

Abstract Submitted
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Imaging Nematic Transitions in Iron-Pnictide Superconductors with a Quantum Gas¹ FAN YANG, STEPHEN TAYLOR, STEPHEN EDKINS², JOHANNA PALMSTROM, IAN FISHER, BENJAMIN LEV, Stanford University — The SQCRAMscope is a recently realized Scanning Quantum CRYogenic Atom Microscope that utilizes an atomic Bose-Einstein condensate to measure magnetic fields emanating from solid-state samples. Here, we combine the SQCRAMscope with an in situ microscope that measures optical birefringence near the surface of a sample to study iron-pnictide superconductors, where the relationship between electronic and structural symmetry-breaking resulting in a nematic phase is under debate. We conduct simultaneous and spatially resolved measurements of both bulk and surface manifestations of nematicity via transport and structural deformation channels, respectively. By performing local measurements of emergent resistivity anisotropy in iron pnictides, we observe sharp, nearly concurrent transport and structural transitions. More broadly, these measurements demonstrate the SQCRAMscopes ability to reveal important insights into the physics of complex quantum materials.

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