How bad metals turn good: spectroscopic signatures of resilient quasiparticles

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In this talk, we will discuss transport in strongly-correlated metals. Within dynamical mean-field theory, we calculate the resistivity, thermopower, optical conductivity and thermodynamic properties of a hole-doped Mott insulator. The results show the existence of two well-separated temperature scales. The first scale is T_{FL} below which Landau Fermi liquid behavior applies. At higher temperatures, a second scale T_{MIR} defines the limit above which the resistivity exceeds the Mott-Ioffe-Regel value and bad-metal behavior is found. We show that between these two limits, where $T_{\mathrm{FL}} \lesssim T \lesssim T_{\mathrm{MIR}}$, quasiparticle excitations remain well defined and dominate transport. The lifetime of these resilient quasiparticles is longer for electron-like excitations and we discuss how this pronounced particle-hole asymmetry has consequences for the thermopower. Finally, we will show that the crossover into the bad-metal regime corresponds to the disappearance of these excitations and that it has clear signatures in optical spectroscopy.

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