第６１回トポロジカル物質科学セミナー
Topological Materials Science Seminar (61)

Kondo Insulator to Semimetal Transformation Tuned by Spin-Orbit Coupling

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Time: 10:30 – 12:00

Place: Room 525, Science Bldg. 5 (Physics), Kyoto University

Abstract:

Recent theoretical studies of topologically nontrivial electronic states have pointed to the importance of spin-orbit coupling (SOC) for stabilizing these states. The assertion is held even in Kondo insulators, however, its systematic experimental study remains elusive [1, 2].

Here we present the successful growth of the substitution series $Ce_3Bi_4(Pt_{1-x}Pd_x)_3$ ($0 \leq x \leq 1$) of the archetypal noncentrosymmetric Kondo insulator $Ce_3Bi_4Pt_3$. The Pt-Pd substitution is isostructural, isoelectronic, and isosize. It therefore is likely to leave the Kondo coupling and the chemical potential essentially unchanged. By contrast, the large mass difference between the 5*d* element Pt and the 4*d* element Pd leads to a large difference in the SOC, which thus is the dominating tuning parameter in the series. With increasing *x* we observe a Kondo insulator to semimetal transition, demonstrating an unprecedented drastic influence of the SOC. The fully substituted end compound $Ce_3Bi_4Pd_3$ show thermodynamic signatures of a recently predicted Weyl-Kondo semimetal.

[1] Hsin-Hua Lai *et al.*, PNAS **115**, 93-97 (2018).

[2] S. Dzsaber *et al.*, Phys. Rev. Lett. **118**, 246601 (2017).

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