



EINLADUNG zum IFP-SEMINAR

Magnetism and structural properties in BiS₂-based layered superconductors

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Host: E. Bauer
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Abstract:

BiS₂-based layered superconductors LnO_{1-x}F_xBiS₂ (Ln: rare earth) have been attracting much attention. Similar to iron pnictides superconductors, these compounds consist of alternative stacking of two conductive BiS₂ layers and insulating Ln₂O₂ block layers. These compounds become superconducting (SC) when charge carriers are introduced via electron doping by partial substitution of O for F. Although there are many investigations for their SC properties, there is little investigation for their magnetisms. Therefore, we focused on the magnetism of 4f electrons on block layers in LnO_{1-x}F_xBiS₂ (Ln: rare earth) compounds and have proceeded experiments using these single crystals. From these investigations, we had reported pronounced $-\log T$ divergence in the specific heat of CeOBiS₂, revealing the presence of quantum critical fluctuations of 4f magnetic moments near a quantum critical point (QCP). Considering that CeOBiS₂ is a nonmetal, this phenomenon cannot be attributed to the competition between Kondo and the Ruderman–Kittel–Kasuya–Yosida (RKKY) interactions as in numerous f-electron-based strongly correlated metals, indicating an unconventional mechanism. We suggest that CeOBiS₂ is the first material found to be located at a QCP among geometrically frustrated nonmetallic magnets. Moreover, we recently discovered that Nd(O,F)BiS₂ shows heavy fermion behavior with large gamma values of ~ 8 J/mol K². Since there is no contribution to conduction band from 4f electrons of Nd, this phenomenon cannot be explained by the conventional Kondo scenario. In this seminar, I will show detailed analysis of these compounds and latest experimental results for other LnO_{1-x}F_xBiS₂ compounds.