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Dual character of the electronic structure in $YBa_2Cu_4O_8$: conduction bands of CuO_2 planes and CuO chains A. KAMINSKI, T. KONDO, R. KHASANOV, J. KARPINSKI, S.M. KAZAKOV, N.D. ZHIGADLO, T. OHTA, H.M. FRETWELL, A.D. PALCZEWSKI, J.D. KOLL, J. MESOT, E. ROTENBERG, H. KELLER, Ames Lab. and Dept. of Physics and Astronomy, Iowa State University — We use microprobe Angle-Resolved Photoemission Spectroscopy (μARPES) to separately investigate the electronic properties of CuO_2 planes and CuO chains in the high temperature superconductor, $YBa_2Cu_4O_8$. In the CuO_2 planes, a two dimensional (2D) electronic structure with nearly momentum independent bilayer splitting is observed. The splitting energy is 150 meV at (π,0), almost 50% larger than in $Bi_2Sr_2CaCu_2O_{8+\delta}$ and the electron scattering at the Fermi level in the bonding band is about 1.5 times stronger than in the antibonding band. The CuO chains have a quasi one dimensional (1D) electronic structure. We observe two 1D bands separated by $\sim$ 550meV: a conducting band and an insulating band with an energy gap of $\sim$240meV. We find that the conduction electrons are well confined within the planes and chains with a non-trivial hybridization.

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