

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Thermal expansion measurements on Fe substituted URu<sub>2</sub>Si<sub>2</sub>**<sup>1</sup>  
SHENG RAN, CHRISTIAN WOLOWIEC, INHO JEON, NAVEEN POUSE, NO-  
RAVEE KANCHANAVATEE, KEVIN HUANG, M. BRIAN MAPLE, Department  
of Physics and Center for Advanced Nanoscience, University of California, San  
Diego, USA, TYLER DAPRON, MARK WILLIAMSEN, DAVID SNOW, DINESH  
MARTIEN, STEFANO SPAGNA, Quantum Design, Inc., San Diego, USA — The  
search for the order parameter of the hidden order (HO) phase in URu<sub>2</sub>Si<sub>2</sub> has  
attracted an enormous amount of attention for the past three decades. The small  
antiferromagnetic moment of only  $\sim 0.03 \mu_B/U$  found in the HO phase is too small to  
account for the entropy of  $\sim 0.2R\ln(2)$  derived from the second order mean field BCS-  
like specific heat anomaly associated with the HO transition that occurs below  $T_0 =$   
17.5 K. A first order transition from the HO phase to a large moment antiferromag-  
netic (LMAFM) phase occurs under pressure. We have recently demonstrated that  
tuning URu<sub>2</sub>Si<sub>2</sub> by substitution of Fe for Ru reproduces the temperature vs applied  
pressure phase diagram and offers an opportunity to study the HO and LMAFM  
phases at atmospheric pressure. Motivated by this observation, we performed ther-  
mal expansion measurements on URu<sub>2-x</sub>Fe<sub>x</sub>Si<sub>2</sub> single crystals for various values of x  
in both the HO and LMAFM regions of the phase diagram. Interesting preliminary  
results have emerged from these studies that shed light on the LMAFM phase and  
its relationship with the elusive HO phase.

<sup>1</sup>Research in UCSD is supported by US DOE BES under Grant No.DE-FG02-  
04-ER46105(materials synthesis and characterization) and US NSF under Grant  
No.DMR-1206553(low temperature measurements).

Sheng Ran  
Department of Physics and Center for Advanced Nanoscience, University of California, San Diego, USA

Date submitted: 04 Nov 2015

Electronic form version 1.4