



26–30 octobre 2026



<https://jmc2026.sciencesconf.org/>

## SD04: Matter and its properties probed *in-situ/operando* using X-rays and neutrons at large-scale facilities

**Organizers:** Thomas W. CORNELIUS (IM2NP), Nicolas JOUAULT (PHENIX), Debora Pierucci (INSP)

**Invited Speakers:** Vincent L.R. Jacques (LPS), Sandrine LYONNARD (CEA)

**Sponsors:** GDR CohereX

### Content:

Nowadays, the fast development of advanced materials demands in-depth understanding of physical mechanisms that drive materials formation, processing, and functionality. Recently, remarkable advances at large-scale facilities have been achieved thanks to emerging techniques developed at high flux reactors or spallation neutron sources as well as at 3<sup>rd</sup> and 4<sup>th</sup> generation synchrotrons and free electron lasers. The high brilliances, small beam size, high photon and particle energies, short but controllable pulses allow for probing structural, microstructural, morphological and electronic structure at unprecedented levels. The unique source properties at synchrotron and XFEL facilities enable time resolutions down to picosecond timescales, spatial resolution down to the nanoscale, bulk penetration, phase contrast, and spectroscopic distinctions of different materials. Similarly, neutrons provide structural and dynamical features in a large space and time range and, with their magnetic moment, are sensitive to magnetic structure and dynamics. Additionally, contrast variation by deuteration, which is frequently used in soft matter to reveal the behavior of multicomponent systems, allows to decouple different contributions in the scattering signal.

This mini-colloque focuses on the *in-situ* and *operando* investigations of materials using X-rays and/or neutrons at state-of-the-art large-scale facilities for understanding design, development and validation of next generation engineering and functional materials. For engineering materials, these techniques provide valuable information about crystal phases, microstructure, texture, defects, residual stresses and electronic properties. The scope of the materials science topics and their applications is extensive, encompassing electronic and optoelectronic devices (including flexible ones), transport properties, catalysis, metallurgy, energy related materials as well as bio-inspired, responsive soft-matter based materials.