Contribution ID: **379** Contribution code: **THAG002** Type: **Contributed Oral Presentation**

Multimodal data acquisition system at MAX IV

Thursday 25 September 2025 09:00 (15 minutes)

The Balder beamline at MAX IV Laboratory, a state-of-the-art 4th generation synchrotron, is designed for X-ray absorption and emission spectroscopy. Delivering a high photon flux (10^{13} ph/s), it supports in situ experiments, which require fast, high-quality data acquisition and support for sequential multi-technique measurements.

This work presents a data acquisition (DAQ) system that combines X-ray absorption spectroscopy (XAS) and X-ray diffraction (XRD) within a single, synchronized experiment. At the core of the system is a Double Crystal Monochromator, operated by ACS SPiiPlusEC motion controller. This controller enables stable and rapid energy scanning via programmable motion trajectories, allowing sequential acquisition of energy spectra and diffraction patterns.

Experiment synchronization is achieved via FPGA-based PandABox, which generates TTL signals based on the real-time motor position, enabling technique-specific pulse trains to be sent to the respective XAS and XRD detectors, precisely gated to the energy scan.

The entire experiment workflow is orchestrated using Sardana through dedicated macros and controllers. User interaction is streamlined through a Taurus GUI, providing an intuitive drag-and-drop interface for sequencing and configuring each technique.

This contribution outlines the system architecture, integration challenges, and benchmarking results, highlighting the enhanced experimental capabilities made possible by this advanced DAQ system at MAX IV.

Footnotes

Funding Agency

Author: DA SILVA, Vanessa (MAX IV Laboratory)

Co-authors: Dr JUST, Justus (MAX IV Laboratory); FREITAS, Áureo (MAX IV Laboratory); Dr KLEMENTIEV, Konstantin (MAX IV Laboratory); LINDBERG, Mirjam (MAX IV Laboratory); ALCOCER, Marcelo (MAX IV Laboratory)

Presenter: DA SILVA, Vanessa (MAX IV Laboratory)

Session Classification: THAG MC09 Experimental Control and Data Acquisition

Track Classification: MC09: Experiment Control and Data Acquisition