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Deviation from $d_{x^2-y^2}$ gap form in Bi2201 revealed by photon-energy-dependent ARPES study MAKOTO HASHIMOTO, SLAC, RUIHUA HE, LBNL, ROB MOORE, DONGHUI LU, SLAC, YOSHIYUKI YOSHIDA, HIROSHI EISAKI, AIST, ZAHID HUSSAIN, LBNL, ZHI-XUN SHEN, Stanford University — Previous ARPES studies on optimally doped cuprate superconductor Bi2201 with moderate incident photon energies ($>$ 20 eV) reported that the gap function deviates from simple $d_{x^2-y^2}$ functional form in the antinode, implying that the pseudogap is different from superconductivity. On the other hand, some other ARPES studies using low photon energies ($<$ 10 eV) found that simple $d_{x^2-y^2}$ functional form extends to the antinode, suggesting that the pseudogap has the same origin as superconductivity. We study this contradiction by photon-energy-dependent ARPES. We show that, at low photon energies, background signal is dominant in the antinode and conceals the true gap magnitude. This confirms that the gap function in optimally doped Bi2201 is not simple $d_{x^2-y^2}$ functional form, and supports that the pseudogap is different order from simple superconductivity.

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