Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Probing Fermi Superfluids with Spin-Orbit Coupling Via Spin-Spin Correlation Functions BRANDON ANDERSON, RUFUS BOYACK, CHIEN-TE WU, K. LEVIN, James Franck Institute, University of Chicago — Systems of fermions with spin-orbit coupling (SOC) have emerged as an exciting area of research in recent years, in large part due to the possibility of observing topological phases. By applying an out-of-plane Zeeman field, a fermi superfluid with SOC can be driven through a topological phase transition, analogous to the the topological transition found in $p + ip$ superconductors. What is frequently missed in these topological transitions is beyond mean-field effects. We establish and characterize fluctuations associated with the standard mean field equations of the superfluid instability. This introduces bosonic degrees of freedom, at a level beyond Gaussian fluctuations, that must condense for the fermionic superfluid to be stable. We present a consistent treatment of these fluctuations in regards to both the condensate as well as in two-body correlation functions. In this context we study spin-spin correlation functions that reveal interesting structure associated with SOC admixed with superfluidity, including signatures of the topological phase transition.

Brandon Anderson
James Franck Institute, University of Chicago

Date submitted: 27 Feb 2015 Electronic form version 1.4