Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Cooperative Intermediate Valence and Anomalous Stability of the Kondo Lattice in $Ce_{1-x}Yb_xCoIn_5$[*1] R.E. BAUMBACH, L. SHU, M. JANOSCHEK, E. GONZALES, K. HUANG, T.A. SAYLES, J.J. HAMLIN, D.A. ZOCCO, C.A. MCELROY, M.B. MAPLE, University of California, San Diego, J. PAGLIONE, University of Maryland, P.-C. HO, California State University, Fresno, J.R. O'BRIEN, Quantum Design — We have investigated the chemical substitution series $Ce_{1-x}Yb_xCoIn_5$ ($0 \leq x \leq 1.0$) by means of X-ray diffraction, energy dispersive X-ray, specific heat, electrical resistivity, and magnetic susceptibility measurements. As Yb is substituted for Ce, the lattice constants remain roughly constant up to $x = 0.775$, contrary to Vegard's law, after which phase separation is observed for $0.8 \leq x < 1$. The superconducting transition temperature shows only a weak linear suppression with increasing x, while the coherence temperature remains constant up to $x = 0.775$. We also observe non-Fermi-liquid behavior for $0 \leq x \leq 0.775$ which is sensitive to the exact value of x, although there is no indication for a quantum critical point in the $T - x$ phase diagram. These results suggest that the Ce and Yb ions adopt cooperative intermediate valence states which preserve the Kondo lattice behavior and SC, while the associated valence fluctuations lead to strong modifications in the non-Fermi-liquid behavior as a function of x.

[1]Supported by grants U.S. DOE DE-FG02-04ER46105 and NSF 0802478.

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Date submitted: 28 Dec 2010 Electronic form version 1.4