MOGNO: A High-Energy Beamline for Multiscale and Time-Resolved Tomography

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The MOGNO beamline at the Sirius synchrotron is a high-energy X-ray imaging facility designed for multiscale micro- and nano-tomography. Its optical system integrates a horizontally focusing mirror with a multilayer-coated Kirkpatrick–Baez (KB) mirror, enabling both energy selection and nanometric focusing. MOGNO operates at three energies - 22, 39, and 67.5 keV, delivers high flux (10^{10} - 10^{11} ph/s/100 mA), and supports spatial resolutions ranging from a few micrometers down to 200 nm.

A key capability of the beamline is its zoom-tomography mode, which allows the same sample to be imaged across multiple length scales simply by adjusting its position relative to the focus and detector. This enables continuous transitions from large fields of view to nanoscale resolution without modifying the experimental setup. MOGNO is also being developed for time-resolved tomography, taking advantage of its high flux, fast detectors, and flexible sample-environment configurations to enable dynamic in situ studies.

The beamline comprises two experimental stations: the nanostation, optimized for nanoscale resolution and designed with reduced mechanical flexibility to ensure stability at the sub-micrometer level, and the microstation, recently opened to regular user proposals, offering a more adaptable layout for diverse sample environments.

MOGNO has been operating for around 2.5 years in user mode, supporting a broad range of applications. Multiple peer-reviewed studies have already been published using data collected at the beamline, spanning fields such as biology, paleontology, materials science, geology, and instrumentation development. Together, these works demonstrate the versatility of MOGNO's multiscale X-ray imaging capabilities and its growing scientific impact. In this presentation, we will show published results obtained at MOGNO, along with key outcomes from our commissioning activities, illustrating the beamline's current performance and scientific potential.

References

N L Archilha *et al* 2022 *J. Phys.: Conf. Ser.* 2380 012123 - 10.1088/1742-6596/2380/1/012123