MAX IV laboratory in Lund, Sweden:  
research portfolio, present status and expected performance

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MAX IV Laboratory is a Swedish national laboratory providing bright x-ray beams for research in various fields. It operates two storage rings with 3 GeV and 1.5 GeV electron beam energy serving, correspondingly, hard and soft x-ray techniques. Additionally, the linear accelerator feeding the storage rings will also provide x-rays to the Short Pulse Facility for time resolved experiments.

The MAX IV 3 GeV storage ring is based on an original multibend achromat lattice for storing electron beam of ~300 pm·rad horizontal emittance. The generated x-ray beams have small linear and angular source size and thus high brightness and high degree of spatial coherence. These properties are essential for obtaining extreme focusing and enabling various innovative imaging and scattering techniques.

The MAX IV 1.5 GeV storage ring is based on a compact double-bend achromat lattice for the production of bright soft x-ray and UV radiation. This storage ring mainly serves beamlines with a variety of photoemission micro-spectroscopy techniques.

Presently, there are 16 beamline projects funded by either Swedish national funding agencies (Swedish Research Council (VR), VINNOVA, Knut and Alice Wallenberg Foundation, Swedish research universities) or international partners. These beamlines were proposed by the research community built around MAXlab – the predecessor laboratory operational in 1987–2015. Several beamlines have already entered the user operation, whereas others are in commissioning, assembly or design phase. The beamline portfolio is expected to grow up to around 30 beamlines in 2026.

In this talk, I present the unique properties of the MAX IV storage rings, consider various types of experimental x-ray techniques a) imaging, b) diffraction and scattering and c) spectroscopy, focus on a few research examples around the topics of the Conference: “nano materials”, “thin films” and “energy” and brief on the present status of the Laboratory. I also give some practical information on submitting beam time proposal, data policy and travel assistance.