Webinar

Spectroscopies at SOLEIL: An Overview

Wednesday, May 13, 2026 — 09:20 to 12:00 (CEST, Paris time)

09:20 Welcome and introduction: Amina Taleb Ibrahimi SOLEIL Scientific Director

09:40 Giulia Serrano

Department of Industrial Engineering and INSTM Research Unit, University of Florence, 50139, Florence, Italy.

Probing Molecular Magnetism on Superconductors via X-ray Magnetic Circular Dichroism

The study of molecular magnetism on superconductors (SCs) has gained increasing attention due to the interplay between localized spins and superconducting order. Magnetic molecules based on transition metals or lanthanides exhibit tunable properties, such as slow relaxation in Single Molecule Magnets (SMMs) and long spin coherence. Our recent X-ray Magnetic Circular Dichroism (XMCD) studies showed the pivotal role of this surface-sensitive technique, enabling element-specific and quantitative probing of spin and orbital moments, in the detection of magnetic interaction at the molecular/SC interface. Two SMMs systems, Fe_4 and TbP_{c2}, reveal distinct behaviors: Fe_4 SMMs undergo a transition to a resonant regime across the superconducting phase transition, while TbP_{c2} films act as local probes of magnetic flux. Current work on Fe_4 deposited on type II superconductors, as $NbSe_2$, highlights the impact of vortex states and mixed-phase superconductivity on molecular magnetism. These results demonstrate the potential of synchrotron-based surface techniques to unravel molecule–superconductor interactions and advance quantum sensing applications.

10:20 Emmanuel L'Huillier

Sorbonne Université, CNRS, Institut des NanoSciences de Paris, 4 place Jussieu, 75005 Paris, France.

SOLEIL assisted design of narrow band gap nanocrystals for infrared optoelectronics

Colloidal nanocrystals are semiconductor nanoparticles with size-tunable optical features. Their first great success was their use as green and red sources for QLED displays. Now, infrared appears as their next playground. In particular, the material offers several advantages for the design of cost-effective infrared imagers thanks to monolithic integration onto CMOS read-out integrated circuits. Although quite a few successes have been reported, further improvements requires a deep understanding of the electronic structure.
In this talk, I will review 10 years of using SOLEIL beamlines (TEMPO, ANTARES, and SMIS) to investigate HgTe nanocrystals' electronic structure. I will start from basic

photoemission, used to systematically determine the absolute band alignment of the material, and then switch to more advanced photoemission methods. This includes pump-probe and spatially resolved photoemission, to understand the coupling of the optically active layer with its surrounding environment.
In the last part of the talk, I will explore the pressure phase diagram of the material, motivated by the growth of core-shell colloidal heterostructures. I will conclude with a few words on the observation of new metastable topological phases made of wurtzite HgTe.

11:00 Valérie Briois

Synchrotron SOLEIL, UR1-CNRS, L'Orme des Merisiers, Route Départementale 128, 91190 Saint-Aubin. France.

ROCK: A Quick-EXAFS beamline dedicated for in situ or operando characterizations of materials

The SOLEIL's Quick-EXAFS ROCK beamline is a dedicated infrastructure for the *in situ* or *operando* characterization of materials with sub-second time-resolution. In addition, full field hyperspectral imaging experiments can be operated offering micrometer spatial resolution for the monitoring of heterogeneous processes. The 4–40 keV energy range of the beamline covers the absorption edges of 65 elements of the periodic table starting from the 3d-elements to the 5d ones, encompassing the 4f elements. The performances and capabilities of ROCK using dedicated cells and combination of techniques will be presented and illustrated with a few examples belonging to catalysis (photo-catalysis, electrocatalysis and thermal catalysis) and energy storage field.

11:40 Discussions on future directions and needs