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Novel feature in the nodal electron self-energy and strong temperature dependence of the Fermi velocity in the high temperature superconductor Bi2212 N.C. PLUMB, T.J. REBER, University of Colorado, J.D. KORALEK, LBNL and UC Berkeley, Z. SUN, J.F. DOUGLAS, University of Colorado, Y. AIURA, K. OKA, H. EISAKI, AIST Tsukuba, D.S. DESSAU, University of Colorado — Using low-photon energy angle-resolved photoemission (ARPES), we study the low-energy dispersion along the superconducting node in Bi2212 as a function of temperature. Less than 10 meV below the Fermi energy, the high-resolution data reveals a novel "kink"-like feature in the real part of the electron self-energy. The kink is strongest below the superconducting critical temperature and appears to vanish as the temperature is raised. A corollary of this finding is that the Fermi velocity, as measured over this small energy range, varies rapidly with temperature – increasing by approximately 35% from 50 to 200 K. This is in contrast to the slope of the dispersion at only slightly deeper energy, which changes little by comparison and whose behavior is ostensibly dominated by the well-known 70-meV kink. We discuss some possible physical origins of the new low-energy feature, including the possibility that it may arise from bosonic mode couplings and/or nonanalytic corrections to Fermi liquid theory in 2D.

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