MS44 Crystallography in large scale facilities

MS44-05

EMBL@PETRA4 – an integrated facility for structural biology and imaging

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Abstract

As a partner of DESY in the planning towards the fourth generation synchrotron radiation source PETRA IV to be established in Hamburg, EMBL is proposing to contribute an Integrated Facility for Structural Biology and Imaging. The facility will offer both easy-to-use, robust, and remotely accessible measurement services and cutting-edge capabilities for tackling the most challenging experiments. As presently implemented for MX and BioSAXS in EMBL@PETRA3, upstream services supporting the preparation of samples, and downstream services for the analysis and interpretation of experimental data will be offered in an integrated fashion.

The core of the Integrated Facility is proposed to consist of a set of endstations receiving X-ray from three insertion devices implementing a range of functionalities for structural biology and X-ray imaging:

- Static and time-resolved small-angle X-ray scattering (BioSAXS) for biological systems,
- Static and time-resolved macromolecular crystallography (MX),
- Medium resolution high throughput phase-contrast X-ray imaging (HiTT) for biological systems.

The next generation BioSAXS beamline will benefit from PETRA IV beam by shorter data collection times, lower sample consumption and unprecedented time resolution for studying biomolecular dynamics. Furthermore, novel SAXS experiments will become possible to bridge the gap between the synchrotron-based and XFEL studies.

For MX, the increased brilliance of PETRA IV in combination with advanced optics will increase throughput and enable the collection of diffraction data to higher resolution from small and/or less-ordered crystals. The time-scales accessible by time-resolved crystallography will be significantly shortened.

The increased coherence of PETRA IV will revolutionize phase-contrast based X-ray imaging. We will provide X-ray imaging in an operational mode ('HiTT' – High-Throughput Tomography) facilitating its use by a wide user community for answering biological questions. Scale-bridging and correlative imaging will be offered in cooperation with other providers of imaging technologies.