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Short-ranged spin correlations and electronic nematicity in the pnictides: theoretical framework and application to elasto-scanning tunneling microscopy data RAFAEL FERNANDES, XIAOYU WANG, University of Minnesota, ERICK ANDRADE, AYELET NOTIS, Columbia University, LINGYI XING, XIANCHENG WANG, CHANGQING JIN, Institute of Physics, Chinese Academy of Sciences, ABHAY PASUPATHY, ANDREW MILLIS, Columbia University — The origin of electronic nematic order in iron-based superconductors is a hotly debated topic, with potential implications for superconducting pairing mechanism in these and other systems. Scanning tunneling microscopy experiments on Co-doped NaFeAs performed in the presence of elastic strain generated by piezoelectric devices reveal a rich temperature and doping dependence of the anisotropy of the electronic states both in real-space and momentum-space. Here, we argue that these observations are consistent with modest symmetry-breaking strain fields inducing unidirectional large-amplitude magnetic fluctuations even in the paramagnetic state. We present a theoretical model describing these effects and their coupling to low-energy electronic states, and discuss the constraints imposed by the experimental data on the character of the magnetic fluctuations.

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