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Charge dynamics in the normal state of the iron oxypnictide superconductor LaFePO[1]

M. M. QAZILBASH, University of California - San Diego

Many-body interactions in materials govern diverse and complex phenomena like high-T_c superconductivity, density wave instabilities and metal-insulator transitions. Infrared spectroscopy is an ideal tool for identifying the fingerprints of the various interactions in a material. We present infrared and optical properties in the normal state of *ab*-plane oriented single crystals of the iron oxypnictide superconductor LaFePO. Prominent Drude peaks and low scattering rates indicate the presence of coherent quasiparticles. We find that this metal has a relatively low carrier density compared to MgB_2, for example. An important result is that the Drude spectral weight i.e. the kinetic energy of itinerant quasiparticles is reduced by correlation effects to 50% of the band theory value. Even though LaFePO is among the most conducting of the iron-pnictides, we find that electronic correlations cannot be ignored in any realistic physical description of this material. We classify LaFePO as a moderately correlated metal.

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