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Evidence for Strong Forward Scattering and Coupling to Acoustic Phonon Modes in the High-Tc Cuprates[1] STEVEN JOHNSTON, IFW Dresden., I.M. VISHIK, W.S. LEE, Stanford University, F. SCHMITT, Stanford Universtiy, S. UCHIDA, University of Tokyo, K. KUJITA, Cornell University, S. ISHIDA, N. NAGAOSA, University of Tokyo, Z.X. SHEN, T.P. DEVEREAUX, Stanford University — The improved resolution of laser ARPES has revealed the presence of a new low-energy kink in the nodal dispersion of $Bi_2Sr_2Ca_2Cu_2O_{8+\delta}$, occuring at an energy below the maximum of the superconducting gap. This observation makes it difficult to interpret this renormalization in terms of coupling to any sharp bosonic modes. We examine coupling to the in-plane acoustic phonon branch via the modulation of the screened Coulomb interaction as an alternative explanation. We demonstrate that such a coupling is strongly peaked in the forward scattering direction and the resulting kink occurs at an energy shifted by the local gap $\Delta(\mathbf{k})$. Considerations for the reduction in screening with underdoping also provides a mechanism for understanding the doping dependence of the kink. These results indicate the importance of coupling to the acoustic branch with a strong forward scattering peak with important implications for the cuprates.

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