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Imaging the coexistence of superconductivity and a charge density modulation in $K_{0.73}$ Fe_{1.67}Se₂ superconductor PENG CAI, CUN YE, WEI RUAN, XIAODONG ZHOU, State Key Laboratory of Low Dimensional Quantum Physics, Department of Physics, Tsinghua University, AIFENG WANG, MENG ZHANG, XI-ANHUI CHEN, Hefei National Laboratory for Physical Science at Microscale and Department of Physics, University of Science and Technology of China, YAYU WANG, State Key Laboratory of Low Dimensional Quantum Physics, Department of Physics, Tsinghua University — We report scanning tunneling microscopy studies of the local structural and electronic properties of the iron selenide superconductor $K_{0.73}Fe_{1.67}Se_2$ with $T_C = 32$ K. On the atomically resolved FeSe surface, we observe well-defined superconducting gap and the microscopic coexistence of a charge density modulation with $\sqrt{2} \times \sqrt{2}$ periodicity with respect to the original Se lattice. We propose that a possible origin of the pattern is the electronic superstructure caused by the block antiferromagnetic ordering of the iron moments. The widely expected iron vacancy ordering is not observed, indicating that it is not a necessary ingredient for superconductivity in the intercalated iron selenides.

> Cun Ye State Key Laboratory of Low Dimensional Quantum Physics, Department of Physics, Tsinghua University

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