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Ultrafast Momentum-resolved Gap and Quasiparticle Dynamics in Bi2212 CHRISTOPHER SMALLWOOD, WENTAO ZHANG, TRISTAN MILLER, GREG AFFELDT, UC Berkeley, LBNL, CHRIS JOZWIAK, LBNL, HIROSHI EISAKI, Electronics and Photonics Research Institute, AIST, Japan, ASHVIN VISHWANATH, DUNG-HAI LEE, ALESSANDRA LANZARA, UC Berkeley, LBNL — Time- and angle-resolved photoemission spectroscopy (trARPES) is a direct and multifaceted probe of electron dynamics in crystalline solids. In cuprate high-temperature superconductors, it holds promise for understanding the interactions potentially linking superconductivity, charge density waves, and antiferromagnetism, which occur in close proximity in the cuprate phase diagram. We have used trARPES to measure the nonequilibrium gap and quasiparticle relaxation dynamics in Bi2212 while varying a range of dopings, temperatures, pump fluences, binding energies, and crystal momenta. Measurements reveal distinct signatures corresponding to superconducting and non-superconducting ordering tendencies, with potential indications of phase coexistence and/or competition.

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