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MMQ05: Quantum properties of f -electron matter

Organizers: William Knafo (LNCMI), Klaus Hasselbach (Institut Néel)

Invited Speaker: Christophe Marcenat (CEA Grenoble)

Lanthanides and actinides compounds offer many opportunities to investigate new quantum states of matter. Due to their f -electrons, they often present strong electronic correlations associated with low energy scales. This allows tuning their quantum properties using external parameters as pressure, chemical doping, or magnetic field. Quantum phase transitions can be induced in these systems, leading to magnetically-ordered phases, new valence states, charge-density-wave ordered phases, and sometimes so called hidden-order phases. In the vicinity of the quantum instabilities, new quantum states or phenomena can emerge, as a non-Fermi-liquid regime or strange metal, incommensurate phases, unconventional superconductivity. f -electron unconventional superconductivity is often characterized by large upper critical fields (well beyond the expected Pauli limit), it can be induced by a magnetic field in vicinity of a metamagnetic transition, and is observed in non-centrosymmetric or chiral materials. Determining the nature of the observed phases and understanding their underlying mechanism constitutes a challenge for both experimentalists and theoreticians.

This mini-colloque proposes to focus on recent studies on the electronic, magnetic and superconducting properties of f -electron quantum materials. It will cover the following topics of interests:

- Unconventional superconductivity (singlet, triplet, chiral, non-centrosymmetric etc.)
- Quantum phase transitions (towards magnetic or charge order)
- Quantum critical phenomena
- Magnetic interactions, magnetic order and fluctuations
- Band structures, Fermi surfaces
- Valence

A large place will be given to contributed talks of young scientists. PhD students and postdocs are encouraged to submit an abstract and participate at the mini-colloque.