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Selective Observation of Bilayer-Split Nodal Quasiparticles in $Bi_2Sr_2CaCu_2O_{8+\delta}$ by ARPES Using Low-Energy Tunable Photons T. YAMASAKI, T. KAMO, H. ANZAI, A. INO, M. ARITA, H. NAMATAME, M. TANIGUCHI, Graduate School of Science and Hiroshima Synchrotron Radiation Center, Hiroshima University, A. FUJIMORI, Department of Complexity Science and Engineering, University of Tokyo, Z.-X. SHEN, Department of Applied Physics and SSRL, Stanford University, M. ISHIKADO, S. UCHIDA, Department of Physics, University of Tokyo — Doubling the CuO_2 layer is considered to enhance the transition temperature of cuprate superconductors. However, since a recent breakthrough in angle-resolved-photoemission spectroscopy (ARPES) using low-energy excitation photons, it has been controversial whether the nodal bilayer splitting is resolvable or not. We have performed the photon-energy-dependent ARPES study of bilayer cuprate $Bi_2Sr_2CaCu_2O_{8+\delta}$ using low-energy synchrotron radiation ($h\nu$ = 7-8 eV). While the bonding and antibonding band are consistently resolved by a constant splitting width of $\Delta k \cong 0.008 A^{-1}$, the spectral weight drastically transfers between them with changing photon energy. The tunable photons enabled us to control the bonding-to-antibonding ratio from 0% to 162%. We will discuss the nodal quasiparticle properties using this bilayer-selective probe.

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