S1.7 Magnetic-field-induced band-structure change in CeBiPt

J. Wosnitza
Institut für Festkörperphysik, Technische Universität Dresden, 01062 Dresden, Germany

The influence of magnetic fields on the electronic band structure of metals is usually minute and may, therefore, in most cases be disregarded. The situation changes, however, considerably in case the relevant energy scales of the electronic system are strongly reduced. Here, we report on the temperature dependence and a magnetic field-induced change of the band structure in the semimetal CeBiPt. This compound as well as LaBiPt are characterized by very low charge-carrier concentrations and very small Fermi surfaces. The electronic properties of LaBiPt can consistently be described by standard Fermi-liquid theory. The experimentally observed magnetic quantum oscillations agree exceptionally well with sophisticated band-structure calculations [1,2].

The picture changes drastically for the isostructural semimetal CeBiPt. Above about 10 K and below 20 T, the electronic properties follow conventional Fermi-liquid theory as in LaBiPt. Towards lower temperatures, however, the Fermi surface changes, i.e., for certain field orientations the Shubnikov-de Haas frequency increases by almost a factor of two between 10 and 0.4 K [1]. Furthermore, from electrical-transport measurements in pulsed magnetic fields up to 60 T there is evidence for a field-induced increase of the charge-carrier concentration by 28% above about 25 T. Concomitantly, the Shubnikov-de Haas signal in CeBiPt vanishes. This remarkable phenomenon is intimately related to the Ce 4*f* electrons, since it is absent in the non-4*f* sister compound LaBiPt for which the Fermi surface remains unaffected by magnetic fields and temperature.

[1] G. Goll et al., Europhys. Lett. **57**, 233 (2002).
[2] J. Wosnitza et al., Physica B **346-347**, 127 (2004).