CRC/TRR 270

HoMMage

TECHNISCHE UNIVERSITÄT DARMSTADT

UNIVERSITÄT DUISBURG ESSEN

Offen im Denken

Hysteresis Design of Magnetic Materials for Efficient Energy Conversion

Tuesday, 29 April 2024, 10:00 s.t., TUDa, in Person and via Zoom

Prof. Dr. Joachim Wosnitza

Hochfeld-Magnetlabor Dresden,

Helmholtz-Zentrum Dresden-Rossendorf

Materials Research in High Magnetic Fields

Abstract:

High magnetic fields are one of the most powerful tools available to scientists for the study, modification, and control of the state of matter. The application of magnetic fields, therefore, has become a commonly used instrument in materials-science research and the demand for the highest possible magnetic-field strengths increases continuously. The High Magnetic Field Laboratory Dresden (Hochfeld-Magnetlabor Dresden, HLD) at the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) makes available pulsed magnetic fields up to the 90 T range, on a 10 ms timescale, for in-house and external users. The HLD is part of the European Magnetic Field Laboratory (EMFL) with further sites in Grenoble and Nijmegen, for static fields, and in Toulouse for pulsed fields. In the pulsed magnets, a variety of experimental methods are available enabling to measure, for example, electrical transport, magnetization, dilatometry, ultrasound, ESR, and even NMR with very high resolution. As a unique feature, a free-electron-laser facility next door allows high-brilliance radiation to be fed into the pulsed-field cells of the HLD, thus making possible high-field magneto-optical experiments in the range from 5 to 250 µm. In-house research of the HLD focuses on electronic properties of strongly correlated and topological materials at high magnetic fields. This includes the investigation of novel frustrated magnetic materials and the determination of Fermi surfaces of topological and correlated metals by means of measurements of magnetic quantum oscillations. We further investigate unconventional high-magnetic-field states of novel superconductors, but, beyond that, even field-induced plasma waves in liquid metals. Here, I will present a brief overview on the experimental infrastructure and discuss some highlights of the in-house research at the Dresden High Magnetic Field Laboratory.

About the speaker:

since 12/2004	Professorship at the University of Technology Dresden (TUD) and director of the Hochfeld-Magnetlabor Dresden (HLD) at the HZDR
10/2001 - 11/2004	Professorship for “Low-Temperature Physics” at the University of Technology Dresden
06/1995	Habilitation in Experimental Physics at Universität Karlsruhe (TH), Germany
11/1988	PhD graduation, Universität Karlsruhe (TH), Germany
09/1986	Changeover to Universität Karlsruhe (TH), Germany
07/1985	Diploma (Physics) at RWTH Aachen, Germany

Selected other (Academic) Positions

2015-2021	Member of the Selection Committee of the Heinz Maier-Leibnitz Prize of the DFG
since 2008	Head of the Scientific and Technical Council (Wissenschaftlich-Technischer Rat) at the HZDR
2007 – 2015	Advisory Professorship at the Huazhong University of Science and Technology, Wuhan, China
2004 - 2012	Elected member of the DFG (Deutsche Forschungsgemeinschaft) Review Board 307 (Condensed Matter Physics); Chair 2010-2012
2003 - 2005	Dean of student affairs of the physics department at the TU Dresden
1993 - 1999	Scientific Assistant, Universität Karlsruhe (TH), Germany
07/1990 - 06/1991	Postdoc at Argonne National Laboratory, Argonne, Illinois, USA