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Magnetic Torque Evidence for Broken Rotational Symmetry in the Tetragonal Phase of $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ Single Crystals SHIGERU KASAHARA, HONGJIE SHI, RYUJI OKAZAKI, KENICHIRO HASHIMOTO, MINORU YAMASHITA, TAKASADA SHIBAUCHI, TAKAHITO TERASHIMA, YUJI MATSUDA, Kyoto University — The emergence of broken four-fold symmetry is found in the tetragonal phase of $\text{BaFe}_2(\text{As}_{1-x}\text{P}_x)_2$ single crystals [1] by in-plane anisotropy measurements of magnetic susceptibility. Magnetic torque detects a spontaneous growth of two-fold oscillations under in-plane field rotations, whose amplitude is linked to an order parameter of an electronic “nematic” phase. Our findings reveal that the spontaneous rotational symmetry breaking sets in far above the tetragonal to orthorhombic structural transition, which might be also linked to the unconventional superconductivity of this system [2,3].

[1] S. Kasahara, et al., Phys. Rev. B 81, 184519 (2010).

[2] K. Hashimoto, et al., Phys. Rev. B 81, 220501(R) (2010).

[3] Y. Nakai, et al., Phys. Rev. B 81, 020503(R) (2010).

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