

NÉEL INSTITUTE Grenoble

Topic for Master 2 internship – Academic year 2021-2022

Theoretical investigation of novel nickelate superconductors

General Scope

The discovery of superconductivity in nickelates has led to one of the most active topics of research in condensed matter physics in the last two years (see e.g. [1]). These systems open new exciting perspectives to eventually understand the challenge of unconventional superconductivity.

The goal of the internship is the theoretical investigation of novel nickelate superconductors by means of first principles calculations (density functional theory). These calculations will be oriented towards the subsequent incorporation of many-body effects (electronic correlations), which are believed to play a key role in the physics of these unconventional superconductors.

[1] Nickelate superconductors: an ongoing dialog between theory and experiments A. S. Botana, F. Bernardini, and A. Cano, JETP 159, 711 (2021); arXiv:2012.02764

Research topic and facilities available

The internship will be carried out at the Condensed Matter Theory (TMC) group at Institut NEEL. The available facilities include a HPC local cluster for the numerical calculations.

Possible collaboration and networking

The internship will be carried out in the framework of an ongoing national and international collaboration that includes theoreticians from U. Cagliari (Italy) and U. Arizona (USA) and experimentalists (Institut NEEL & ICMCB, CNRS Bordeaux).

Possible extension as a PhD

Yes

Required skills

Theory. Solid state physics. Numerical calculations. Quantum field theory is a plus.

Starting date 1/02/2021 (tentative)

Contact

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