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Momentum Dependence of Fluctuation Spectrum of Slightly Underdoped Bi2212 from High Resolution Laser ARPES JIN MO BOK, JAE HYUN YUN, HAN-YONG CHOI, SungKyunKwan Univ, WENTAO ZHANG, X.J. ZHOU, Chinese Academy of Sciences, CHANDRA VARMA, University of California, Riverside — The Eliashberg function describes the spectral function of the fluctuation and their coupling to electrons and is therefore of fundamental importance in determining the normal state properties and pairing mechanism in metals. For conventional superconductors it was successfully extracted by the McMillan-Rowell procedure. For the cuprates, however, its momentum dependence has not yet been determined directly from experimental data. Here, we report the deduction of momentum dependence of Eliashberg function $\alpha^2F(\theta,\omega)$ at energy ω and along momentum cuts at angles θ normal to the Fermi surface from the high resolution laser angle resolved photoemission spectroscopy on slightly underdoped Bi2212 in normal state. Our principle result is that despite the θ dependence of the single-particle self-energy, the $\alpha^2F(\theta,\omega)$ collapse onto a single function of ω independent of θ. It has a weak peak around 0.05 eV and an intrinsic cut-off of about 0.4 eV or the energy of the band bottom in direction θ, whichever is lower. These results are consistent only with fluctuation spectra which have the correlation length of the lattice constant or shorter.

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