

High Energy Inelastic Scattering (BL08W)

1. Introduction

The BL08W beamline has been constructed for high energy inelastic scattering experiments (Compton scattering). In such experiments, a photon energy higher than 100 keV is utilized. For these experiments involving materials containing 3d elements, 4d elements, and actinides systems, the high energy photons are very suitable.

A wiggler was chosen as the high energy photon sources. This insertion device produces circular and linearly polarized X-rays. To date experiments have been performed for a gap wider than 30 mm. The gap, however, will be narrowed to 25 mm by January 1999.

2. Beamline Design and Present Status

This beamline has one optics hutch and two experimental hutches. The schematic layout of the beamline is shown in Fig. 1. In the optics hutch, a 300 keV monochromator and a 60 - 100 keV monochromator were installed. Both monochromators were designed for a single crystal arrangement.

The 60 - 100 keV monochromator is of the doubly-bent type with used the Si(400) reflection. Monochromatized X-rays are introduced to hutch B. Estimations are made by measuring the XANES spectra around the Uranium K-edge. The energy resolution is $\Delta E/E = 1.25 \times 10^{-3}$ at 115 keV. The photon flux is 10^{12} photons/sec.

An asymmetric Johann type monochromator is employed for the 300 keV monochromator. Si(771) reflection is used with an asymmetric angle of about one degree to make the crystal length smaller and to direct the focal point forward. The relative energy resolution of monochromatized X-rays is determined

by the energy spectrum of elastically scattered X-rays detected by a Ge SSD; it has been found to be 1.48×10^{-3} . The photon flux is 10^9 photons/sec. The degree of circular polarization P_c is 0.78 for 274 keV X-rays emitted from a wiggler with parameters $k_x = 0.6$ and $k_y = 11.2$. The value of P_c determined from magnetic Compton effect on Fe.

In the hutch A, some magnetic Compton scattering measurements have been carried out. This hutch is equipped with a superconducting magnet (see Fig. 2). It is possible to change the external magnetic field up to ± 3 T at a frequency of 0.2 Hz. The temperature of a sample can be changed from 9 K to room temperature.

In the hutch B, the measurement system of the high resolution Compton scattering was installed. This system was supposed to consist of a Chousias type spectrometer and microstrip Ge detector; We do not have the microstrip Ge detector. In the future, Compton profiles will be able to be measured in this system, which has a momentum resolution of less than 0.1 a.u..

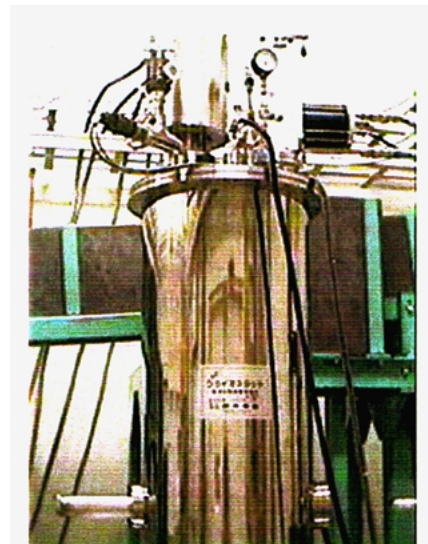


Fig.2. The picture of superconducting magnet.

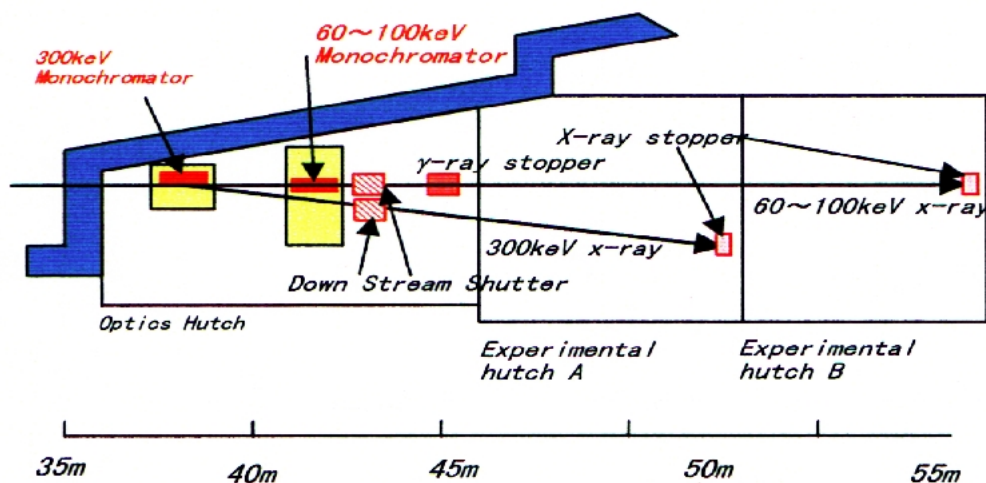


Fig.1. Schematic layout of BL08W.