

2. Status of Beamline BL07LSU at the SPring-8

Two permanent staffs and an adjunct at the Harima branch have been devoted to activities for upgrading the University-of-Tokyo Synchrotron Radiation Outstation Beamline (SPring-8 BL07LSU) and for supporting frontier spectroscopy experiments by users.

In 2010, four figure-8 undulators of the vertically linear-polarization type were constructed and they were installed in the SPring-8 storage ring with the existing four figure-8 undulators of the horizontally linear-polarization type. The soft X-ray long undulator of BL07LSU is, at present, composed of two types of the undulator segments, arranged alternately and connected with the phase shifters. The long undulator follows the concept of “the crossed undulator[1]” and it is designed to emit soft x-ray light of various polarizations with the possible fast switching.

Through adjustment of the insertion device and the beamline monochromator, the soft x-ray beam covers the photon energy range of 250~2000 eV with the high energy resolving power ($E/\Delta E > 10^4$), the high photon flux ($>10^{12}$ photons/s/0.01 % B.W.), the spot size smaller than 10 μm with the focusing mirrors, and the linear polarizations better than 97% along the vertical and horizontal axes[2].



Fig.1 Eight figure-8 undulators in the SPring-8 storage ring



Fig.2 Arrangement of magnets in the figure-8 undulator of the vertically linear-polarization type.

At the beamline, four endstations were developed to realize advanced spectroscopy experiments.

(1) Time-Resolved soft X-ray spectroscopy station (TR-SX spectroscopy)

The station is to make time-resolved photoemission spectroscopy experiments by synchronizing the high-brilliant soft x-ray and the ultra-short laser pulses. A new type of the electron spectrometer, the two-dimensional angle-resolved time-of-flight analyzer, has also been developed.

(2) 3D-scanning photoelectron microscope (3D nano-ESCA)

The station enables angle-resolved photoemission spectroscopy measurements with a nanobeam, created by zone-plates. The spot size is smaller than 100nm.

(3) Ultra high-resolution soft X-ray emission spectroscopy (HORNET)

The station is for soft X-ray emission spectroscopy measurements with the ultra high-resolution ($E/\Delta E > 10^4$) and under various environmental conditions (gas, liquid and solid).

(4) Free-port station

The station is equipped with the focusing mirror chamber which can be connected to any experimental chamber. The station has been opened for users with their own machines. In 2009, development of the wide angle-range photoemission spectrometer and experiment of the coherence were performed.

References:

- [1] K.J. Kim, Nucl. Instr. and Meth. A **219**, 425 (1984).
- [2] Y. Senba, S. Yamamoto, H. Ohashi, I. Matsuda, M. Fujisawa, A. Harasawa, T. Okuda, S. Takahashi, N. Nariyama, T. Matsushita, T. Ohata, Y. Furukawa, T. Tanaka, K. Takeshita, S. Goto, H. Kitamura, A. Kakizaki and M. Oshima, Nucl. Instr. and Meth. A, in print.