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Nematic magnetoelastic effect contrasted between $Ba(Fe_{1-x}Co_x)_2As_2$ and FeSe YUWEN HU[1], XIAO REN, Peking University, China, RUI ZHANG, Rice University, USA, HUIQIAN LUO, Chinese Academy of Sciences, China, SHIGERU KASAHARA, TATSUYA WATASHIGE, Kyoto University, Japan, TAKASADA SHIBAUCHI, University of Tokyo, Japan, PENGCHENG DAI, Rice University, USA, YAN ZHANG, Peking University, China; Collaborative Innovation Center of Quantum Matter, China, YUJI MATSUDA, Kyoto University, Japan, YUAN LI, Peking University, China; Collaborative Innovation Center of Quantum Matter, China — Whether the nematic order ubiquitously found in Fe-based superconductors is driven by the spin or the charge or orbital degree of freedom is currently under heated debate. To elucidate its microscopic origin, we report a Raman scattering study of lattice dynamics, which quantify the extent of C_4-symmetry breaking, in $BaFe_2As_2$ and FeSe. FeSe possesses a nematic ordering temperature T_s and orbital-related band-energy split below T_s that are similar to those in $BaFe_2As_2$, but unlike $BaFe_2As_2$ it has no long-range magnetic order. We find that the E_g phonon-energy split in FeSe sets in only well below T_s, and its saturated value is substantially smaller than that in $BaFe_2As_2$. Together with reported results for the $Ba(Fe_{1-x}Co_x)_2As_2$ family, the data suggest that magnetism exerts a major influence on the lattice.

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