MAGNETIC STRUCTURE, CRYSTALLINE LATTICE AND FERMI SURFACE IN Tb: THEORY AND EXPERIMENT

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9.7 cm

The RKKY-exchange, responsible for the magnetic ordering in heavy rare-earth metals, depends strongly on the properties of the Fermi surface in these materials. The shape of this Fermi surface, in turn, appears to be highly sensitive to the minor variations in the crystalline lattice parameters. Even the topology of the Fermi surface might be changed by the proper elastic deformation. As a consequence, the magnetic ordering in rare-earth metal can be altered by minor change of the lattice parameters that causes the change in the Fermi surface and hence in the exchange parameters.

We present a set of experiments focused on the expected change in the Fermi surface shape under pressure and its effect on the type of the magnetic ordering in terbium single crystal. In particular, the well-known helical antiferromagnetic structure of Tb was suppressed completely by uniaxial elastic deformation as low as 10^{-3}.

A self-consistent approach that links magnetic structure with the crystalline lattice of the metal via its Fermi surface is presented. It describes qualitatively the main features demonstrated by the magnetic phases in the rareearth metals.

1. A.Vl.Andrianov, A.I.Beskrovnyi, D.I.Kosarev. Physical Review B, **62**, 21, 13844 (2000).

13.4 cm

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