

BioMAX: Trends and developments at a 4th generation Macromolecular Crystallography Beamline

The MAX IV laboratory hosts the first 4th generation storage rings. Currently MAX IV operates two Macromolecular Crystallography (MX) beamlines, BioMAX, and MicroMAX. The BioMAX beamline became operational in 2017. The beam can be focused to $20 \times 5 \mu\text{m}^2$ FWHM with a photon flux of about 5×10^{12} photons/s. Changes of energy between 6 and 24 keV and beam defocusing up to $100 \times 100 \mu\text{m}^2$ are automated. The experimental hutch is equipped with a MD3 microdiffractometer, an IRELEC Isara sample changer and a 16M Eiger detector. Data collection at cryotemperatures can be done fully remotely. BioMAX is a highly versatile beamline, capable of handling a wide array of experimental techniques from conventional oscillation experiments, data collection from small crystals and unit cell, experimental phasing as well as to the state of the art technique of synchrotron serial crystallography (SSX).[1]

Current priorities at BioMAX are influenced by the current trends in Structural Biology, notably the increasing use of Cryo-EM, particularly for large complexes and membrane proteins, the advent of AlphaFold for prediction of accurate models of protein structures and the interest in the study of protein dynamics at room temperature. While maintaining user friendly capacities for de novo phasing, like high speed energy scans and automated SAD and MAD data collection, efforts have concentrated in the development of fully automated “unattended” data collection to handle an increasing demand for fragment based drug discovery projects enabled by the development of the FragMAX platform [2] and industrial beamtime, implementation of in-situ data collection and remote data collection for room temperature experiments, and developing and testing sample delivery instruments and data handling procedures for the new sister beamline MicroMAX a cutting edge beamline specialized in microfocus applications and time-resolved experiments.

Primary author: GONZALEZ, Ana (MAX IV)

Co-authors: AGGARWAL, Swati; AURELIUS, Oskar (MX); BJELČIĆ, Monika; CHENCHILIYAN, Manoop; EGUIRAUN, Mikel; FINKE, Aaron; GORGISYAN, Ishkhan; KROJER, Tobias (BioMAX); JAGUDIN, Elmir; MILAS, Mirko; LI-DON-SIMON, Julio (MAX IV Laboratory); NAN, Jie (MX-group); THUNNISSEN, Marjolein (Lund University); YAZDI, Meghdad; MUELLER, Uwe (HZB); URSBY, Thomas (MAX IV Laboratory)

Presenter: GONZALEZ, Ana (MAX IV)