



TRR 80 Sonderseminar

Am Donnerstag, den 7. November um 14:00 Uhr

spricht

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über das Thema

Quantum oscillations as a probe for Fermi surface properties

The measurement of quantum oscillations has a long history as a method allowing to determine the Fermi surface properties of metallic systems. Its particular strength lies in its ability to resolve fine details of the electronic band structure at the Fermi level. Quantum oscillations are thus a versatile tool to study, e.g., band (avoided) crossing behavior and magnetically induced Fermi surface reconstruction.

In this talk I will address three different scientific cases. Firstly, the Fermi surface of MnSi exhibits a number of peculiarities, which are due the combination of inversion asymmetry, spin-orbit coupling, nonsymmorphic symmetries and magnetic order. Notably, MnSi exhibits distinct band degeneracies that can be selectively lifted by the magnetic order. I will highlight the possible implications for the observed unusual optical and transport properties. Secondly, the band structure of the isostructural CoSi was recently predicted to host exotic „beyond-Weyl“ fermions. Here, I will focus on the effects of spin-orbit coupling which leads to distinct changes in the nature of the fermions which were missed by ARPES experiments. Finally, I will discuss „Fermi loops“ of two-dimensional quantum well systems in III-V semiconductor heterostructures whose properties are governed by the Rashba- and Dresselhaus spin-orbit coupling effects relevant for spintronics. Here, I will show that an approach beyond the well-established Lifshitz-Kosevich formalism – taking into account explicitly the magnetic field dependence of the bands - is needed in order to extract the relevant coupling constants from quantum oscillations.

Special attention will be given in this seminar to the discussion of practical advantages and limitations of the technique in an introductory way.

Gäste sind herzlich willkommen.

Der Vortrag findet im Seminarraum S-288, Institut für Physik, Universität Augsburg statt.

Gastgeber: Prof. Dr. István Kézsmárki

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