Abstract Submitted
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Investigating structural distortions in Bi based superconductors by scanning tunneling microscopy[1] MICHAEL M. YEE, ILIJA ZELJKOVIC, Department of Physics, Harvard University, ANJAN SOUMYANARAYANAN, Department of Physics, Massachusetts Institute of Technology, ELIZABETH MAIN, T. WILLIAMS, Department of Physics, Harvard University, TAKESHI KONDO, T. TAKEUCHI, HIROSHI IKUTA, Department of Crystalline Materials Science, Nagoya University, G.D. GU, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory, E.W. HUDSON, Department of Physics, Pennsylvania State University, JENNIFER E. HOFFMAN, Department of Physics, Harvard University — We use scanning tunneling microscopy to image symmetry-breaking structural distortions in the bismuth-based high-Tc superconductors, $Bi_2Sr_2Ca_{n-1}Cu_nO_{2n+4+x}$ (BSCCO). To elucidate the structure, we have implemented a new algorithm that quantifies atomic distortions with picometer resolution. Using this algorithm, we have observed an in-plane inversion-symmetry-breaking orthorhombic structural distortion in the BiO layer. We have also quantified the lattice distortions resulting from the use of Pb substitution to suppress the supermodulation in BSCCO. Each of these structural distortions break point group symmetries of the CuO_2 plaquette, which may be generally relevant to understanding the broken symmetries of the mysterious pseudogap state in high-Tc cuprates.

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