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Electronic Origin of the Nanoscale Variation of Pairing Gaps in $Bi_2Sr_2CaCu_2O_{8+x}$[1] ABHAY PASUPATHY, KENJIRO K. GOMES, AAKASH PUSHP, COLIN PARKER, Department of Physics, Princeton University, GENDA GU, Brookhaven National Laboratory, SHIMPEI ONO, CRIEPI, Japan, YOICHI ANDO, ISIR, Osaka University, ALI YAZDANI, Department of Physics, Princeton University — The magnitude of the low-temperature superconducting gap measured in $Bi_2Sr_2CaCu_2O_{8+x}$ shows large nanoscale spatial variations. On raising the temperature, these superconducting gaps disappear locally at temperatures above the superconducting transition temperature Tc. We present the first atomically resolved measurements of the spectrum of overdoped $Bi_2Sr_2CaCu_2O_{8+x}$ at temperatures where all gaps have closed. We show that the shape of this "normal" state spectrum is inhomogeneous over a length scale similar to that of the gap variation at low temperature. We then track the same lattice sites down to low temperature and observe the opening of gaps in the spectrum. We will discuss the relationship between the shape of the spectrum measured in the "normal" state at high temperature and the size of the low-temperature superconducting gap at the same atomic site.

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