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Origin of the in-plane resistivity anisotropy of the iron pnictides: scattering rate or plasma frequency?[1] MICHAEL SCHTT, Univ of Minn - Minneapolis, JRG SCHMALIAN, Institute for Theoretical Condensed Matter Physics, Karlsruhe Institute of Technology, 76128 Karlsruhe, Germany, RAFAEL FERNANDES, Univ of Minn - Minneapolis — The prime experimental tool to probe the electronic nematic phase in the iron pnictides is the in-plane resistivity anisotropy, which can arise from an anisotropic scattering rate and/or an anisotropic plasma frequency. To shed light on its origin, we investigate the impact of spin fluctuations on the anisotropic ac conductivity of the iron pnictides. We show that two mechanisms contribute to the ac conductivity anisotropy. On the one hand, the inelastic scattering by spin fluctuations directly introduces an anisotropic scattering rate. On the other hand, the same inelastic scattering causes the renormalization of the Fermi velocity at the hot spots. Interestingly, while both mechanisms affect the ac conductivity anisotropy, only the first causes an anisotropy in the dc limit. In contrast, the second mechanism effectively renormalizes both the plasma frequency and the scattering rate. The latter effect opposes the anisotropy induced by the direct scattering of electrons, effectively reducing the observable scattering rate anisotropy. Our results agree qualitatively with recent experiments in detwinned iron pnictides and show the unavoidable entanglement between the scattering rate anisotropy and the plasma frequency anisotropy that arises from spin fluctuations.

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