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Non-Fermi Liquid due to Orbital Fluctuations in Iron Pnictide Superconductors WEI-CHENG LEE, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign — We propose that the quantum fluctuations associated with quasi-1D d_{xz} and d_{yz} bands could result in a non-Fermi liquid behaviour in iron-pnictide superconductors. Using a five orbital tight binding model with generalized Hubbard on-site interactions, we find that within a one-loop treatment, a branch of overdamped collective modes develops at low frequency in channels associated with quasi-1D d_{xz} and d_{yz} bands. When the critical point for the C_4 symmetry broken phase (structural phase transition) is approached, the overdamped collective modes soften, and acquire increased spectral weight, leading to a non-Fermi liquid behavior at the Fermi surface. We argue that this non-Fermi liquid behavior is responsible for the recently observed zero-bias enhancement in the tunneling signal in quantum point contact spectroscopy. A key experimental test of this proposal is the absence of the non-Fermi liquid behaviour in the hole-doped materials. Our result suggests that quantum criticality plays an important role in understanding the normal state properties of iron-pnictide superconductors.

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