

Abstract Submitted  
for the MAR06 Meeting of  
The American Physical Society

**Normal and superconducting state properties of the  $(\text{Pr}_{1-x}\text{Nd}_x)\text{Os}_4\text{Sb}_{12}$  system**<sup>1</sup> PEI-CHUN HO, WILLIAM YUHASZ, TATSUYA YANAGISAWA, NEIL FREDERICK, NICHOLAS BUTCH, TODD SAYLES, JASON JEFFRIES, BRIAN MAPLE, Physics & IPAPS/UCSD, YUICHI NEMOTO, TERUTAKA GOTO, Grad. Sch. Sci. & Tech./Niigata U., Japan — Our previous experimental studies of the  $(\text{Pr}_{1-x}\text{Nd}_x)\text{Os}_4\text{Sb}_{12}$  system revealed that: (1) superconductivity and ferromagnetism from both end compounds were suppressed almost monotonically toward  $x = 0.55$ , (2) retention of the antiferroquadrupolar order phase in  $(\text{Pr}_{1-x}\text{Nd}_x)\text{Os}_4\text{Sb}_{12}$  to higher values of  $x$  than in  $\text{Pr}(\text{Os}_{1-x}\text{Ru}_x)_4\text{Sb}_{12}$ , (3) two possible CEF energy level schemes in  $\text{NdOs}_4\text{Sb}_{12}$ , in which the ground state is either the  $\Gamma_6$  doublet or  $\Gamma_8^{(2)}$  quartet. Recent ultrasonic measurements in the  $\text{NdOs}_4\text{Sb}_{12}$  sample ( $x = 1$ ) revealed softening of the  $C_{44}$  mode, which indicated that the CEF ground state in this compound is more likely to be the  $\Gamma_8^{(2)}$  quartet. The lattice parameter in  $(\text{Pr}_{1-x}\text{Nd}_x)\text{Os}_4\text{Sb}_{12}$  seems to increase slightly from  $\text{PrOs}_4\text{Sb}_{12}$  ( $x = 0$ ) toward  $\text{NdOs}_4\text{Sb}_{12}$  ( $x = 1$ ). The T-x and H-x phase diagrams related to superconductivity, ferromagnetism, antiferroquadrupolar order, and the CEF energy level scheme for the  $(\text{Pr}_{1-x}\text{Nd}_x)\text{Os}_4\text{Sb}_{12}$  system for  $0 \leq x \leq 1$  will be discussed.

<sup>1</sup>The research at UCSD is funded by U.S. DOE and NSF; the research at Niigata U. is supported by the Grant-in-Aid for Scientific Research Area "Skutterudites" of MEXT, Japan.

Pei-Chun Ho  
IPAPS/UCSD

Date submitted: 29 Nov 2005

Electronic form version 1.4