Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Fermi-liquid like normal state electrodynamics in Co-doped $BaFe_2As_2$ ERIK VAN HEUMEN, ALONA TYTARENKO, YINGKAI HUANG, ANNE DE VISSER, University of Amsterdam, STEVEN JOHNSTON, University of Tennessee — Elucidating the origin of high temperature superconductivity requires two equally important ingredients: a framework for the normal state electron dynamics and a pairing interaction. In iron-pnictide high T_c superconductors the electron doped compounds, such as $BaFe_{2-x}Co_xAs_2$, are predicted to be weakly correlated Fermi liquids [1,2], but clear evidence has thus far been lacking. In this contribution we unveil the true nature of the normal state dynamics by carefully annealing $BaFe_{1.8}Co_{0.2}As_2$ single crystals. We show that optical spectroscopy experiments on such annealed crystals display a characteristic Fermi liquid scaling of frequency and temperature over a large energy range [3]. A comparison with as-grown single crystals shows that magnetic impurity scattering has thus far masked this behavior. A further analysis shows that a Fermi-liquid like single-particle self-energy can well describe both the mass renormalization and optical scattering rate, leaving little room for additional contributions.

[1] P. Werner et al., Nature Phys. 8, 1 (2012).
[2] L. De' Medici et al., Phys. Rev. B 83, 205112 (2011).
[3] C. Berthod et al., Phys. Rev. B 87, 115109 (2013).

Erik Van Heumen
University of Amsterdam

Date submitted: 14 Nov 2014 Electronic form version 1.4