

Electrodynamics of the Nodal Metal State in Weakly Doped High- T_c Cuprates

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We report on the detailed analysis of the infrared (IR) conductivity of two prototypical high- T_c systems $\text{YBa}_2\text{Cu}_3\text{O}_y$ and $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ throughout the complex phase diagram of these compounds, highlighting the electromagnetic response of the nodal metal state. According to the recent photoelectron spectroscopy the nodal metal state is initiated with only a few holes doped in parent antiferromagnetic systems and extends up to the pseudogap boundary in the phase diagram. The key signature of the nodal metal in optical conductivity is the two-component feature: the Drude mode at low energies followed by a resonance in mid-IR. The origins of these two components and their evolutions with doping are discussed. We also critically re-evaluate common approaches to the interpretation of the optical data in underdoped region.

keywords : High- T_c superconductor, nodal metal state, infrared spectroscopy