MicroMAX – A flexible macromolecular crystallography beamline at MAX IV with applications in serial and time-resolved crystallography

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MicroMAX at the first 4th generation storage ring [1] is a new beamline providing the macromolecular crystallography field with a new powerful tool. The main applications are serial crystallography, time-resolved science and micro-crystallography.

MicroMAX will have different sample delivery systems for serial crystallography, in particular fixed-target and injector-based systems but will also be flexible to accommodate other setups. MicroMAX will also have a highly automated mode for oscillation data collection similar to the existing BioMAX beamline [2]. The beamline will use the same control system, MXCuBE3, and information management system, ISPyB, as BioMAX. The setup will include a chopper providing short X-ray pulses (down to microseconds) and instrumentation for different time-resolved experiments. The detector stage will host two area detectors including an integrating detector.

The X-ray beam at the sample with 10^{13} photons/second in monochromatic mode (5-25 keV energy range) and up to 10^{15} photons/second using a wider energy bandpass mode (10-13 keV energy range) is fed by a 156-period in-vacuum undulator. The beam focusing will use compound refractive lenses with final focusing by either lenses or mirrors to give a focused beam down to 1 micrometer.

The possibility to combine all these different modes and instrumentation in a flexible way will allow to cater a wide range of experiments in structural biology including methods not yet developed.

MicroMAX will have a laboratory for working with different sample environments and a laboratory for sample preparation. Additional infrastructures including a bio-laboratory and resources for data handling and analysis are shared with other beamlines. The beamline has a second experiment hutch that will be taken in operation at a later stage. It will allow preparation of specialized setups while experiments are done in the first hutch.

X-ray commissioning of MicroMAX is planned to start in 2022 and general user operation in 2023.

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