

## In-Plane Electronic Anisotropy in Iron Pnictides

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The iron pnictides possess a competing and sometimes coexisting phase in their underdoped regime. This phase appears below the magneto-structural phase transition at  $T_S$ . We address the questions associated with a remarkable in-plane anisotropy in the charge transport of Co-underdoped  $\text{BaFe}_2\text{As}_2$ : (i) Why is the conductivity in the  $a$ -axis direction is higher than that in the  $b$ -direction ? (ii) Does the anisotropy persist up to temperatures well above  $T_S$  (nematicity) ? and (iii) Why is the anisotropy is enhanced by the Co doping ?

The measurements of resistivity and optical conductivity spectra on detwinned crystals reveals that the in-plane anisotropy arises primarily from an opening of anisotropic pseudogap with wider gap along the  $b$ -direction. As the sample quality is improved, the temperature range of nematicity shrinks, and the transition at  $T_S$  becomes a first-order like, suggesting that the nematicity may be an extrinsic effect. It turns out that the dopant Co atom works as a strongly anisotropic scattering center which causes the enhanced anisotropy.

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