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Scanning tunneling spectroscopy studies of Bi$_2$Sr$_2$CaCu$_2$O$_{8+x}$ from the strongly underdoped to strongly overdoped regime
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Using atomically resolved scanning tunneling microscopy (STS), we investigate the electronic structure Bi$_2$Sr$_2$CaCu$_2$O$_{8+x}$ across a range of doping levels from $x \sim 0.1$ up to as high as $\sim 0.23$, with significant changes in electronic structure observed above $p \sim 0.21$. New sample preparation processes [1] were used to produce heavily overdoped crystals suitable for the imaging of various forms of electronic heterogeneity. The evolution of the gap map $\Delta(r)$, coherence peak height map $A(r)$, the inelastic tunneling signatures $\omega(r)$, and the quasiparticle interference LDOS modulations, as well as their interrelations across this range of doping levels, will be presented.

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