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The Optical Phase Diagram of URu₂Si₂: Effects of Anisotropy, Charge Coherence and Fermi Surface Gapping
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URu₂Si₂ is a heavy fermion with a Kondo temperature of 370 K. Hybridization between heavy *f* electrons with conduction electrons creates a crossover to a Kondo liquid state having coherent transport properties below 70 K. At 17.5 K, a second-order mean-field transition creates an electronically ordered state, which clear origin remains unknown. The formation of an unconventional superconducting phase below 1.5 K completes the thermal phase diagram. The charged nature of this phase diagram, makes it a fertile ground for optical investigations. Here I discuss the optical properties of the hidden order, the Kondo coherent and the Kondo phases. On the *ab*-plane, an incoherent conductor exists at room temperature. Upon crossing into the Kondo coherent state, a sharp Drude peak develops and narrows quickly upon further cooling. Along the *c*-axis the Drude peak is present at all temperatures and is mostly insensitive to the formation of the coherent Kondo state. When entering the hidden order phase, a 6.5 meV gap opens. It follows a mean-field temperature dependence in the *ab*-plane but remains constant along the *c*-axis where it fills-up rather than close. In parallel, phonons are very sensitive to the Kondo coherence and couple strongly to the electronic continuum. The optical properties of URu₂Si₂ shows a strongly anisotropic behavior between the *ab*-plane and the *c*-axis.