Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Temperature Evolution of the Electronic States & Multiple Gap Features in Bi$_2$Sr$_{2-y}$La$_y$CuO$_6$.\textsuperscript{1} AAKASH PUSHP, ABHAY PASUPATHY, KENJIRO K. GOMES, COLIN PARKER, Department of Physics, Princeton University, SHIMPEI ONO, CRIEPI, Japan, YOICHI ANDO, ISIR, Osaka University, ALI YAZDANI, Department of Physics, Princeton University — Like Bi$_2$Sr$_2$CaCu$_2$O$_{8+x}$, Bi$_2$Sr$_{2-y}$La$_y$CuO$_6$ samples show inhomogeneous gaps in the DOS at low temperature. We present atomic resolution STM spectroscopy measurements of the evolution of the DOS with temperature for optimal ($y=0.4$) and overdoped ($y<0.4$) samples and compare these measurements to Bi$_2$Sr$_2$CaCu$_2$O$_{8+x}$. In Bi$_2$Sr$_2$CaCu$_2$O$_{8+x}$, the low temperature ($T<T_c$) spectra of overdoped samples are all characterized by a single d-wave gap with sharp coherence peaks. In contrast, Bi$_2$Sr$_{2-y}$La$_y$CuO$_6$ shows a variety of spectra at low temperature ranging from those without gaps to ones with multiple gap features \cite{1}. By measuring the temperature evolution of these gap features at given lattice sites for various doping levels, we estimate the local temperature at which pairing develops in these samples. \cite{1} Boyer et al., Nat Phys 3, 802 (2007)

\textsuperscript{1}Work supported by NSF, DOE and PCCM-MRSEC.

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Date submitted: 27 Nov 2007

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