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Ultrafast quenching of electron-boson interaction and superconducting gap in a cuprate superconductor WENTAO ZHANG, CHOONKYU HWANG, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA, CHRISTOPHER SMALLWOOD, TRISTAN MILLER, GREGORY AFFELDT, Department of Physics, University of California, Berkeley, California 94720, USA, KOSHI KURASHIMA, Department of Applied Physics,Tohoku University, Sendai 980-8579, Japan, CHRIS JOZWIAK, Advanced Light Source, Lawrence Berkeley National Laboratory, Berkeley, California 94720, USA, HIROSHI EISAKI, Electronics and Photonics Research Institute, National Institute of Advanced Industrial Science and Technology, Ibaraki 305-8568, Japan, TADASHI ADACHI, Department of Engineering and Applied Sciences, Sophia University, Tokyo 102-8554, Japan, YOJI KOIKE, Department of Applied Physics,Tohoku University, Sendai 980-8579, Japan, DUNG-HAI LEE, LANZARA ALESSANDRA, Department of Physics, University of California, Berkeley, California 94720, USA — Ultrafast spectroscopy makes it possible to track similarities and correlations that are not evident near equilibrium. Time- and angle-resolved photoemission measurements on cuprate high-temperature superconductor reveals that below the superconductor's critical temperature, ultrafast excitations trigger a synchronous decrease of electron self-energy and superconducting gap. In contrast, electron-boson coupling is unresponsive to ultrafast excitations above the superconductor's critical temperature and in the metallic state of a related material. These findings open a new pathway for studying transient self-energy and correlation effects in solids.

Wentao Zhang
Materials Sciences Division, Lawrence Berkeley National Laboratory,
Berkeley, California 94720, USA

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