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An Infrared Probe of the Nodal Metal State in High-Tc Superconductors

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The focus of this talk will be on the electromagnetic response of the nodal metal state which is initiated with only few holes doped in parent antiferromagnetic systems and extends up the pseudogap boundary in the generic phase diagram of cuprates. The key spectroscopic signature of the nodal metal is the two- component conductivity: the Drude mode at low energies followed by a resonance in mid-IR. The former can be attributed to the response of coherent quasiparticles residing on the Fermi arcs. The microscopic origin of the mid-IR band is yet to be understood. A combination of transport and infrared data uncovers fingerprints of the Fermi liquid behavior in the response of the nodal metal. The comprehensive nature of the infrared conductivity data sets for YBCO and LSCO systems allows us to critically re-evaluate common approaches to the interpretation of the optical data. Specifically, I will re- examine the role magnetic excitations in generating electronic self energy effects through the analysis of the infrared data for underdoped YBCO in magnetic field.