SEXTANTS: Soft x-ray EXperimenT resonANT Scattering

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Areas of application, instrumentation and methodologies used
Energy range: 50 – 1700 eV

The SEXTANTS beamline serves photon-in/photon-out resonant techniques, highly appropriated in the study of electronic and magnetic properties under applied magnetic/electric fields, with tunable bulk versus surface sensitivity.

Major disciplines
Three main techniques of polarization-dependent resonant X-ray scattering: Resonant Inelastic X-ray Scattering (RIXS) – X-ray Magnetic Resonant Scattering (XRMS) - Coherent X-ray Imaging (CXI) and Fourier Transform Holography (FTH).

Inelastic X-ray scattering: Access to the electronic structure - band structure - measuring elementary excitations (dd excitations, charge transfer, magnons...) - highlighting the dynamics of excited state femtosecond molecular vibrations, etc.
The analysis spectrometer is unique because it covers the widest energy range (50 - 1000eV), while having a resolving power on a par with the best in the world.

X-ray magnetic resonant scattering: optical constants directly linked to the electronic and magnetic properties of the sample - magnetic and non-magnetic information concerning the sample structure. Sensitivity to the electron structure provided by the spectroscopic response to resonant excitation of inner-shell electrons.

Coherent X-ray imaging/Fourier Transform Holography: The coherence of the beam provides an image of the structure (and of the magnetic structure) of the sample with a resolution (several nm) limited by the wavelength of the X rays. This imaging technique provides a versatile sample environment (high field, low temperature), and is ideal for time-resolved imaging experiments.