Ecole thématique du CNRS en Thermoélectricité

Matériaux thermoélectriques: de la structure de bandes aux corrélations électroniques

Responsable : Jernej Mravlje, Antoine Georges
Laboratoires : CPHT Ecole Polytechnique (Palaiseau), College de France (Paris), Jozef Stefan Institute (Ljubljana)
*Email:*jernej.mravlje@cpht.polytechnique.fr,
antoine.georges@cpht.polytechnique.fr r
Durée du module : 2h

Objectifs

The aim of the course is to develop the basic understanding of the influence of the electronic correlations. The consequences of electronic correlations for single-particle spectroscopies and for the thermoelectric properties of the system will be discussed.

Contenu - programme

1) Electronic correlations, theory and material examples
   - electronic structure of solids: successes and limitations of the band-picture
   - Mott insulators, Hubbard model
   - correlated metals:renormalized quasiparticle band and atomic excitations
   - temperature evolution of the spectra
   - brief introduction to dynamical mean-field theory
2) Seebeck coefficient in a correlated metal
   - calculation of transport, key differences with transport in semiconductors
   - low T Boltzmann transport, influence of velocities and of scattering time
   - high T atomic limit, Heikes formula
   - case of a doped Mott insulator in a dynamical mean-field theory
   - role of entropy, benefits of going to multi-orbital