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Doping dependence of the electron-phonon and electron-spin fluctuation interactions in Bi-2212 ELBERT CHIA, DANIEL SPRINGER, SARITHA NAIR, XINAQUAN ZOU, SIEW ANN CHEONG, CHRISTOS PANAGOPOULOS, Nanyang Technological University, ANTOINETTE TAYLOR, Los Alamos National Laboratory, TSUYOSHI TAMEGAI, University of Tokyo, HIROSHI EISAKI, AIST, SHIGEYUKI ISHIDA, SHIN-ICHI UCHIDA, University of Tokyo, JIAN-XIN ZHU, Los Alamos National Laboratory — In the BCS theory of conventional superconductors, electrons form (Cooper) pairs via interactions with the underlying crystal lattice. In the cuprate superconductors, it is not clear whether Cooper pairing takes place via electrons interacting with phonons, spin fluctuations, or whether a bosonic mechanism is necessary at all. Though time-integrated optical measurements on the cuprates can give information on the coupling strength between electrons and an effective boson, it is difficult to tell whether one or more bosons are involved, or the nature of these bosons. We report measurements of time-resolved quasiparticle relaxation of $Bi_2Sr_2CaCu_2O_{8+\delta}$ single crystals (hole concentration $p =$ 0.10-0.22). Our data indicate that *two* bosonic modes are associated with superconductivity: the electron-phonon coupling constant (λ_{e-ph}) peaks at optimal doping, while the electron-spin fluctuation coupling constant (λ_{e-sf}) decreases monotonically with doping.

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