Non-local electronic correlation effects

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Dynamical mean field theory (DMFT) in combination with the first-principle LDA-scheme is an optimal starting point to go beyond static density functional approximation and include effects of spin and charge fluctuations in strongly correlated materials. In order to go beyond the local approximation we investigate a cluster generalization of the DMFT scheme as well as analytical dual-fermions scheme which include a full interaction vertex of impurity problem and spin fluctuations in the ladder approximation. We discuss non-local correlation effects in real materials which have anomalies in the energy spectrum.