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Ising-nematic spin correlations in the tetragonal state of uniaxial strained $BaFe_{2-x}Ni_xAs_2$ XINGYE LU, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, JITAE PARK, Heinz Maier-Leibnitz Zentrum (MLZ), TU Munchen, RUI ZHANG, HUIQIAN LUO, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, A.H. NEVIDOMSKYY, QIMIAO SI, PENGCHENG DAI, Department of Physics and Astronomy, Rice University — Superconductivity in iron pnictides can be derived from electron or hole-doping to their antiferromagnetic (AF) ordered parent compounds. In the normal state above the superconducting transition temperature (Tc), an in-plane resistivity anisotropy has been observed in uniaxial strained iron pnictides $BaFe_{2-x}T_xAs_2$ (T = Co, Ni) near the AF ordered state. This anisotropy has been suggested as a signature of the spin Ising-nematic phase that breaks the in-plane four-fold rotational symmetry of the underlying tetragonal lattice, but direct evidence for a spin nematic state is lacking. Here we use inelastic neutron scattering (INS) to show that low-energy spin excitations in uniaxial strained $BaFe_{2-x}Ni_xAs_2$ (x = 0, 0085) change from four-fold symmetry to two-fold symmetry in the tetragonal phase at temperatures corresponding to the onset of the in-plane resistivity anisotropy. Our results thus indicate that spin excitation anisotropy plays a crucial role in the electronic nematic behavior of iron pnictides.

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