

Polarimeter for BL07LSU

Masami Fujisawa*, Iwao Matsuda*

*Synchrotron Radiation Laboratory, The Institute for Solid State Physics, The University of Tokyo

Introduction

A polarization-controlled soft X-ray undulator is equipped at a soft X-ray beamline BL07LSU at the Spring8. It is composed of four segments of horizontally polarized and four segments of vertically polarized Figure-8 undulators, being in line alternatively [1], and seven phase shifters for matching the phases of the eight undulators. Elliptical and 45 degrees linear polarization is obtained by superposing horizontal and vertical linear polarization. The degree of polarization depends on the amount of the phase shift. It is important to measure the degree of polarization. Then a simple and exclusive polarimeter is prepared for recognizing the degree of polarization. In this article, we describe the outline of the polarimeter for BL07LSU.

Outline of the polarimeter

Our polarimeter adopts a rotating (reflection type) analyzer method, being ordinary in soft X-ray region. A degree of polarization is obtained by analyzing a reflectivity curve of a multilayer analyzer with azimuth angle scanning. Our polarimeter may be said to be a reflectometer for multilayer analyzer, being a part of a full-scale polarization analyzer [2]. Figure 1 shows the photograph of the polarimeter. All mechanism is fixed on an ICF253 and can be installed in the pipe with an inner diameter of 200mm. Five multilayers can be exchanged without breaking vacuum. Technical data of the polarimeter are summarised in Table1.

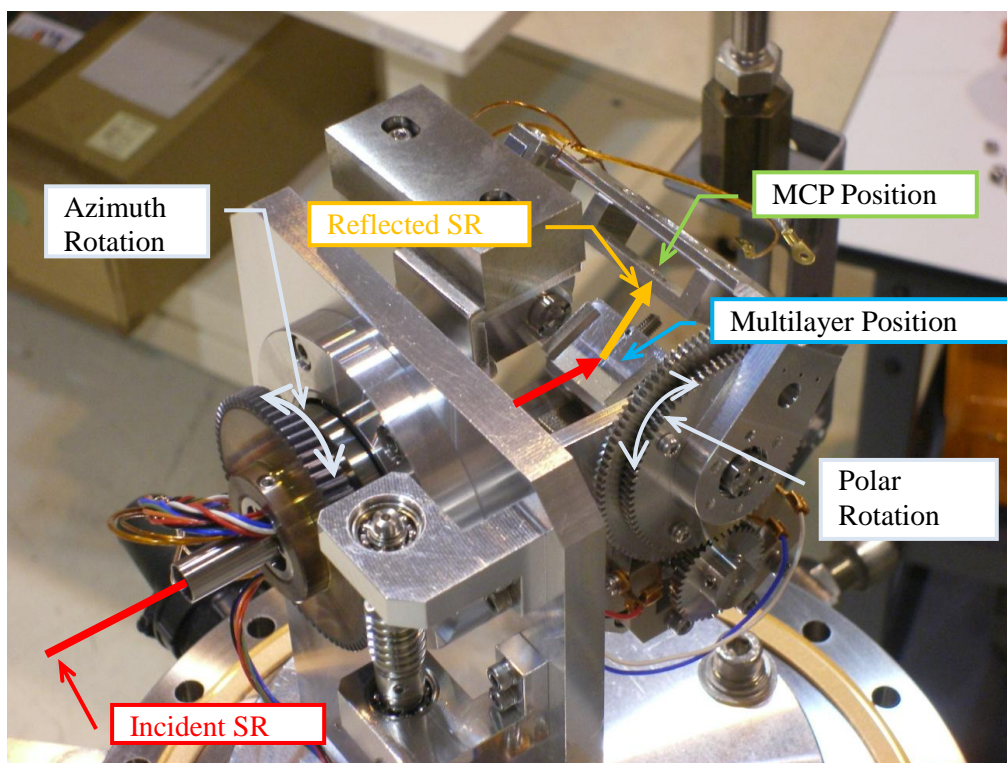


Figure 1 Photograph of the polarimeter

Table 1: Technical data of the polarimeter

Azimuth angle range:	-20 to 380[deg.]
Polar angle range:	-5 to 60[deg.] (=glancing angle)
Detector:	MCP F4655 (Hamamatsu Photonics Corporation)
Electrometer:	8252(ADC Corporation)
Software language for data acquisition:	Visual Basic 2008 on Windows Vista™
Multilayer analyzer:	Material: W/B4C(ratio 0.4/0.6),
	Number of layers=100
	#1: Period=2.99[nm] for hw=300[eV]
	#2: Period=1.19[nm] for hw=720[eV]
	(NTT AT Corporation)

Example

Figure 2 shows the reflection curve of the multilayer analyzer #1 in the Table 1 with azimuth angle scanning. The glancing angle is 44.9[deg.]. SR of 300eV is obtained by four segments of horizontal polarized Figure-8 undulators with proper phase shifters and VLS-PGM [3]. The degree of horizontal linear polarization is obtained by fitting based on Malus's Law under some assumptions. Details are reported at the Activity Report of Synchrotron Radiation Laboratory 2011.

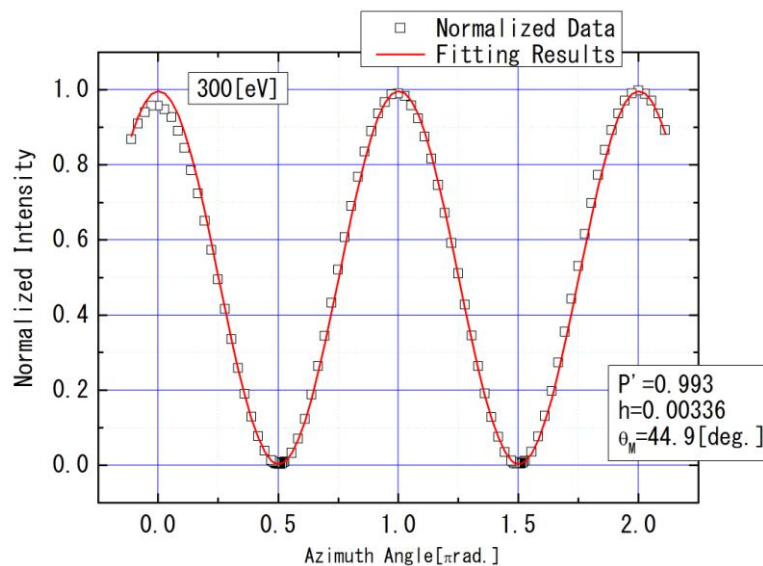


Figure 2 Reflection curve of multilayer with azimuth rotation.

References

- [1] T. Tanaka and H. Kitamura, Nucl. Instrum. Methods Phys. Res. A, 490(2002)583.
- [2] H. Kimura, et al., Proc. 8th International conference on SRI, AIP Conference Proceedings 705, 537(2004)
- [3] Activity Report of Synchrotron Radiation Laboratory 2009.