Serial Crystallography at a 4^{th} Generation Synchrotron Radiation Source: MicroMAX at the MAX IV Laboratory

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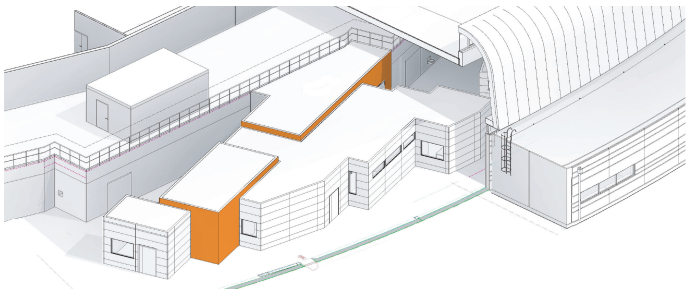
The recently funded MicroMAX beamline will be a serial crystallography facility characterized by high performance and flexibility. The goal is to give optimal performance for collecting optimal data from small and weakly diffracting crystals. This will allow interrogation of the most scientifically rewarding and challenging projects and expand experimental possibilities, including the opportunity to collect time-resolved data with resolution down to the microsecond timescale. Inspired by the recent rapid advancements in serial crystallography, MicroMAX will make it possible to benefit from this profusion of new techniques whilst still permitting traditional single crystal oscillation data collection, when this is deemed the best method.

MicroMAX will benefit from the unique performance of the first multi-bend achromat storage ring [1]. The X-ray beam will be tuneable in both size (1-10 mm) and energy (5-30 keV) whilst offering either a highly monochromatic or a wide bandpass beam, with maximum 10^{13} and 10^{15} photons/second respectively in the two modes. The experimental setup will be highly flexible to allow switching between a variety of different sample delivery systems. Additionally, there will be a high-precision rotation axis goniometer. The experimental setup will utilise a hybrid pixel detector capable of recording data in the microsecond range. The experiment control will be based on the same system developed for BioMAX. The computing and analysis infrastructure will be dimensioned to handle the exceptionally large data volume produced by the experiments foreseen at MicroMAX.

MicroMAX will be the second macromolecular crystallography beamline at MAX IV after the phase one BioMAX beamline, now in user operation. BioMAX is a near microfocus, state-of-the-art-beamline that offers excellent performance for most MX experiments. BioMAX will also be used for the development of sample delivery systems and serial crystallography methodologies with the aim of also allowing scientifically relevant experiments. These developments will be performed in collaboration with other research groups and facilities.

MicroMAX is planned for user operations in 2022. The project is funded by the Novo Nordisk Foundation.



Architect's view of the MicroMAX beamline.

References

[1] P.F. Tavares, S.C. Leemann, M. Sjöström and Å. Andersson, J. Synchrotron Radiat. **21**, 862-877 (2014).