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Two views of the dynamical conductivity in MnSi

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I will present terahertz time-domain spectroscopy measurements of the dynamical conductivity of MnSi, and compare them to Fermi liquid theory at low temperatures and low frequencies. I will also describe a new methodology for terahertz time-domain data analysis, developed to perform this comparison, which has higher sensitivity to fit quality than earlier methods. Within the extended Drude model framework, the conductivity scattering rate exhibits quadratic dependence on both frequency and temperature, as expected in Fermi liquid theory. However, the joint dependence of the scattering rate on frequency and temperature deviates from the standard functional form associated with Fermi liquid theory, as observed previously in other materials. We find better agreement with two alternative models, which are also motivated by Fermi liquid theory but which rely on different assumptions. These observations offer a way to reconcile Fermi liquid theory with the observed conductivity of real materials.

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