

# Wide Range X-ray Diffraction Station BL40B2

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## 1. Introduction

We have started construction on a new beamline BL40B2 in the D zone of SPring-8 for structure biology. The idea for the beamline was basically proposed by Professor Yoji Inoko of Osaka University and his macromolecular small angle X-ray scattering group. The beamline committee of JASRI approved the construction while mentioning the importance of supplying protein crystallography capabilities. Strong efforts were made in drawing the blue prints for the beam line optics and X-ray protection hatches, especially by Dr. Shunji Goto and Dr. Kunikazu Takeshita of JASRI [1]. This paper presents the current status of the experimental station for BL40B2.

## 2. Basic Concepts for Experiments

The propose of the beamline in the area of small-angle scattering is to record the monochromatic scattering from non-crystalline biological materials using a tunable beam with wide ranges for the resolution and X-ray energy. For protein crystallography, the purpose of the beamline is to collect monochromatic data for routine macromolecular structure analysis. To facilitate energy changes, beam alignment, and sample set up, all R & D issues have been removed.

## 3. Beam Supplied to the Experimental Station

The location of BL40B2 is in the D2 zone of the SPring-8 storage ring. The light source is a B2 type

bending magnet that has its magnetic field at 0.679 T and critical energy at 28.9 keV. The white X-ray generated by the bending magnet is introduced into the optical system including a fixed-exit double crystal monochromator and bent cylinder mirror.

According to calculations by Dr. Goto, the optimal glancing angle is 3.2 mrad at a distance of 38,015 mm between the light source and the mirror and in an energy range from 5 keV to 20 keV. The expected photon flux is approximately 1012 ph/s in 0.1 % b.w. at 20 keV. The expected energy resolution is 10-4 ( $\Delta E/E$ ). The optics and experimental facilities have been made X-ray proof by Pb sealed hatches.

## 4. Experimental Station

The experimental station has two experiment modes including the SX mode and PX mode. In the both modes, common detector is an imaging plate area detector, Rigaku R-AXIS IV. In the SX mode, the X-ray beam is orthopediated by an extra quadrant slit in the beamline optics and excess scattering is removed by the quadrant slit in the experimental station. Two fixed length vacuum paths allow camera lengths of 400 mm and 1000 mm. In the PX mode, an inverted geometry goniometer is installed to allow some free space around the crystal.

## References

- [1] S. Goto *et al.*, J. Synchrotron Rad. 5 (1998) 1202.

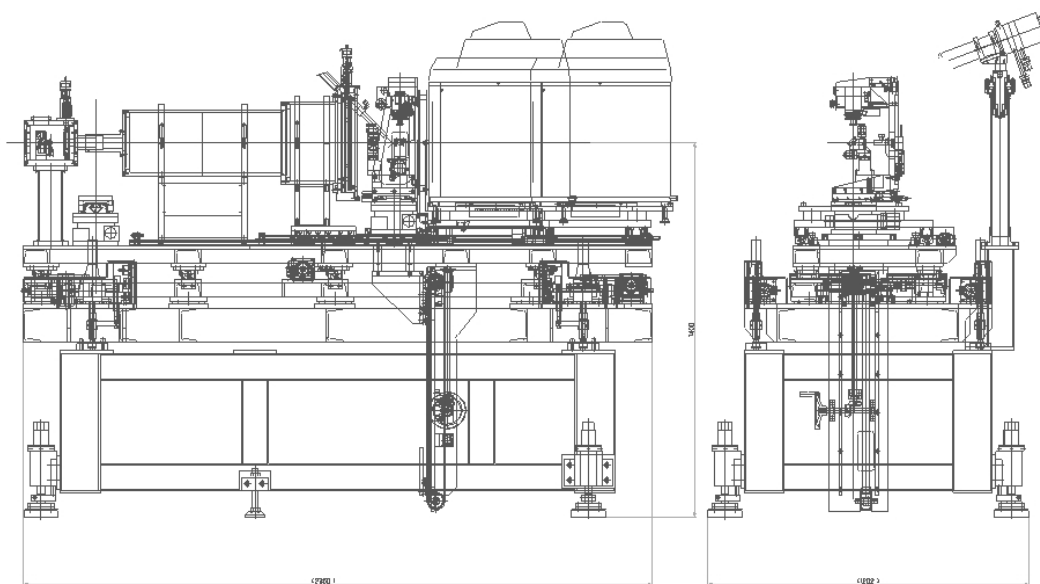


Fig.1. Experimental station at BL40B2 in PX mode.