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## ASTRA - Tender XAS Beamline at SOLARIS Synchrotron: Reflections on 1 Year of Operation

*Friday 30 August 2024 11:40 (20 minutes)*

Since putting into service, the ASTRA beamline at SOLARIS synchrotron (Krakow, Poland) has gained great interest among scientists working on various research topics. Even though ASTRA is a relatively new bending magnet beamline, open for user operation just for 10 months, until April 2024 a total of over 45 experiments were carried out there. As its name ("Absorption Spectroscopy beamline for Tender energy Range and Above") suggests, ASTRA is an X-ray absorption spectroscopy (XAS) beamline. The photon energy range covered by ASTRA reaches from 1 to 15 keV, including the tender and part of the hard energy range of X-rays. The white beam is monochromatized by a modified Lemonnier type double crystal monochromator (DCM) working at high vacuum, which can be equipped with different types of crystals to cover the working energy range: Ge(422), Ge(220), Si(111), Ge(111), InSb(111), Beryl(10<sup>-10</sup>) and organic potassium acid phthalate (100) + multi-layer. Crystal pairs can be exchanged in less than one hour! The beamline allows measuring XANES/EXAFS spectra at K-edges of important elements such as Si, P, S, Cl, K, Ca and up to Se. Besides, ASTRA's energy range also includes L-edges of elements up to Bi and some M-edges of heavier elements including U, allowing investigations of a variety of highly relevant materials. XAS spectra are recorded in transmission and fluorescence mode. The beamline is equipped with an X-ray camera, facilitating appropriate sample positioning for XAS with higher data quality and more reliable results. The measurements are controlled by the specially developed program AstraLibra with a user friendly interface and advanced functionalities. Special cells for measuring samples in liquid phase and in dynamic environments (in situ and operando), even in the tender energy range, were developed and successfully used. Implementation of a combination of XAS with Raman spectroscopy at the beamline is in progress. During the presentation technical aspects of the beamline will be discussed and selected results of ex-situ and in-situ experiments will be presented.

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### I plan to submit also conference proceedings

Yes

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