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Infrared dynamics of Tl-doped PbTe JASON HANCOCK, ZACK SCHLESINGER, University of California Santa Cruz, YANA MATSUSHITA, THEODORE GEBALLE, IAN FISHER, Stanford — The rock-salt structure small-gap semiconductors PbTe exhibits highly unusual transport behavior when doped with thallium, including superconductivity and Kondo-like resistivity behavior at low temperature. Tl is a hole type dopant at low doping (up to about 0.3%), but apparently aquires an amphoteric character higher doping which is associated with anomalous scattering and resonance formation at the Fermi level. It has been proposed that valence fluctuations at the Tl site cause it to act as a negative-U center. We use infrared and optical reflectivity measurements which encompass the region of the energy gap and the plasma edge as well as free-carrier response to study the nature of the charge dynamics in this system as a function of frequency, temperature and doping. [1] Y. Matsushita, H. Bluhm, T. H. Geballe, I. R. Fisher, cond-mat/0409174

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