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Visualizing Two Gaps in the High Temperature Superconductor

Bi-2201 MICHAEL BOYER, W.D. WISE, KAMALESH CHATTERJEE, MIT, MING YI, Stanford U., T. KONDO, Ames, T. TAKEUCHI, H. IKUTA, Nagoya U., E.W. HUDSON, MIT — The relationship between the superconducting and pseudogap states in the cuprates has been a subject of much interest as well as debate in the HTS community. At the forefront of this debate is whether the pseudogap exists below T_c , and if it does, in what capacity. We present scanning tunneling microscopy measurements which provide evidence for two distinct but simultaneously coexisting gaps in the density of states of $\text{Bi}_2\text{Sr}_2\text{CuO}_{6+x}$ (Bi-2201) below T_c ; one identified as the superconducting gap and the other, the pseudogap. In addition, we discuss our preliminary doping dependence measurements showing that the small (superconducting) gap scales with T_c while the larger (pseudogap) gap scales with T^* indicating a consistency with their identification.

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