MS2-P5 **EMBL beamlines for life-science applications at PETRA III.** Thomas R. Schneider[a], Gleb Bourenkov[a], Michele Cianci[a], Manfred Roessle[a], Dmitri Svergun[a], Florent Cipriani[b], Stefan Fiedler[a], [a]*EMBL ? DESY, Notkestr. 85, 22603 Hamburg, Germany,* [b]*EMBL Grenoble, 6 rue Horowitz, BP 181, 38042 Grenoble Cedex 9, France*
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EMBL Hamburg is in the process of commissioning three beamlines for applications in structural biology at the low-emmittance storage ring PETRA III at DESY in Hamburg (Germany). One beamline is dedicated to small-angle X-ray scattering (SAXS) experiments on macromolecules in solution, while the other two beamlines will provide excellent conditions for macromolecular crystallography (MX). All three beamlines receive synchrotron radiation from U29 undulators and are based on very similar optical schemes comprising a liquid-nitrogen cooled double crystal monochromator with a single pair of adaptive X-ray mirrors in Kirkpatrick-Baez geometry. All three beamlines are tunable. For SAXS applications on beamline P12, a beam with 10^13 photons/sec. into a 60 x 200 µm2 focus (V x H) at a divergence of less than 50 µrad in both directions will allow to collect high-quality data on small volumes with short exposure times. P12 is equipped with a fully-automatic SBS-plate based sample changer which can be controlled remotely and a PILATUS 2M detector. Data collection is controlled by the 'BMS' control software which also links the hardware to a data evaluation pipeline. The crystallographic beamlines offer full tunability extending into the low (down to 4.5 keV on P13) and high (up to 35 keV on P14) energies. P13 operates with moderate focussing and will provide a beamsize of 20 x 30 µm2 with 10^13 photons/sec while P14 will offer micro-focussing conditions with a beamsize of 1 x 4 µm2 at a flux of more than 10^13 photons/sec. Both endstations will allow to handle very small crystals using a mini-kappa equipped standard MD2 diffractometers with horizontally (P13) or vertically (P14) mounted spindle axes. High-capacity / high-speed crystal loading will be achieved with MARVIN six-axis robotic systems. The MX-beamlines are controlled via the mxCube (ESRF) graphical user interface. We shall describe the optical layout, the components used and report results from commissioning and first user experiments.

Keywords: structural biology, synchrotron radiation; automation

MS2-P6 **Structural biology beamlines at the Photon Factory.** Yusuke Yamada,[a] Naohiro Matsugaki,[a] Leonard M.G. Chavas,[a] Masahiko Hiraki,[a] Nobutaka Shimizu,[a] Noriyuki Igarashi,[a] Soichi Wakatsuki[a] [a]*Photon Factory/Structural Biology, Institute of Materials Structure Science, High Energy Accelerator Research Organization*
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At the Photon Factory, the Structural Biology Research Center currently operates five beamlines dedicated to macromolecular crystallography and two beamlines dedicated to small-angle X-ray scattering. The light sources of all five macromolecular crystallography beamlines are insertion devices. The optic for three of the beamlines was designed to provide monochromatic beam of energies from 6 to 17 keV, in an environment ideal for high-throughput crystal screening, data collection and analysis. These beamlines, BL-5A, AR-NW12A[1] and AR-NE3A[2], deliver a measured flux ranging from 3.9×10^{11} to 1.2×10^{12} photons/sec of 12.4 keV photons on the sample. Together with improvements in the automation of the beamline control, notably through the implementation of sample exchange systems and automatic sample centering, a fully automated data collection and processing system was optimized to allow data acquisition of more than 150 data sets per day in a routinely manner. The remaining two beamlines are the ones with short-gap undulators placed in the 2.5 GeV ring. These beamlines dedicated for a diffraction experiment with small-sized crystal (~10 um) with micro-beams in size of 10 ~ 50 um. In addition, BL-1A and BL-17A[3] deliver brilliant lower energy beams at around 6 keV and 4 keV, respectively, ideally optimized for sulphur single-wavelength anomalous dispersion (S-SAD) experiments. In order to facilitate S-SAD experiments at the Photon Factory, technical developments on He substitution, sample mounting are in progress. For small-angle scattering, there are two bending magnet beamlines and we are constructing a new insertion device beamline. In a wide variety of activities in small-angle X-ray scattering (SAXS) including non-biological experiments, a Bio-SAXS activity is steadily increasing. In this presentation, we will present a brief summary of the beamline designs and the challenges facing the new developments, some construction highlights, together with the future of structural biology beamlines at the Photon Factory.

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