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Nematic Quantum Critical Fluctuations in iron-based superconductor $BaFe_{2-x}Ni_xAs_2$ ZHAOYU LIU, YI-FENG YANG, SHILIANG LI, Institute of Physics, CAS — We have systematically studied the nematic fluctuations in electron-doped iron-based superconductor $BaFe_{2-x}Ni_xAs_2$ by measuring the in-plane resistance change under uniaxial pressure. While the nematic quantum critical point can be identified though the measurements along the (110) direction as studied previously, quantum and thermal critical fluctuations cannot be distinguished due to similar Curie-Weiss-like behaviors. Here we find that sizable pressure-dependent resistivity along the (100) direction presents in all doping levels, which is against the simple picture of Ising-type nematic model. The signal along the (100) direction becomes maximum at optimal doping, suggesting that it is associated with nematic quantum critical fluctuations. Our results indicate that thermal fluctuations from striped antiferromagnetic order dominate the underdoped regime along the (110) direction. We argue that either there is a strong coupling between the quantum critical fluctuations and the fermions or more exotically, a higher symmetry may present around optimal doping.

Zhaoyu Liu
Institute of Physics, CAS

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