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Electron-phonon Interactions in Correlated Metals

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The interplay of electron-electron interaction and electron-phonon interaction is very difficult to understand due to the lack of suitable expansion parameters. We briefly review the Migdal-Eliashberg theory of electron-phonon interaction in a weakly interacting Fermi liquid theory, and investigate the influence of electron-phonon interaction in strongly correlated systems in the framework of dynamical mean field theory. The new results obtained via numerical renormalization group methods are explained and they are compared with the semi-classical analytic results. Especially the Kondo temperature is shown to increase, and the phonon correlation functions is shown to pick up singular corrections from spin fluctuations.

keywords : phonon, strongly correlated metal, dynamical mean field theory, Kondo system