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Magnetically induced in-plane susceptibility and resistivity anisotropies in $BaFe_2As_2$ and FeSe MINGQUAN HE, LIRAN WANG, FRÉDÉRIC HARDY, THOMAS WOLF, PETER ADELMANN, CHRISTOPH MEINGAST, Institute for Solid State Physics, Karlsruhe Institute of Technology, 76021 Karlsruhe, Germany, FELIX AHN, ILYA EREMIN, Institut für Theoretische Physik III, Ruhr-Universität Bochum, D-44801 Bochum, Germany, JÖRG SCHMALIAN, Institute for Theory of Condensed Matter,Karlsruhe Institute of Technology, 76131 Karlsruhe, Germany — The in-plane resistivity and uniform magnetic susceptibility anisotropies of $BaFe_2As_2$ are obtained with a new method, in which a large symmetry-breaking uniaxial strain is applied using a substrate with a very anisotropic thermal expansion [1]. The resistivity anisotropy and its corresponding elastoresistivity exhibit very similar diverging behavior as those obtained from piezo-stack experiments [2]. This suggests that the resistivity anisotropy is more a direct measure of magnetism than of nematicity, since the nematic transition is no longer well-defined under a large strain. In strong contrast to the large resistivity anisotropy above T_N , the anisotropy of the in-plane magnetic susceptibility develops largely below T_N. Using an itinerant model, we show that the susceptibility anisotropy is determined by spin-orbit coupling and the orientation of the magnetic moments in the magnetically ordered phase. Similar results, however with opposite signs, are found for FeSe, suggesting that the nematic transition in FeSe is also of magnetic origin. [1] M. He et al., arXiv:1610.05575v2 (2016). [2] J.-H. Chu et al.,Science 337, 710 (2012).

Mingquan He
Institute for Solid State Physics, Karlsruhe Institute of Technology

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