

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Magnetic Phase Diagram of the Binary Intermetallic GdSi D.M. SILEVITCH, University of Chicago, YEJUN FENG, Argonne National Laboratory, J.-Q. YAN, Univ. Tennessee and ORNL, JIYANG WANG, NAYOON WOO, T.F. ROSENBAUM, University of Chicago — The magnetic phase diagram of the binary intermetallic GdSi is investigated via magnetotransport and magnetization measurements along all three principal crystal axes. At zero applied field, two distinct phase transitions are observed at 53 and 54.7 K, corresponding to a spin flip and Neel transition, respectively. An additional ordered antiferromagnetic state appears for magnetic fields applied in the a-c plane, transitioning to a ferromagnetic ground state at $H \sim 20$ T. Although Gd ions are well characterized by local spin-only moments, and the magnetic anisotropy is small in this system, the additional antiferromagnetic ordering transition is observed to be considerably softer along c than along a. The interplay between this complex magnetic phase diagram, the band structure, and quantum effects will be discussed.

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Date submitted: 09 Nov 2012

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