Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

$LaFe_{0.6}Sb_2$: Strongly to weakly correlated system with Ni doping[1] J.C. MISURACA, Stony Brook University and the University of Illinois at Urbana-Champaign, J.W. SIMONSON, J.J. KISTNER-MORRIS, A. PURI, T. ORVIS, Stony Brook University, L.H. GREENE, University of Illinois at Urbana-Champaign, M.C. ARONSON, Stony Brook University and Brookhaven National Laboratory — Since the discovery of superconducting $Ca_{1-x}La_xFeAs_2$ with a T_c of 34 K [1], there has been an increasing interest in growing 112 iron pnictides in the search for high T_c superconductivity. We have grown large single crystals of $LaFe_{0.6}Sb_2$, which form in a tetragonal 112 structure with a significant amount of Fe vacancies, confirmed via single crystal x-ray diffraction. We present a doping study utilizing Ni which replaces both the Fe and vacancies while transforming the material from strongly to weakly correlated, as determined by low temperature heat capacity measurements. The Sommerfeld coefficient γ of the undoped crystal is 50 mJ/mol Fe K^2, indicating a large mass enhancement, while $LaNiSb_2$ is 5 mJ/mol Ni K^2 with no vacancies and up to 18% interstitial Ni according to energy-dispersive x-ray spectroscopy. When doping $LaFeSb_2$ with Ni, γ remains constant when normalized per transition metal, possibly indicating a constant density of states. A divergence appears in C/T vs. T^2 once the vacancies are filled, at 89% Ni, and the divergence remains until the $LaNiSb_2$ sample, which is a weakly correlated 1 K superconductor. [1] Katayama, et al. arXiv:1311.1303v1 (2013).

[1]We acknowledge funding via an NSSEFF from the Office of Assistant Secretary of Defense for Research and Engineering and via ICAM from the NSF International Materials Institute Award: DMR-0844115.

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Date submitted: 13 Nov 2013 Electronic form version 1.4