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Electronic origin of charge-density wave instability in underdoped YBCO RICCARDO COMIN, G. LEVY, I. ELFIMOV, G.A. SAWATZKY, A. DAMASCELLI, Quantum Matter Institute, UBC, Vancouver, Canada — Very recent diffraction and scattering results found direct (i.e. structural) evidence for an incommensurate charge-density-wave (CDW) in underdoped YBCO ($p \sim 0.1-0.12$), which appears to be electronically-driven and competing with superconductivity. We have investigated the origin of this CDW-instability by analyzing in detail the charge susceptibility starting from the experimentally available ARPES maps, and using an RVB-derived self-energy whose parameters are tuned to maximize comparison to ARPES data. We derive the non-interacting and full susceptibilities, which reveal how the electronic response evolves starting from the bare, uncorrelated (LDA-like) band structure to the fully dressed single-particle spectral function (incorporating both coherent and incoherent excitations). We then compare the temperature-dependent calculations to the scattering results and resolve the connection between single-particle spectroscopies and structural probes in YBCO.

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