

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Phonon Thermal Transport of URu₂Si₂: Broken Translational Symmetry and Strong-Coupling of the “Hidden Order” to the Lattice

PETER SHARMA, National High Magnetic Field Laboratory-LANL, N. HARRISON, M. JAIME, NHMFL-LANL, Y.S. OH, K.H. KIM, Seoul Nat'l University, C.D. BATISTA, LANL, H. AMITSUKA, Hokkaido University, J.A. MYDOSH, Max Planck Institute, Dresden — A dramatic increase in the total thermal conductivity (k) is observed in the Hidden Order (HO) state of single crystal URu₂Si₂. Through measurements of the thermal Hall conductivity, we explicitly show that the electronic contribution to k is extremely small, so that this large increase in k is dominated by phonon conduction. An itinerant BCS/mean-field model describes this behavior well: the increase in k is associated with the opening of a large energy gap at the Fermi Surface, thereby decreasing electron-phonon scattering. Our analysis implies that the “Hidden Order” parameter is strongly coupled to the lattice, suggestive of a broken symmetry involving charge degrees of freedom.

Peter Sharma
National High Magnetic Field Laboratory-LANL

Date submitted: 17 Nov 2005

Electronic form version 1.4