Abstract Submitted
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Nematic fluctuations and acoustic phonon in the Raman response of iron-based superconductors[1] M. KHODAS, University of Iowa, W.-L. ZHANG, Chinese Academy of Sci (CAS), G. BLUMBERG, Rutgers University, Piscataway, New Jersey 08854, USA, P. RICHARD, H. DING, Chinese Academy of Sci (CAS), ATHENA S. SEFAT, Oak Ridge National Laboratory — Nematicity is a generic feature in the under- and optimally-doped iron-based superconductors. Raman and shear modulus studies indicate a critical behavior of the xy symmetry susceptibility towards an extrapolated temperature θ defining a hidden critical point tens of degrees below the structural transition T_S. It was proposed that Raman scattering is insensitive to the orthorhombic lattice deformation and a strong electron-phonon (ep) coupling could possibly lift the nematic transition from θ to T_S, while the ep coupling strength remains unknown. Here we report a very low frequency phonon mode associated with an orthorhombic lattice deformation near T_S contributing to the xy symmetry Raman response. We propose an ep coupling model to describe the Raman response and establish the connection of Raman susceptibility and elastic shear modulus. The ep coupling strength deduced from the Raman response is insufficient to lift T_S by 60 K above θ, suggesting that the structural phase transition at T_S and the hidden phase transition at θ have different origins.

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