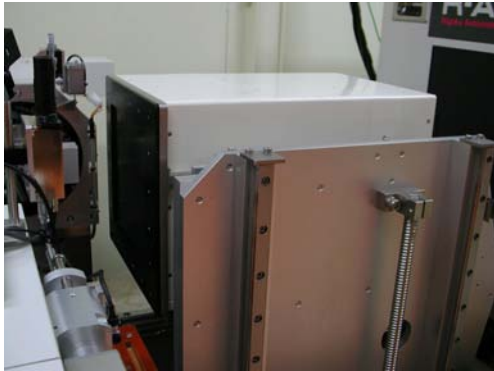


Sample pin



Sample tray

Detectors



2 × 2 mosaic CCD detector

Product : Jupiter210 (RIGAKU/MSC)

Aperture : $210 \times 210 \text{ mm}^2$

Pixel dimension : 4096×4096

Pixel size : $51.3 \mu\text{m}$

Readout : 180 images/hour



Imaging plate detector

Product : R-AXIS V (RIGAKU/MSC)

Aperture : $400 \times 400 \text{ mm}^2$

Pixel dimension : 4000×4000

Pixel size : $100 \mu\text{m}$

Readout : 60 images/hour

Other facilities

Cryostat

Continuous cold stream of nitrogen generated from atmosphere. The temperature range is 90 to 300K.

Si PIN photodiode detector for XAFS measurement

Multi-channel analyzer for fluorescence measurement

Automatic absorber selection software with the remote controllable attenuator unit

Automatic loop-centering software

Data processing software

CrystalClear (RIGAKU/MSC), HKL2000 (HKL Research, Inc.)

Contact information

Masaki YAMAMOTO

SPring-8 / RIKEN

1-1-1 Kouto, Mikazuki-cho, Sayo-gun, Hyogo 679-5148

Phone : +81-(0)791-58-2809

Fax : +81-(0)791-58-2807

e-mail : yamamoto@postman.riken.go.jp