Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Hidden one-dimensional order in a three-dimensional metal
YEJUN FENG, Argonne National Lab, JIYANG WANG, A. PALMER, University of Chicago, B. MIHAILA, Los Alamos National Lab, J.-Q. YAN, University of Tennessee, P.B. LITTLEWOOD, T.F. ROSENBAUM, University of Chicago —
The rare-earth intermetallic GdSi has a spin-density-wave ground state originating from a cooperative interaction between nested itinerant spins and RKKY exchange-ordered local moments. We probe directly the stability of the SDW under pressure, using non-resonant x-ray magnetic diffraction. The incommensurate antiferromagnetic state remains unchanged up to 16.4 GPa, even though the lattice contracts by 5%! Band structure calculations show that the stability can be attributed to a persistently nested portion of the Fermi surface that grows increasingly one-dimensional under pressure. This cooperatively ordered itinerant and local spin ensemble is expected to provide a stable antiferromagnetic state in thin films, even with large lattice strain and lattice mismatch, and could be suitable for spin-valve and giant magnetoresistance device applications.

Yejun Feng
Argonne National Lab

Date submitted: 07 Nov 2013 Electronic form version 1.4