

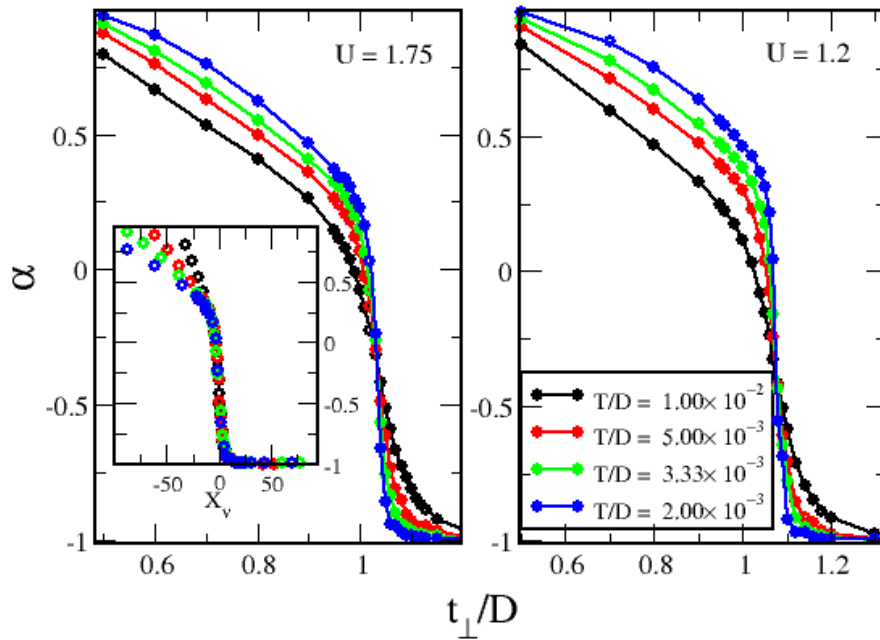
Emergent Soft-gap Anderson Models at Quantum Criticality in a Lattice Hamiltonian within Dynamical Mean Field Theory

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Local quantum criticality in itinerant fermion systems has been extensively investigated through the soft-gap Anderson impurity model, wherein a localized, correlated impurity, hybridizes with a broad conduction band with a singular, $|\omega|^r$, density of states. However, lattice models hosting quantum critical points (QCPs), do not appear to have such a spectrum emerging at the QCP. In this work, we report the emergence of such a singular form of the density of states in a three-orbital lattice model, within dynamical mean field theory, precisely at a quantum critical point, separating a gapless, Fermi liquid, metallic phase from a gapped, Mott insulating phase. A temperature-dependent exponent, α , defined using the corresponding Matsubara self-energy, is found to vary from +1 deep in the FL regime, to -1 in the Mott insulator regime. Interestingly, we find that α becomes temperature independent, and hence isosbestic, precisely at the QCP (as shown in the attached figure). The isosbestic exponent is shown to lead to an emergent soft-gap spectrum, $|\omega|^r$ at the QCP, where $r = |\alpha_{iso}|$. We discuss the implications of our findings for non-Fermi liquid behaviour in the quantum critical region of the phase diagram.



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