Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Orbital Angular Momentum and Spectral Flow in Two Dimensional Chiral Superfluids"

Masaki Oshikawa, University of Tokyo

Abstract: The orbital angular momentum in a chiral superfluid has posed a paradox for several decades. For example, for the $p+ip$-wave superfluid of N fermions, the total orbital angular momentum should be $N/2$ if all the fermions form Cooper pairs. On the other hand, it appears to be substantially suppressed from $N/2$, considering that only the fermions near the Fermi surface would be affected by the pairing interaction. To resolve the long-standing question, we studied chiral superfluids in a two-dimensional circular well, in terms of a conserved charge and spectral flows.

We find that the total orbital angular momentum takes the full value $N/2$ in the chiral $p+ip$-wave superfluid, while it is strongly suppressed in higher-order ($d+id$ etc.) chiral superfluids. This surprising difference is elucidated in terms of edge states.

References:
Y. Tada, W. Nie, and M. O. arXiv:1409.7459 (to be published in Phys. Rev. Lett.)

12:00noon
Tuesday, March 17, 2015
Duboc Seminar Room (4-331)

Host: Senthil Todadri