Solid State Physics IV provides a materials and experimental technique oriented introduction to electronic and magnetic properties of strongly correlated electron systems. Established knowledge is complemented by current research trends, aiming to prepare the students for independent research.

Content

1. Scattering methods
   - Neutron scattering
   - Resonant X-ray scattering
   - Angular resolved photoemission
2. Bulk methods
   - Transport, specific heat and susceptibility
3. Strongly correlated electron materials
   - Transition metal oxides
   - Cuprates: high-temperature superconductivity
   - manganites: colossal magnetoresistance
4. Quantum magnets
   - Low-dimensional magnetism
   - Rare-earth magnetism
   - Quantum phase transitions

Learning Prerequisites

Recommended courses
Solid state physics I and II or the equivalent to one of the book Aschroft&Mermin or Kittel

Learning Outcomes

By the end of the course, the student must be able to:

- Formulate the neutron scattering cross sections
- Decide which experimental technique is suited to investigate a certain phenomenon or property
- Interpret experimental data in the context of phenomena encountered during the course
- Sketch the key electronic and magnetic properties of transition metal material classes

Transversal skills

- Make an oral presentation.
Teaching methods
Lectures, exercises, visit to Paul Scherrer Institut

Assessment methods
oral exam (100%)

Resources
Ressources en bibliothèque
• Transition metal compounds / Khomskii

Websites
• http://lqm.epfl.ch/