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Elasto-Scanning Tunneling Microscopy: Visualizing the Coupling of Strain to Electronic Nematicity in NaFeAs ERICK ANDRADE, AYELETE NOTIS, Columbia Univ, LINGYI XING, XIANCHENG WANG, CHANGQING JIN, Institute of Physics, Chinese Academy of Sciences, ABHAY PASUPATHY, Columbia Univ — Electronic nematicity is a widely observed phenomenon in the pnictide superconductors. In this phenomenon, the electronic structure breaks four-fold rotational symmetry and displays anisotropic behavior that can be observed in several transport and spectroscopic measurements. Understanding the driving force for the nematicity and its relationship to superconductivity remains a key goal in these materials. Motivated by transport measurements that indicate that the nematicity is strongly coupled to crystal strain, we developed a new experimental technique by which tunable uniaxial strain can be applied to a crystal while scanning tunneling microscopy is performed on the crystal surface. The technique allows us to track the same atomically resolved area of the sample as a function of strain. Using this new technique, we measure the response of the local density of states to strain in the tetragonal and orthorhombic phases of the crystal. In the orthorhombic phase, we find that strain can move structural domain walls but does not affect the magnitude of the electronic nematicity. On the other hand, in the tetragonal phase we find that strain controls the magnitude of the electronic nematicity, indicating that the material is in a paranematic state above the structural transition.

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