

BL practice at BL25SU

09/01/2007, ver.1, T.Nakamura

Time schedule

- 9:00- Introduction of beamline design and major scientific activities.
- 10:00- Sample preparation and introduction to the load lock chamber.
- 10:30- Introduction of the helicity switching and MCD data acquisition techniques.
- 11:30- Measurement of beam properties under helicity switching in the 1 Hz mode.
- 12:30- ----- Lunch -----
- 13:30- MCD measurements (Spectra and hysteresis loops). I propose including time for exchange of scientific interests and discussion on some technical subjects during the measurements.
- 16:00- Up to participant's interests and requests.
- 17:00 Close

Outline of BL25SU

BL25SU is designed for research on electronic structures, magnetic states and surface structures of solids with high energy-resolution circularly-polarized soft x-rays. Left- and right-handed circularly polarized radiation is obtained along the same optical axis by twin helical undulators. The helicity of the circularly polarized radiation can be periodically switched at 0.1, 1 or 10 Hz by using kicker magnets distributed around the two undulators. The beamline monochromator is a constant deviation type with varied line-spacing plane gratings covering the energy region of 0.22 ~ 2 keV. The resolving power of the monochromator is more than 10,000 over the whole energy region.

Four kinds of spectroscopic techniques are available for public use: **high energy-resolution photoemission spectroscopy, magnetic circular dichroism of core absorption, two-dimensional angular distributions of photoelectrons, photoelectron emission microscope**. Measurements are performed in ultra high vacuum conditions down to 10^{-8} Pa.

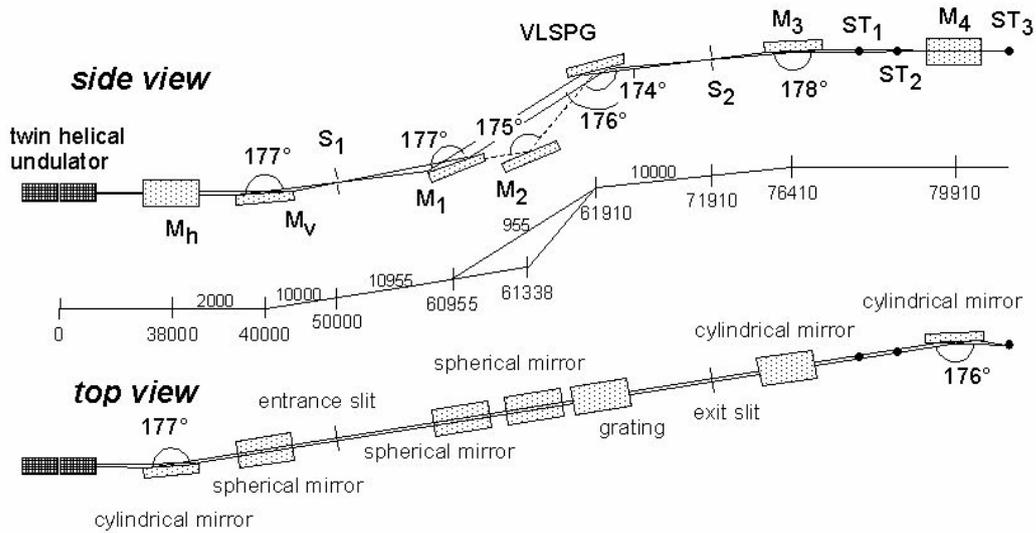


Fig.1 Layouts of beamline optics at BL25SU. MCD apparatus is installed as a station-4 (ST₄) downstream of the ST₃.

X-ray magnetic circular dichroism

Magnetic circular dichroism (MCD) of soft x-ray absorption is a powerful tool to study magnetic and electronic states of ferromagnetic and ferrimagnetic materials. At BL25SU, helicity switching of circularly polarized radiation from the twin helical undulators is used for MCD measurements. Two absorption spectra are measured with one energy scan, switching the helicity at each energy point. The helicity-switching method is effective for precise measurements. The switching frequency is currently 1 Hz.

Samples are magnetized by a water-cooled type electromagnet equipped with double yokes. The electromagnet generates a variable magnetic field up to 1.9 T at the sample position. The sample temperature can be controlled from 10 K to 300 K, or from 300 K to 550 K. Absorption intensity is measured by means of the total electron yield. When combined with the helicity switching technique, the apparatus enables element-specific magnetic hysteresis (ESMH) measurements.