Investigating structures at the local scale via x-ray absorption spectroscopy.

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X-ray absorption spectroscopy is nowadays a well-established technique and a still rich research field. Its history and applications are tightly bound to synchrotron sources and the presence of such a source and a XAFS spectrometer in the middle east open an exciting opportunity to enlarge the user community.

The absorption cross section of X-rays exhibits a fine dependence on the material structure; the shape of an absorption edge of an element relates to the short-range order around the element itself and its electronic structure, while it is rather insensitive to long range order. This makes the study of X-ray absorption fine structure (XAFS) a tool of choice for chemistry and material science, especially when the focus is on a dopant, a nano structure like a cluster or finely dispersed atoms in catalysis.

Starting with 3d elements, X-ray absorption edges of interest involve transitions from core orbitals placing most XAFS studies in the hard x-ray regime. This energy range is well covered by the BM08 spectrometer at SESAME synchrotron.

In this introductory talk, I will illustrate the basic concepts of XAS spectroscopy, a glimpse of data analysis and propose possible applications through examples.