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Multiple energy scales and emerging quasiparticles in a doped Mott insulator WENHU XU, GABRIEL KOTLIAR, Department of Physics and Astronomy, Rutgers University — We recognize two temperature scales relevant to formation of quasiparticles but distinct from the Brinkman-Rice scale in a doped Mott insulator. T_{qp} marks the formation of incoherent quasiparticles, while a smaller scale T_{FL} indicates the onset of Fermi-liquid coherence. Below T_{qp}, the scattering rate evolves linearly with temperature and the quasiparticle weight is also strongly T-dependent. Furthermore, the imaginary part of self energy is particle-hole asymmetric at low energy. These facts lead to non-Fermi liquid behaviors in transport properties. The Fermi liquid scale T_{FL} is characterized by a smooth saturation of quasiparticle weight and emerging particle-hole symmetry in self energy. We compute transport properties and find that non-Fermi liquid behavior of longitudinal and Hall resistivity persist down to well below T_{FL} while Hall angle and Nernst effect have revealed Fermi-liquid behavior above T_{FL}. We also discuss the validity of relaxation time approximation in interpreting non-Fermi liquid behaviors.

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