Kondo effect in electron-phonon system

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Abstract: Recently, a new possibility of electron-phonon coupled state emerging in strongly correlated electron materials such as clathrate compounds, pyrochlore oxides, and filled skutterudites has attracted much attention in the research area of condensed matter physics. A common feature of these materials is the existence of nano-size cage composed of relatively light atoms, in which guest atom feels a highly anharmonic potential and oscillates with large amplitude. Such an oscillation is frequently called *rattling*, which is considered to be one of key ingredients of cage-structure materials, when we attempt to clarify their electronic properties. For instance, in order to understand magnetically robust heavy-fermion behavior observed in Sm-based filled skutterudite compound $SmOs_4Sb_{12}$, the non-magnetic Kondo effect originating from phonon degree of freedom has been pointed out. Along with this research direction, in order to promote our understandings on the Kondo physics in electron-phonon systems, I have performed numerical calculations on the basis of the Anderson model coupled with local phonons [1-6]. In this presentation, I review the Kondo effect in electron-phonon system. In particular, I focus on the robustness of electronic specific heat coefficient against an applied magnetic field. I also propose a way to confirm experimentally the relevance of rattling to the magnetically robust heavy fermion phenomenon from the viewpoint of isotope effect on Kondo temperature.

References:

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