Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Multi-Method Specific Heat Investigation of the Overdoped High-Tc Superconductor, $BaFe_2(As_{1-x}P_x)_2$[1] CAMILLA M. MOIR, NHMFL/FSU, SCOTT C. RIGGS, JOSE A. GALVIS, NHMFL, XIUJUN LIAN, NHMFL/FSU, JIUN-HAW CHU, University of Washington, PHILIP WALMSLEY, IAN R. FISHER, Stanford University, ARKADY SHEKHTER, GREG S. BOEBINGER, NHMFL — We examine the specific heat of the iron-based high-temperature superconductor, $BaFe_2(As_{1-x}P_x)_2$ for $0.44 \leq x \leq 0.60$ using three distinct methods: zero-magnetic-field analysis of the jump in specific heat at T_c, zero-magnetic-field determination of the electronic specific heat in the T=0 limit, and, most importantly, high-magnetic-field measurement of the electronic specific heat in which we suppress superconductivity to reveal the normal state specific heat [1]. We report the coupling strength parameter $\alpha_c = \Delta C/(\gamma_n T_c)$ as a function of doping. We also observe a finite, zero-temperature specific heat, which has also been reported in $Ba(Fe_{1-x}Co_x)_2As_2$ [2] and the cuprates [3]. By comparing the three methods, we are able to deduce a consistent treatment of specific heat measurements in this iron-based high-temperature superconductor. The data establish that mass enhancement occurs in multiple bands as optimal doping is approached and, furthermore, α_c deviates from the expected BCS value. [1] Moir, C.M. et. al. arXiv:1608.07510 (2016) [2] Gang, MU, et. al. Chinese Phys. Lett. 27 037402 (2010) [3] Brooks, J.S. and J. R. Schieffer, editors. Handbook of High-Temperature Superconductivity, (2007).

[1]The NHMF is supported by NSF/DMR-1157490.

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Date submitted: 11 Nov 2016 Electronic form version 1.4