Local Signatures and Spectral Inversion of Bosonic Mode Coupling in a High-Temperature Superconductor\textsuperscript{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\textsubscript{2}Sr\textsubscript{2}Ca\textsubscript{0.93}Y\textsubscript{0.07}Cu\textsubscript{2}O\textsubscript{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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Laila S. Mattos  
Stanford University

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