RIKEN SR Physics (BL19LXU)

1. Introduction

19LXU is an x-ray beamline for the SPring-8 Long Undulator Source 1 (SLUS1). The beamline is mainly exploited to develop coherence-related x-ray applications toward x-ray free electron laser (XFEL) utilization. The construction project for the beamline was commenced in 1998 as a shorter beamline accommodated within the experimental hall of SPring-8. In 1999, the beamline extension program was approved to prevent possible interference between end station equipment and the storage ring. Design works for the extension were performed. The factory manufacture of beamline components for the shorter section was also carried out.

2. Beamline Optics and Experimental Station Equipment

The total length of the undulator magnet is 25 m with a magnetic period of 32 mm. The total radiation power of the undulator reaches 35 kW. Since most of the radiation power is removed in the FE section, we designed a beamline structure based on a SPring-8 standard undulator beamline (Fig. 1). Monochromator mechanism and transport-channel (TC) components are SPring-8 standard types [1-2]. The beamline equips one optics hutch (OH) and four experimental hutches (EH1-4). OH and EH1-3 are connected in tandem. EH4 is located in an extension building around 130 m from the source. X-rays are transported from EH3 to EH4 along 51 m through Pb-shielded vacuum ducts. The TC including these ducts are evacuated with SPring-8 standard exhaustion units with turbo-molecular pumps and scroll pumps.

For EH1, a multi-axis precision diffractometer [3] is installed. A femto-second laser system, a streak camera system and a precise diffractometer are equipped for EH2. The control system for EH1 and EH2 is compatible with that of BL29XU [4]. EH3 is an open hutch for installing large equipment, such as vacuum chambers or cryostats. EH4 is equipped with a 15-T super conducting magnet with vertical magnetic field, a multi-axis diffractometer, and a crystal phase retarder [5]. Since the station is located far from the storage ring, the leak magnetic field of the 15-T magnet does not influence the orbital electrons in the storage ring. For the experimental control system of EH3 and EH4, we plan to use spec.

References

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[2] S. Goto *et al.*, J. Synchrotron Rad. **5** (1998) 1187.
[3] T. Ishikawa *et al.*, Rev. Sci. Instrum. **63** (1992) 1015.
[4] K. Tamasaku *et al.*, in this volume.
[5] M. Suzuki *et al.*, Jpn. J. Appl. Phys. **37** (1998) L1488.

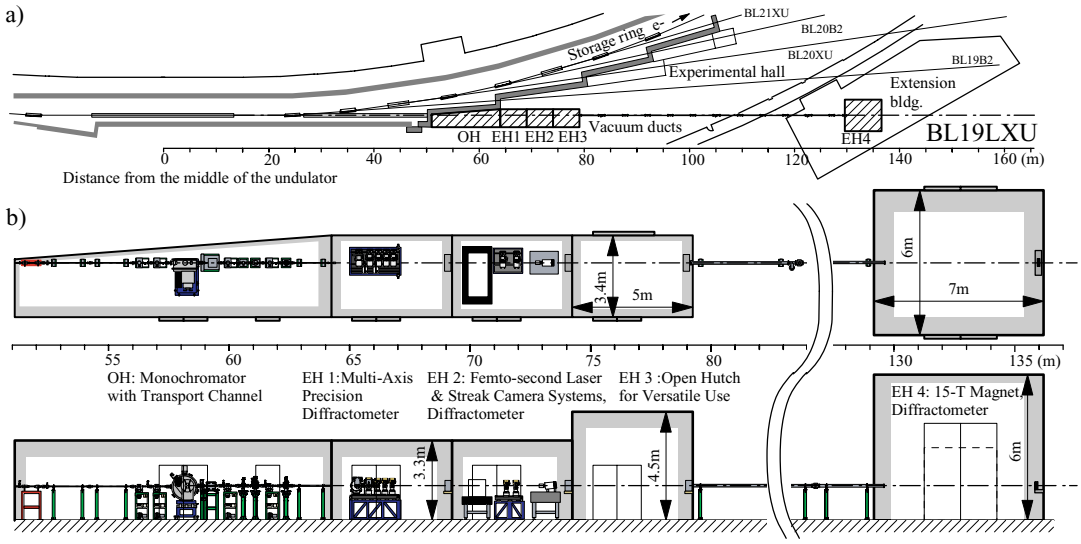

Fig. 1. Beamline location (a) and layout (b).

Light source	
Light source	25-m long X-ray in-vacuum undulator
Brilliance	8.2×10^{20} photons/sec/mm^2/mrad^2 in 0.1%b.w.
Energy range	7.4-18.5 keV (1st harmonics)
	22 - 45 keV (3rd harmonics)

X-rays at sample
~10^{14} photons/sec with Si 111 monochromator

Facilities in Experimental Station
EH1: A multi-axis precision diffractometer
EH2: A femto-second laser system, a streak camera system, a precise diffractometer
EH3: Open hutch
EH4: A 15-T super conducting magnet, a multi-axis diffractometer, a phase retarder