

Processing of multi-modal x-ray imaging datasets at the NANOSCOPIUM beamline

Nanoscopium is a unique innovative hard X-ray beamline, which is dedicated to fast scanning multimodal and multi-length scale X-ray imaging.

It offers simultaneous information in a quantitative manner about the elemental composition (down to trace levels), to chemical speciation and sample morphology and in the same experimental conditions. The fast multi-length scale imaging available at the beamline creates large data-sets with multi-technique data-sets.

The aim of the tutorial is to provide a brief introduction to the analytical techniques available at Nanoscopium and to guide the participants through the basic steps of the related data processing. The elemental distribution maps will be extracted from the scanning X-ray Fluorescence (XRF) dataset with simple quantification. Morphological information will be obtained from the calculated differential phase contrast and scattering maps. The interpretation of the obtained multimodal dataset will be discussed.

A multimodal big data file (>100 Gb) measured at Nanoscopium will be used for the practical training. The tutorial will be done at Soleil with the computers available in the computing room.

The open source softwares Pymca [1], MMX-I [2] and Octave [3] will be presented and used during this tutorial.

The number of participants will be limited to 20 people.

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[1] V.A. Solé, E. Papillon, M. Cotte, Ph. Walter, J. Susini, *A multiplatform code for the analysis of energy-dispersive X-ray fluorescence spectra*, Spectrochim. Acta Part B 62 (2007) 63-68.

[2] Bergamaschi, A., Medjoubi, K., Messaoudi, C., Marco, S., & Somogyi, A. (2016). *MMX-I: data-processing software for multimodal X-ray imaging and tomography*. Journal of synchrotron radiation, 23(3), 783-794.

[3] <https://www.gnu.org/software/octave/>