

Distinct electronic nematicities between electron and hole underdoped iron pnictides

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We systematically investigated the in-plane resistivity anisotropy of electron-underdoped $EuFe_{2-x}Co_xAs_2$ and $BaFe_{2-x}Co_xAs_2$, and hole-underdoped $Ba_{1-x}K_xFe_2As_2$. Large in-plane resistivity anisotropy was found in the former samples, while *tiny* in-plane resistivity anisotropy was detected in the latter ones. When it is detected, the anisotropy starts above the structural transition temperature and increases smoothly through it. As the temperature is lowered further, the anisotropy takes a dramatic enhancement through the magnetic transition temperature. We found that the anisotropy is universally tied to the presence of non-Fermi liquid T-linear behavior of resistivity. Our results demonstrate that the nematic state is caused by electronic degrees of freedom, and the microscopic orbital involvement in magnetically ordered state must be fundamentally different between the hole and electron doped materials.