

Scientific Report

Correlated Electron Systems in High Magnetic Fields

International Workshop – Dresden, MPIPKS, October 13 - 17, 2008

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The main focus of the workshop was to foster exchange of ideas between theoreticians and experimentalists using high magnetic fields as a tool for the investigation of electronic and magnetic properties of strongly correlated electron systems (SCES) both in three-dimensional and low-dimensional systems. For this sake, the leading experts from the high-magnetic field centers of the EuroMagNET consortium and other key experimental labs were invited as well as theoreticians active in the studies of SCES under extreme conditions. We may indicate the following names of participants: C. Berthier, T. Giamarchi, N. Hussey, M. Jaime, J. Mydosh, M. Potemski, C. Proust, U. Zeitler, S. Zvyagin as well as many others.

Among the young scientists the most impressive presentations were given by I. Burmistrov, A. Coldea, D. Kovrizhin, A. Laeuchli, N. Laflorencie. There were a large number of young researchers, such as PhD students from MPI-PKS, MPI-CPfS, FZD Rossendorf, and the Dresden University of Technology who were attracted by the talks and were active participants of the workshop.

The conference was devoted to experimental and theoretical studies of various systems carried out in high magnetic fields. The first talk by J. Mydosh served as perfect introduction to the importance of research in the highest experimentally accessible magnetic field with a special reference to heavy-fermion systems. This day was completed by the MPI-PKS colloquium given by N. Hussey.

There were several sessions on frustrated antiferromagnetic systems which exhibit various phase transitions analogous to Bose-Einstein condensation and other nontrivial phenomena. Exchange interaction is the most relevant parameter in these systems, which requires very high magnetic fields (above 40 T) in order to drive the system into new phases. Two sessions were devoted to the hot topic of graphene systems, which are characterized by an unusual type of Landau quantization and correspondingly quantum Hall effect in high magnetic fields. According to the talks given by E. Shimshoni (theory) and by U. Zeitler (experiment) the most interesting phenomena may be achieved in extremely high magnetic field. The workshop was complemented by a visit to the high magnetic field facilities at the FZD in Dresden-Rossendorf.