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From hidden order to magnetic order: Optical conductivity reveals new behavior in URu_2Si_2[1] JESSE HALL, McMaster University, NORAVEE KANCHANAVATEE, MARC JANOSCHEK, KEVIN HUANG, University of California, San Diego, NICHOLAS BUTCH, Lawrence Livermore National Lab, BRIAN MAPLE, University of California, San Diego, THOMAS TIMUSK, McMaster University — As a new generation of experimental techniques is brought to bear against the heavy-Fermion compound URu_2Si_2, striking new details about the electronic structure changes at the mysterious hidden order (HO) transition are becoming clear. Far infrared optical conductivity measurements were performed on oriented samples of URu_2Si_2 doped with both Fe and Re. While Re-doping pushes the material towards ferromagnetism, Fe-doping substitutes for hydrostatic pressure and enhances the temperature of the HO transition slightly before pushing the material into antiferromagnetism. Optical conductivity measurements have revealed new information about the charge dynamics at the transition, and how these evolve with doping. Both the structure and energy of the gap are altered as the material is pushed towards magnetic ordering. Comparison is made between the gap seen in optical conductivity and the charge gaps seen in scanning tunneling spectroscopy and ARPES, as well as the gaps in the magnetic excitation spectrum seen in neutron scattering.

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