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Elasto-Scanning Tunneling Microscopy - New Insights into the nature of Electronic Nematicity in the Pnictides ERICK ANDRADE, AYELET NOTIS BERGER, Columbia University, XIAOYU WANG, University of Minnesota, LINGYI XING, XIANCHENG WANG, CHANGQING JIN, Institute of Physics, Chinese Academy of Sciences, RAFAEL FERNANDES, University of Minnesota, ANDREW MILLIS, ABHAY PASUPATHY, Columbia University — Mechanical strain is a powerful technique for tuning electronic interactions in quantum materials. In particular, strain affects nematic order in the same way that magnetic field affects ferromagnetic order. Here, we report a new experimental scanning probe technique that provides atomic-resolution insight into the effect of strain on electronic structure. We use this technique to study the coupling between strain and electronic nematicity in the iron pnictide superconductors. We show that while true long range nematic order in the pnictides is established at the tetragonal to orthorhombic structural transition temperature, the dominant effects on the electronic structure are associated with the magnetic phase transition. We complement this technique with temperature and doping dependent measurements of ordered domains across the phase diagram which show that strong nematic fluctuations persist all the way to the overdoped end of the superconducting dome, and that the strength of electronic nematic order in the pnictide NaFeAs is intimately connected to magnetic correlations.

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