Valence Fluctuations in the Extended Periodic Anderson Model at Finite Temperatures

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Recently, valence fluctuations have attracted much interest. Interesting examples are the valence transition and its related phenomena, which have been observed in the f-electron systems such as Ce- and Yb-based compounds. It has theoretically been suggested that critical valence fluctuations near the transition play an important role in understanding non-fermi liquid behavior and superconductivity in a certain compounds[1-4]. Therefore, it is desired to clarify how valence fluctuations develop and the valence transition occurs at finite temperatures.

In this study, we consider the extended periodic Anderson model with the interactions between the conduction and f-electrons. By combining dynamical mean-field theory with the non-crossing approximation, we clarify that a first-order valence transition occurs at low temperatures in a certain parameter region. It is also found that at higher temperatures, a smooth crossover appears, instead of the transition. We then discuss how electron correlations and thermal fluctuations affect valence fluctuations at finite temperatures.

References

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