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Distinct Fermi-momentum dependent energy gaps in deeply underdoped Bi2212. K. TANAKA, W.S. LEE, D.H. LU, Stanford University, A. FUJIMORI, T. FUJII, University of Tokyo, * RISDIANA, I. TERASAKI, Waseda University, K. FUJITA, M. ISHIKADO, S. UCHIDA, University of Tokyo, D.J. SCALAPINO, University of California, Santa Barbara, T.P. DEVEREAUX, University of Waterloo, University of British Columbia, Z. HUSSAIN, Lawrence Berkeley National Laboratory, Z.-X. SHEN, Stanford University — Our recent angle-resolved photoemission spectroscopy study of deeply underdoped cuprate superconductors Bi2Sr2(Ca,R)Cu2O8 (R = Y or Dy) (Bi2212) suggested the presence of two distinct energy gaps exhibiting different doping dependences [1]. One gap, associated with the antinodal region where no coherent peak is observed, increases with underdoping - a behavior known for more than a decade and considered as the general behavior of the gap in the underdoped regime. The other gap, associated with the near nodal regime where a coherent peak can be observed in energy distribution curves (EDCs), does not increase with less doping - a behavior not seen in the single particle spectra before. The theoretical implications of these findings and temperature dependence of the spectra will be discussed. [1] Science, in press. (http://www.sciencemag.org/cgi/content/abstract/1133411)

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