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Optical Response of Sr_2RuO_4 Reveals Universal Fermi-liquid Scaling and Quasiparticles Beyond Landau Theory[1] DAMIEN STRICKER, University of Geneva, JERNEJ MRAVLJE, Ecole Polytechnique CNRS, CHRISTOPHE BERTHOD, University of Geneva, ROSALBA FITTIPALDI, ANTONIO VECCHIONE, Universita di Salerno, ANTOINE GEORGES, Ecole Polytechnique CNRS, DIRK VAN DER MAREL, University de Geneva — We report optical measurements demonstrating that the low-energy relaxation rate ($1/\tau$) of the conduction electrons in Sr_2RuO_4 obeys scaling relations for its frequency (ω) and temperature (T) dependence in accordance with Fermi-liquid theory. In the thermal relaxation regime, $1/\tau \propto (\hbar\omega)^2 + (p\pi k_B T)^2$ with p = 2, and ω/T scaling applies. Many-body electronic structure calculations using dynamical mean-field theory confirm the low-energy Fermi-liquid scaling, and provide quantitative understanding of the deviations from Fermi-liquid behavior at higher energy and temperature. In this regime, evidence for electron-like "resilient" quasiparticle excitations with a scattering rate deviating from Landau's Fermi-liquid form is presented.

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