

CMP Seminar
Michigan State University

J. A. Sauls
Department of Physics & Astronomy
Northwestern University

Signatures of Broken Time-Reversal Symmetry in Unconventional Superconductors

I will discuss the mechanisms responsible for broken time-reversal symmetry (BTRS) in unconventional superconductors, focusing on Sr_2RuO_4 , UPt_3 and the high pressure phase of superfluid ^3He . I summarize spectroscopic signatures for BTRS ranging from optical to microwave and acoustic spectroscopy for Sr_2RuO_4 , UPt_3 . I then discuss static signatures of BTRS and their connection with topological order of the ground-states of superfluid ^3He , and possibly Sr_2RuO_4 and UPt_3 [1]. I highlight the direct detections of BTRS in the heavy fermion superconductor UPt_3 , and the A-phase of superfluid ^3He . The former is the observation of a polar Kerr effect at optical frequencies [2], while the latter is based on the measurement of an anomalous Hall mobility of negative ions in $^3\text{He-A}$ [3]. I show how this result provides a direct observation of chiral edge currents in $^3\text{He-A}$. I conclude with open issues on the interpretation of the ground state and signatures of BTRS in Sr_2RuO_4 [4].

References

1. J. A. Sauls, Phys. Rev. B 84, 214509 (2011).
2. E. R. Schemm, et al. Science 345, 190 (2014).
3. H. Ikegami, Y. Tsutsumi, and K. Kono, Science 341, 59 (2013).
4. J. A. Sauls, Hao Wu and S-B. Chung, *Front. Phys.* **3**:36 (2015).

Monday, Nov. 30, 2015
4:10 PM
BPS 1400
Prof. Mark Dykman - Host