

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

Please note: This title/abstract is a revision to the one previously announced.

“Theory of Unconventional Disordered Superconductors[†]”

Boris Spivak
University of Washington

Abstract: We study suppression of superconductivity by disorder in unconventional (p,d-wave and higher orbital momenta) superconductors. At sufficiently high level of disorder, the distribution of the superconducting order parameter is highly inhomogeneous. We show that in the vicinity of the superconductor-metal transition the superconductivity is described by the Mattis model known from the theory of spin glasses. Consequently in this regime the samples which at low level of disorder are unconventional superconductors behave like s-wave superconductors with respect to all superconducting interference experiments. In particular, in the geometry of corner squid experiments there will be no flux trapped, there will be no current flowing along the edge of superconductor, and there will be no Majorana fermions inside the magnetic vortices. This is a universal property of the system which is independent of the sign of the interaction constant in the s-channel. We also predict the existence of (at least) two sequential low temperature transitions as a function of increasing disorder: an unconventional superconductor-to s-wave superconductor, and then an s-wave superconductor-to-metal transition. At zero temperature we study properties of the latter quantum transition.

12:00 noon
Monday, April 7, 2014
Duboc Seminar Room (4-331)

[†]Jointly sponsored by the Chez Pierre Seminar Series