NEW YORK CITY COLLEGE OF TECHNOLOGY
Physics Department
Center for Theoretical Physics

Exotic superconductivity of disordered Dirac fermions

Presented by:

Prof. Lia Krusin-Elbaum

The City College of CUNY
New York, NY

Thursday, January 30 at 12:00 PM
Namm, Room 823

Abstract

Recent discovery of topological insulators (TIs), a new class of materials that host topologically protected spin-helical Dirac surface states, launched the search for a topological superconducting analogue characterized by a fully gapped odd parity pairing state that could support Majorana bound states. Such a superconducting phase has important implications for a fault-tolerant quantum computing owing to the non-Abelian exchange statistics obeyed by Majorana fermions. Superconductivity reported thus far in some topological materials appears to be of bulk origin, with yet uncertain proximal connection to the topological Dirac fermion metal. In my talk I will discuss our most recent results on a three-dimensional topological material, Sb_2Te_3 synthesized under a modest pressure, where we have discovered nontrivial surface-like superconductivity with $T_c \sim 9$ K, the highest transition temperature among the TIs reported thus far at which the global coherence is acquired. The diamagnetic state of this new superconductor is very unusual, since a sharp Meissner response onsets at much higher temperature, above 50 K, and even in the normal state the system supports large orbital currents, while maintaining a robust singular spin response of the disordered Dirac fermions in the superconducting state. I will discuss our observations in the context of recent ideas of disorder assisted superconducting fluctuations that can turn Dirac semimetal into a superconductor.

Email: krusin@sci.ccny.cuny.edu

Light refreshments will be served.