Open Post-Doc position for studying

Topological Transitions in Condensed Matter

Project

Within a collaboration between LNCMI Grenoble (CNRS) and PHELIQS (CEA) laboratories this research project aims at a systematic investigation of the signatures of field induced Fermi surface instabilities (Lifshitz transitions). More precisely, it is planned to measure thermoelectric transport properties (Seebeck effect) and thermodynamic properties (magnetization) at low temperatures and under high magnetic field (up to 35T). Comparing these two experimental probes together with theoretical predictions should allow for a clear distinction of the major consequence of Lifshitz transitions: a change in the density of states or extra scattering processes. As a first class of samples, highly correlated electron systems will be investigated (in-house grown high quality single crystals of UCoGe, YbNiSn, etc.) since their generally flat bands at the Fermi level are very sensitive to magnetic fields.
As a second hot spot it is planned to study recent topological materials like Weyl and Dirac semi-metals (for example Cd_3As_2 or Na_3Bi) which exhibit simpler band structures than the former materials, and are expected to exhibit exotic topological transitions.

Position

The candidate will be hosted jointly by PHELIQS laboratory and the National High Magnetic Field laboratory, Grenoble. Funding is granted by a special budget of Grenoble University, salary will depend on the experience (since PhD diploma, 2000 - 2900€ net per month) and the duration of the contract will be about 18 months.
(For interested PhD candidates: if supplementary funding can be obtained, a conversion into a 3-year PhD grant is not excluded)
The deeply motivated post-doc candidate is expected to have some experience in *condensed matter physics*. The experimental set-ups are available and almost ready to run - the mission of the candidate will include strongly sensitive *measurements* at very low temperatures, *data exploration* and *discussions* with *theory* groups.

Start date: as soon as possible (not later than fall 2018)

Contacts

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Recent related publications

-A. Gourgout, A. Pourret, G. Knebel, D. Aoki, G. Seyfarth, et al. ,"Collapse of Ferromagnetism and Fermi Surface Instability near Reentrant Superconductivity of URhGe", Phys. Rev. Lett. **117**, 046401 (2016)
-G. Bastien, A. Gourgout, D. Aoki, A. Pourret, I. Sheikin, G. Seyfarth, J. Flouquet, G. Knebel, *Lifshitz Transitions in the Ferromagnetic Superconductor UCoGe*, Phys. Rev. Lett. **117**, 206401 (2016)
-D. Aoki, G. Seyfarth, A. Pourret, et al., "*Field-Induced Lifshitz Transition without Metamagnetism in* $CeIrIn_5$", Phys. Rev. Lett. **116**, 037202 (2016)
-A. Palacio-Morales, A. Pourret, G. Seyfarth, M.T. Suzuki, D. Braithwaite, G. Knebel, et al., *"Fermi surface instabilities in* $CeRh_2Si_2$ *at high magnetic field and pressure"*, Phys. Rev. B (editor's suggestion) **91**, 245129 (2015)

Key words

Fermi surface instabilities – Lifshitz transitions - heavy fermion systems – Dirac and Weyl semi-metals – topological materials – high magnetic fields – low temperatures – quantum oscillations – thermoelectric power – magnetization