Orbital Kondo effect from ideal to reality

Yoshio Kuramoto
Institute of Materials Structure Science, KEK, Tsukuba

Abstract

Since the original proposal of Nozières and Blandin [1], the local non-Fermi liquid state has been a focus of intensive research. In idealistic models, it is well known that the multi-channel Kondo effect with overscreening by conduction electrons brings about the non-Fermi liquid. Orbital degeneracy in conduction bands is a candidate for the overscreening [2]. However, experimental confirmation of the orbital Kondo effect in real materials is still lacking. In this sense there is a deep valley between the ideal and reality. We shall try to bridge the valley by inspection of favorable band structures in real materials. We begin the talk with pedagogical review of the multi-channel Kondo effect under ideal conditions, and mention some real candidates so far proposed [3]. Our message is that good candidates must have the Γ_8^- state in the conduction band near the Fermi level. Simple examples such as $PrMg_3$ and $PrPb_3$ are taken for the case study [4].

References

[1] P. Nozières and A. Blandin, J. Physique **41**, 193 (1980).

[2] D.L. Cox and A. Zawadowski, Adv. in Phys. **47**, 599 (1998).

[3] R. M. Potok, I. G. Rau, Hadas Shtrikman, Yuval Oreg and D. Goldhaber-Gordon, Nature **446**, 167 (2007).

[4] H. Funashima, Y. Kuramoto and H. Harima, to be published (2019).