

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Evidence for a nematic component to the Hidden Order parameter in URu<sub>2</sub>Si<sub>2</sub> from differential elastoresistance measurements**  
MAXWELL SHAPIRO, Stanford University, SCOTT RIGGS, National High Magnetic Field Laboratory, AKASH MAHARAJ, SRINIVAS RAGHU, Stanford University, ERIC BAUER, RYAN BAUMBACH, National High Magnetic Field Laboratory, PAULA GIRALDO-GALLO, Stanford University, MARK WARTENBE, National High Magnetic Field Laboratory, IAN FISHER, Stanford University — In this work, we use a novel piezo actuator technique to measure the differential elastoresistance of the unconventional heavy fermion superconductor URu<sub>2</sub>Si<sub>2</sub>. Prior to the onset of superconductivity ( $T_c \sim 1.5$  K), URu<sub>2</sub>Si<sub>2</sub> undergoes a phase transition to a novel “Hidden Order” state which has defied comprehensive understanding for over 30 years. By tracking the temperature dependence of various elastoresistivity coefficients (proportional to the nematic susceptibility in the limit of linear response) above the Hidden Order transition temperature ( $T_{HO} \sim 17.5$  K), our measurements reveal an extended nematic fluctuation regime at high temperatures and a strong anomalous divergence (which scales as the singular contribution to the heat capacity) proximate to the Hidden Order transition. Understood within a Ginzburg-Landau framework for coupled order parameters, these measurements imply that the Hidden Order parameter is a two-component vector oriented in the [110] crystallographic direction which breaks the underlying four-fold symmetry of the lattice (in addition to other symmetries).

Maxwell Shapiro  
Stanford University

Date submitted: 14 Nov 2014

Electronic form version 1.4