

BL45XU (RIKEN Structural Biology I)

BL45XU is equipped with vertical tandem undulators consisting of two stations: small-angle X-ray scattering (SAXS) and small- and wide-angle X-ray scattering and diffraction (SWAXS/D). Both can be independently operated. The beamline was constructed in 1997 originally for SAXS^[1] and protein crystallography (PX). From FY2008 the PX station changed to the SWAXS/D station. The SWAXS/D station was used to develop new equipment and methods by in-house staff^[2]. Hence, the SAXS station was utilized only for user operations, including SWAXS/D users. The usable energy range of X-rays in the beamline is from 7 keV to 13 keV. The energy is typically fixed around 12.4 keV. The photon flux at the SAXS station is $\sim 3 \times 10^{12}$ photons/s, and the beam size is 300 (h) $\mu\text{m} \times 150$ (v) μm . The camera length can be changed from 0.2 m to 3.5 m. From FY2012 to FY2016, we upgraded the utility of the SAXS station with support by Platform for Drug Discovery, Information, and Structural Life Science (PDIS) from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan. The PILATUS 3X 2M detector was installed first. Station control GUI software, including the data processing program, was upgraded. Then an in-vacuum flow cell and online FPLC system were developed. Afterward, a sample changer was installed. Since FY2017, the Basis for Supporting Innovative Drug Discovery and Life Science Research (BINDS) has supported an upgrade to the Bio-SAXS equipment as well as academic and industrial biological scientists. In FY2018, the introduction of the online FPLC system had

contributed to the sophistication of user experiments, and a guard pinhole was installed in the front of samples for WAXS/D measurements. Most of the beamtime ($\sim 60\%$) of the SAXS station was allocated to RIKEN projects, 25% was allocated for R&D studies of public user projects, and the remaining 15% was allocated to internal Bio-SAXS users through the BINDS project. RIKEN and public projects include both structural biology and materials science projects^[3-6]. The SAXS and SWAXS/D stations of BL45XU were closed in December 2018 for reconstruction for other purposes.

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