BL32B2
R&D-BM

1. Introduction

BL32B2 is allocated to the R&D beamline for facility-related problems and challenges, which are relevant to a bending-magnet beamline. This beamline was rebuilt and restarted along with two experimental hutches (EH1 and EH2) in FY2018. Thereafter, BL32B2 has undergone the following updates: the replacement of the counter/timer module and the pulse motor-driving system (FY2019), the installation of the flight tube-retracting mechanism in EH1 to facilitate the handling of huge tubes (FY2019), the introduction of SPEC software for instrument control and data acquisition (FY2020), the update of the beamline interlock system (FY2021), the introduction of the MOSTAB system (FY2022), and the installation of the XZ translation stage unit (FY2023).

The optics are composed of transport-channel slits, a double-crystal monochromator, and a pair of total-reflection mirrors. To provide high-energy X-rays, a net plane of a silicon-crystal pair can be switched from Si(111) to Si(311). The type of mirror coating can be selected from platinum or rhodium, depending on the situation. A mirror-bending mechanism is available for vertical focusing, and the cylindrical shunt on the second mirror is used for horizontal focusing. EH1 is dedicated to R&D studies and has dimensions of 5.0 m (W) × 3.0 m (D) × 3.3 m (H). An optical bench is placed inside this hutch. It accommodates two XY carriers and five Y carriers, which can load user test benches. For a computer embedded with user equipment, KVM extenders are laid between the optical bench and the operation console desk. An 8-channel counter/timer module (CT08-01F) can count at rates of up to 300 MHz for FAST NIM and 100 MHz for TTL. Silicon PIN photodiodes, ionization chambers, high-speed transimpedance amplifiers, voltage-to-frequency converters, and high-voltage power supplies are also provided to users. A 16-channel pulse motor controller (PM16C-16HW2) can run all subordinate motors simultaneously. The default setting is 16 Type-II pulse motor driver units. Four Type-I pulse motor driver units can be used if necessary. Motor cables are wired into the hutch and have a TRIM TRIO connector (8P socket plug type) on the motor side. A GPIB instrument control device (GPIB-ENET/1000) intermediates between the SPEC and legacy instrument components. EH2 is now devoted to the RISING3 Project of NEDO and Kyoto University. The beam path in EH1 should be bridged by a wide-bore vacuum flight tube during experiments at EH2, which means that the long-term installation of any equipment in EH1 is prohibited.

2. Recent activities

In 2024, a sample adjustment assistive device was configured with a digital microscope and manual XYZ-axis stages (see Fig. 1). The device can magnify observed objects up to 240 times. This enables users to center a sample with an accuracy equivalent to the eccentricity error of the high-precision rotating stage. An objective lens with a long working distance of 95 mm prevents interference with various accessories around samples. The objective lens is a zoom type and can be reduced to 40x magnification as needed.

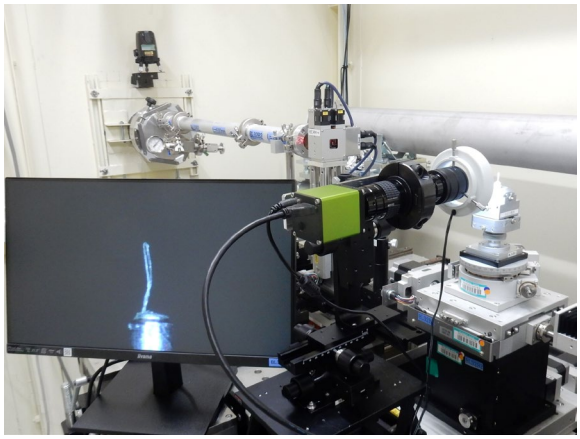

Fig. 1. Appearance of a sample adjustment assistive device installed with manual XYZ-axis stages.

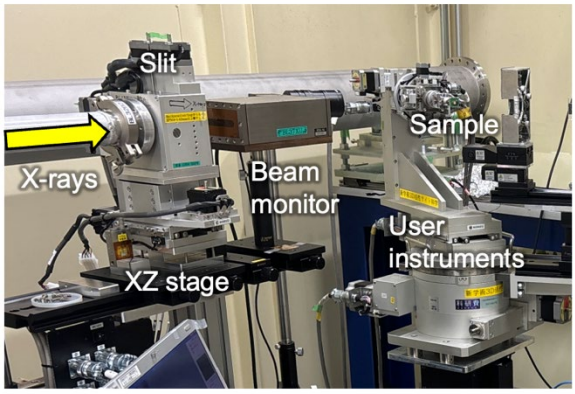

Fig. 2. Typical experimental setup for the public used with a carry-in user's instrument.

Various user experiments were conducted at EH2 for investigations on battery science by NEDO and Kyoto University. Since FY2024, EH1 has been open, in part, for public use. To encourage users to set up a flexible experimental setup, we offer free space for their equipment in the hutch. X-ray fluorescence holography (XFH) users have actively applied for the beamtime opportunities accessible to carry-in instruments (Fig. 2) open to other users. XFH, which is a technique to observe atomic-resolution holograms produced by interference between fluorescence X-rays from the source atom and those scattered by the surrounding atoms, offers an element-specific analysis using the wavelength tunability of synchrotron X-rays and requires a photon-hungry experiment that needs count statistics finer than 0.1%. Dr. Tajiri prepared a dedicated setup for XFH from JASRI. This setup includes a cylindrical bend mirror for X-ray focusing, slits, and an incident beam monitor.

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