

## Electronic Symmetry of the Cuprate Pseudogap States from SI-STM

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Direct visualization of the electronic structure within each crystalline unit cell of a solid is a new frontier in condensed matter physics(M. J. Lawler *et al.*, *Nature* **466**, 347 (2010)). We use this approach to study the pseudogap phase of cuprate high temperature superconductors. Recent experiments provide evidence that this phase may be associated with spontaneously broken electronic symmetries. By studying the Bragg peaks in Fourier transforms of Spectroscopic Imaging STM(SI-STM) images, and in particular by resolving both the real and imaginary components of these Bragg amplitudes, we find strong evidence for intra-unit-cell nematicity - the breaking of  $C_{4v}$  symmetry of the crystal lattice. We also find that the co-existing smectic modulations couple to the intra-unit-cell nematicity through the  $2\pi$  topological defects. Finally intra-unit-cell inversion symmetry breaking of the cuprate pseudogap states is discussed.