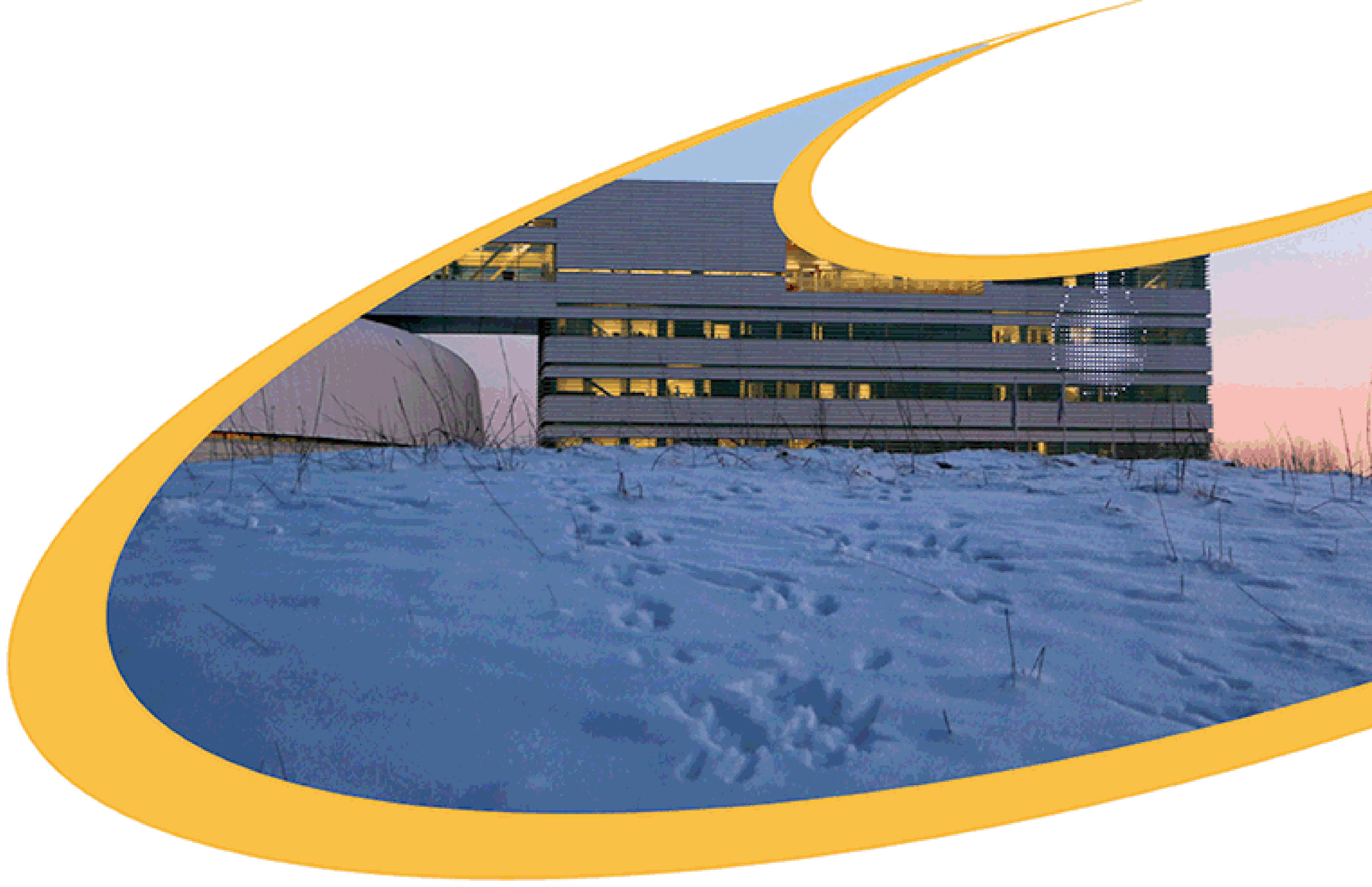
Facility Update



MicroMAX – a new serial crystallography beamline for structural biology

MAX IV Laboratory has received funding from the Novo Nordisk Foundation for MicroMAX, a new structural biology beamline inspired by the recent development of serial crystallography at both FEL and storage ring-based sources.

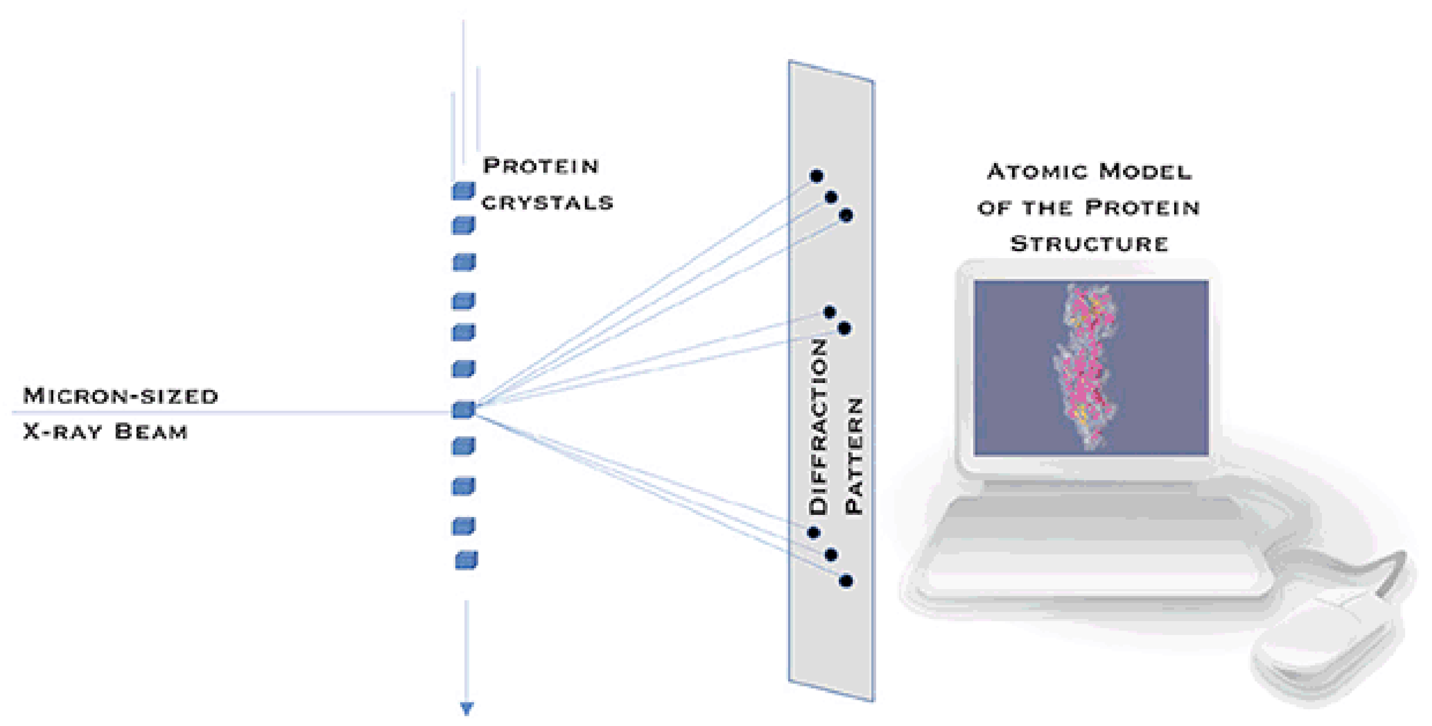
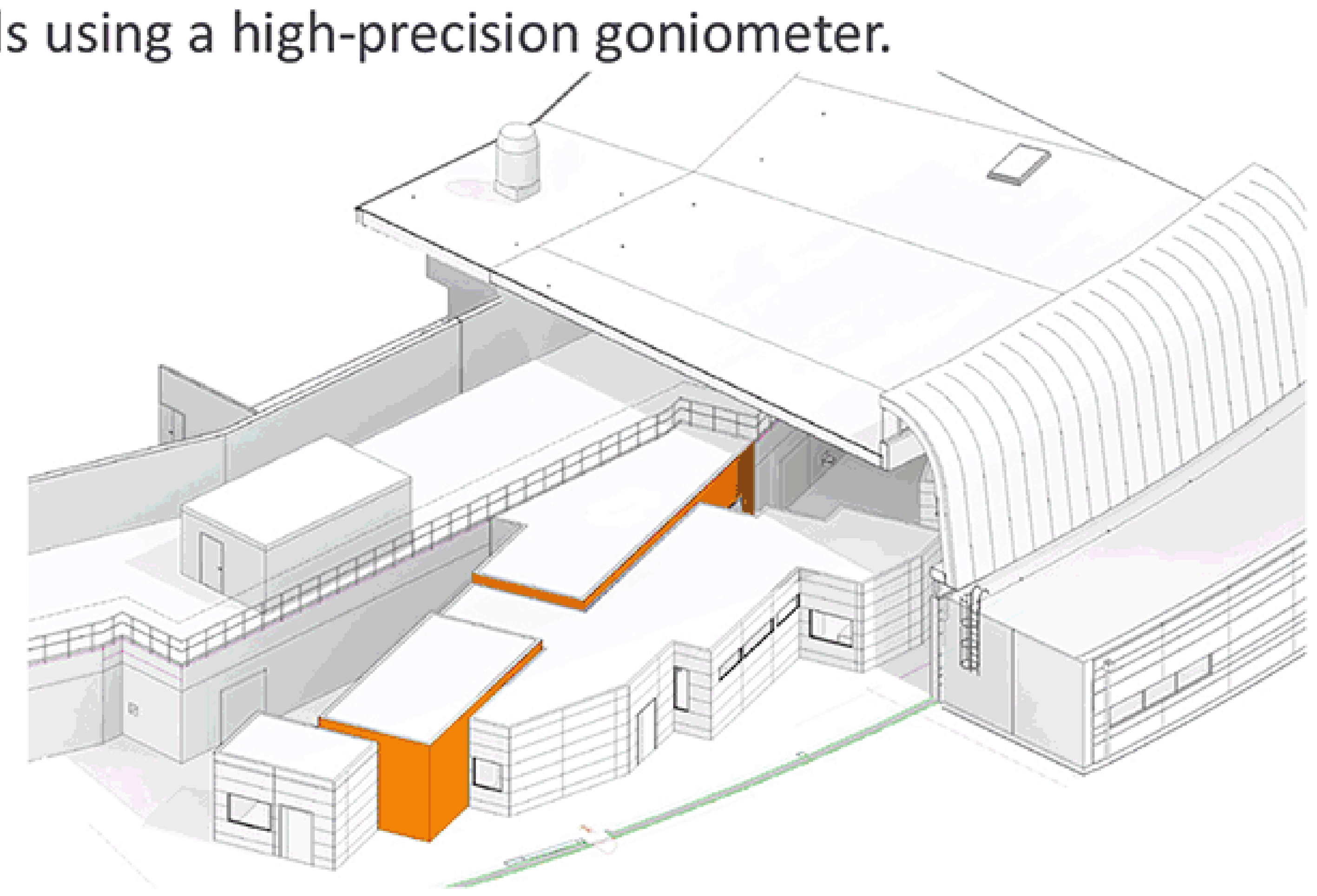


Illustration of a serial crystallography experiment at the MicroMAX beamline. Credit: Thomas Ursby

With the unique performance of the MAX IV Laboratory 3 GeV ring and a design characterized by flexibility MicroMAX will enable studies of the most challenging and scientifically interesting structures with the possibility to also collect time-resolved data down to the microsecond time scale. The X-ray beam will have a focus below one micron with 10^{13} photons/s in monochromatic mode and up to 10^{15} photons/s in wide-bandpass mode. The beam size will be easily tunable in size in the range 1-10 microns and in energy in the range 5-30 keV. MicroMAX will allow easy access to different sample delivery systems including for example jet and fixed target technology but also be prepared for new developments. In addition, it will be possible to collect oscillation data of individually mounted crystals using a high-precision goniometer.

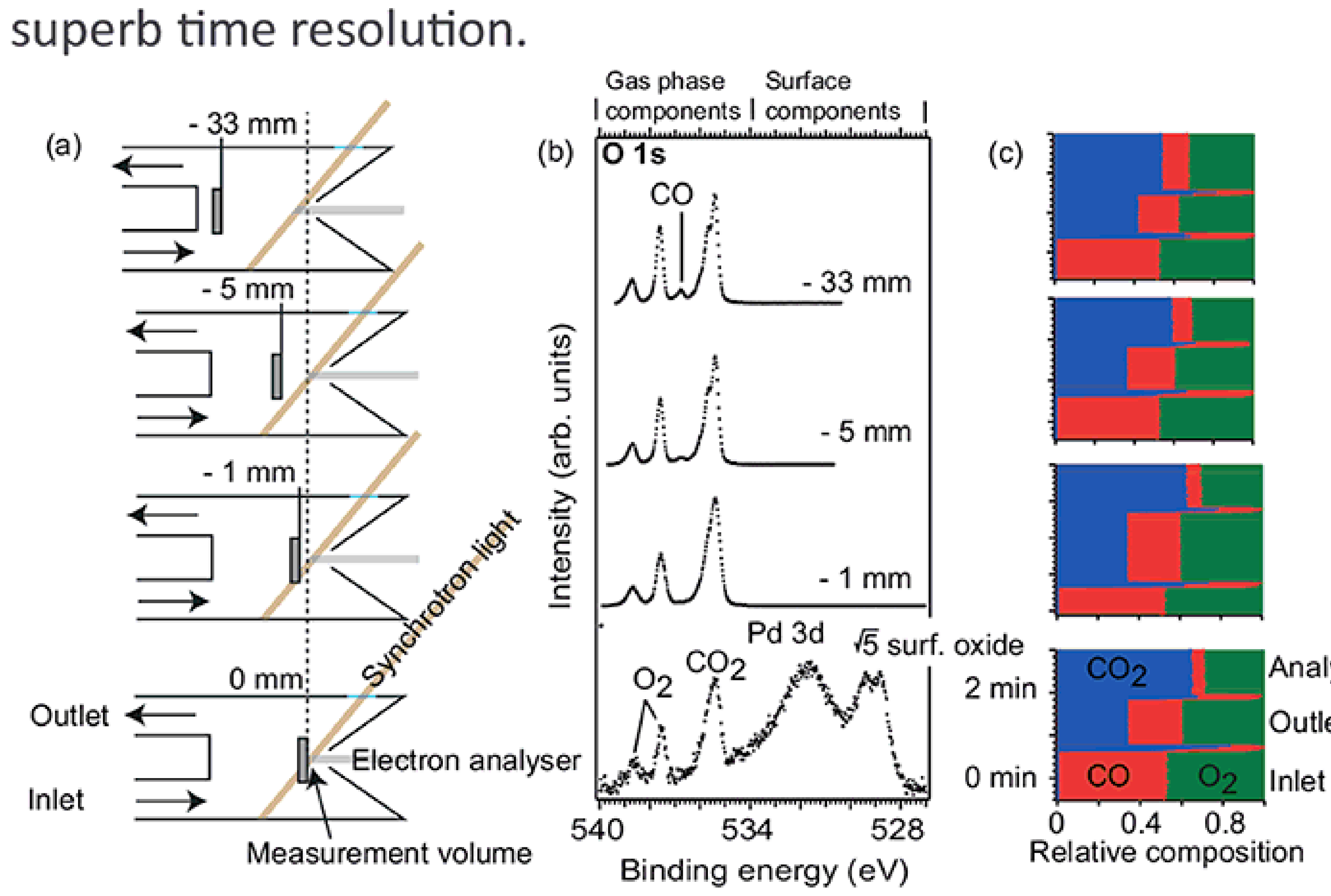


Drawing of the beamline MicroMAX. Credit: Tengbom

HIPPIE welcomes regular users spring 2018

The HIPPIE beamline for ambient pressure x-ray photoelectron spectroscopy (APXPS) is now entering regular user operation, one year after the beamline received its first light. While the first expert users performed experiments at HIPPIE already during 2017, it is in April 2018 that we will welcome the first regular user group.

The beamline offers their users the possibility of doing APXPS experiments at pressures up to 50 mbar. The gas delivery system with computerised flow and pressure control is now operational, with the principal option of mixing up to eight different gases and feeding them into the experiment volume in the form of an ”ambient pressure cell” (AP cell). Vapours can be handled, as well. At the same time as APXPS experiments are performed, the gas composition can be monitored on both the inlet and exit llines of the AP cell and in the first pumping stage of the electron energy analyser, enabling our user to correlate reactivity and surface chemistry. The Scienta Omicron HiPP-3 energy analyser can presently be operated with either a 17 Hz or a 120 Hz MCP/CCD detector, proving the experiments with superb time resolution.



Surface characterisation at HIPPIE. Credit: Tamires Gallo, Virginia Boix and the HIPPIE team

The figure above shows data acquired during an *operando* CO oxidation experiment over a Pd(100) single crystal surface held at 570 K (1.6 mbar total presssure and CO and O_2 flows of 4.8 ml/min). As indicated to the left, the gas composition was probed by APXPS close to the surface and at 1, 5 and 33 mm above the surface. Simultaneously, we used mass spectrometry to probe the composition of the gas flowing through the inlet and pumping outlet of the ambient press cell and of the gas that entered the electron energy analyser. From the bottom APXP spectrum it is seen that a (√5x√5)R27° surface oxide is formed during the CO oxidation reaction. More importantly here, the APXPS data demonstrate clearly that a CO depletion layer is formed that extends very far into the ambient pressure cell.

For news, updates on beamlines and call for proposals please see www.maxiv.se

MAX IV