

MAR14-2013-005648

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Bad Metallic Behavior in Model Hamiltonian Studies and in Transition Metal Oxides

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We investigate the transport properties of a correlated metal within dynamical mean-field theory. Canonical Fermi liquid behavior emerges only below a very low temperature scale T_{FL} . Surprisingly the quasiparticle scattering rate follows a quadratic temperature dependence up to much higher temperatures and crosses over to saturated behavior around a temperature scale T_{sat} indicating the existence of “hidden” Fermi liquid behavior. The non-Fermi-liquid transport above T_{FL} , in particular the linear-in- T resistivity, is shown to be a result of a strongly temperature dependent band dispersion. We derive simple expressions for the resistivity, Hall angle, thermoelectric power and Nernst coefficient in terms of a temperature dependent renormalized band structure and the quasiparticle scattering rate. We discuss the implications of the results for numerous transition metal oxides and other correlated materials connecting the non Fermi liquid transport with anomalous transfer of spectral weight.

References:

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