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Constraints on the Fermi liquid scaling of the optical conductivity in MnSi J. STEVEN DODGE, LALEH MOHTASHEMI, MICHAEL BARTRAM, AMIR FARAHANI, Simon Fraser University, ERIC KARHU, THEODORE L. MONCHESKY, Dalhousie University — We will present time-domain terahertz spectroscopy measurements of the optical conductivity of MnSi thin films. The measurements cover a temperature range $T = 5$–300 K and a frequency range $\nu = 0.1$–4.0 THz, with high accuracy and precision. Below $T \approx 35$ K and $\nu \approx 2$ THz, the conductivity is consistent with the prediction of Fermi-liquid theory, $\rho(\omega, T) = [\sigma(\omega, T)]^{-1} = \rho_0 + A[(\hbar\omega)^2 + (p\pi k_B T)^2]$, with $p = 2$. We observe deviations from this scaling at higher frequencies and temperatures, which allows us to establish the boundary of the Fermi-liquid scaling regime. As the temperature increases further, the system loses quasi-particle coherence, while the plasma frequency inferred from a Drude fit decreases dramatically.

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