1. Disordered local moments formation in high dimensional strongly correlated materials (DMFT + IPT)

We have investigated the electronic properties of strongly correlated materials, including the possibility of disordered local moments formation in the framework of the dynamical mean field theory (DMFT). We used a self-consistent generalization of the iterated perturbation theory (IPT) and calculated the value of local moment amplitudes. Low energy behavior and temperature dependence of local moments are also examined.

Hubbard Model

\[ H = -t \sum_{\langle i,j \rangle} n_{i \sigma} c_{i \sigma}^\dagger c_{j \sigma} + U \sum_i n_{i \uparrow} n_{i \downarrow} \]

Iterated Perturbation Theory

\[ \Sigma_{\uparrow\downarrow}(\omega) = -\frac{U}{2}[\rho_{\uparrow\downarrow}(\omega) + \Sigma_{\uparrow\downarrow}^{\text{DMFT}}(\omega)] \]

\[ \Sigma_{\downarrow\uparrow}(\omega) = -\frac{U}{2}[\rho_{\downarrow\uparrow}(\omega) + \Sigma_{\downarrow\uparrow}^{\text{DMFT}}(\omega)] \]

\[ \Sigma_{\uparrow\downarrow}(\omega) = U^2(G_{\uparrow\downarrow}(\omega)^2 G_{\uparrow\downarrow}(\omega) - \rho_{\uparrow\downarrow}(\omega)) \]

\[ \Sigma_{\downarrow\uparrow}(\omega) = U^2(G_{\downarrow\uparrow}(\omega)^2 G_{\downarrow\uparrow}(\omega) - \rho_{\downarrow\uparrow}(\omega)) \]

2. Metal Insulator transition induced by disorder in strongly correlated materials (DMFT + NCA + CPA)

- Site specific and averaged DOS
- New states for increasing \( x \) mainly on B sites
- B close to half filling
- no MIT for increasing \( v \) for \( x=0.5 \) (diff [3])
- Hubbard band splitting
- Resonant quasiparticle weakly affected by disorder

Conclusion:

- New type of MIT combining disorder and strong correlations
- Semiconductor doped with transition metals

Perspectives:

- Possible short range ordering for the DLM state.
- Effect of orbital degeneracy of the d-band.

References:
