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Charge-orbital-lattice coupling in a quasi-one-dimensional cuprate revealed through energy shifts in the dd-excitation profile B. MORITZ, SLAC National Accelerator Laboratory, J.J. LEE, Stanford University, W.-S. LEE, SLAC National Accelerator Laboratory, M. YI, C.J. JIA, Stanford University, A.P. SORINI, Exponent Failure Analysis Associates, K. KUDO, Okayama University, Y. KOIKE, Tohoku University, K.J. ZHOU, C. MONNEY, V. STROCOV, L. PATTHEY, T. SCHMITT, Swiss Light Source, Z.-X. SHEN, Stanford University, T.P. DEVEREAUX, SLAC National Accelerator Laboratory — One-dimensional edge-sharing copper oxides provide a unique opportunity to study the effects of electron-lattice (e-l) interactions without complication from magnetic degrees of freedom which have a much lower energy scale in these compounds. Building on the characterization of e-l coupling in these materials from the elastic line profile found in resonant inelastic x-ray scattering (RIXS) at the O K-edge, new analysis of dd-excitation peak positions in Cu L-edge RIXS reveals abrupt shifts as one tunes the incident photon energy through the resonance. The observations point toward an orbital-specific coupling of the high-energy excited states of the system to the low-energy degrees of freedom. A Franck-Condon treatment of e-l coupling, consistent with other measurements, reproduces these shifts and highlights charge-orbital-lattice renormalization in the high energy d-manifold with obvious repercussions for other copper oxides.

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