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Local Signatures and Spectral Inversion of Bosonic Mode Coupling in a High-Temperature Superconductor[1] LAILA S. MATTOS, CHRISTOPHER R. MOON, BRIAN K. FOSTER, GABRIEL ZELTZER, MARTIN GREVEN, HARI C. MANOHARAN, Stanford University — High-resolution spectroscopy and mapping of the high-temperature superconductor $Bi_2Sr_2Ca_{0.93}Y_{0.07}Cu_2O_{8+d}$ was performed with a custom-built low-temperature scanning tunneling microscope. At optimal doping ($T_c \approx 96$ K), these materials exhibit unusually strong spectral sidebands characteristic of electron-boson coupling. The magnitude of these Holstein-like d-wave density of states replicas facilitates a spectral inversion procedure, from which the critical parameters of the bosonic coupling can be directly extracted. This results in electron-boson coupling $\lambda \approx 0.2$-0.4 and boson energy $\Omega \approx 70$-90 meV. Origins and implications of these excitations will be discussed.

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