

# Doping Dependence of the Coupling to MFL Fluctuations from $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8-\delta}$ Reflectance Data

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We use 300 K  $\text{Bi}_2\text{Sr}_2\text{CaCu}_2\text{O}_{8-\delta}$  reflectance data to investigate the coupling to Marginal Fermi Liquid (MFL) fluctuation. We calculate the coupling constant at 300 K from the reflectance data by using the MFL theory. The coupling constant,  $\lambda(p)$ , appears to vary smoothly with the hole doping level,  $p$ . Although we analyze reflectance data at 300 K, a temperature that is well above the superconducting transition temperature ( $T_c$ ) and the pseudogap temperature ( $T^*$ ), we can observe some indications of phase changes. We introduce a doping dependent parameter  $\alpha$  to see how well the reflectance of a given system agrees with the MFL theory. The parameter  $\alpha$  is a constant close to the MFL value ( $\alpha=1$ ) in the underdoped region ( $p \leq 0.16$ ) and a little bit higher and more variable in the overdoped region ( $p \geq 0.16$ ); this difference between underdoped and overdoped cuprates is probably related to the pseudogap. We also observe a possible sign of a competing new phase setting in from a rapid drop of  $\alpha$  above a doping level of  $p = 0.21$ .

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