

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Doping and temperature dependent optical properties of $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ JUNGSEEK HWANG, THOMAS TIMUSK, McMaster University, GENDA GU, Brookhaven National Laboratory, MARTIN GREVEN, HIROSHI EISAKI, Stanford University — We report on the ab-plane reflectance of underdoped (UD), optimally doped (OPT), and overdoped (OD) $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8+\delta}$ (Bi-2212) samples [$T_c = 69$ K(UD), 96 K (OPT), 82 K (OD), 80 K (OD: annealed from the OPT sample), 65 K (OD) and 60 K (OD)]. We analyzed the measured reflectance data and previous data of two underdoped Bi-2212 samples ($T_c = 67$ K (UD) and 82 K (UD)) to extract the doping dependent optical constants. Bi-2212 is one of the most important cuprate systems widely studied by ARPES and tunnelling. We also calculate the doping dependent dc resistivity from extrapolation of the optical conductivity and the doping dependent superfluid density and the optical self-energy by using the extended Drude model. With these quantities in hand, we will discuss some current issues: the kinetic energy change at T_c , the role of the magnetic resonance mode, and a possible quantum critical point.

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Date submitted: 26 Nov 2005

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