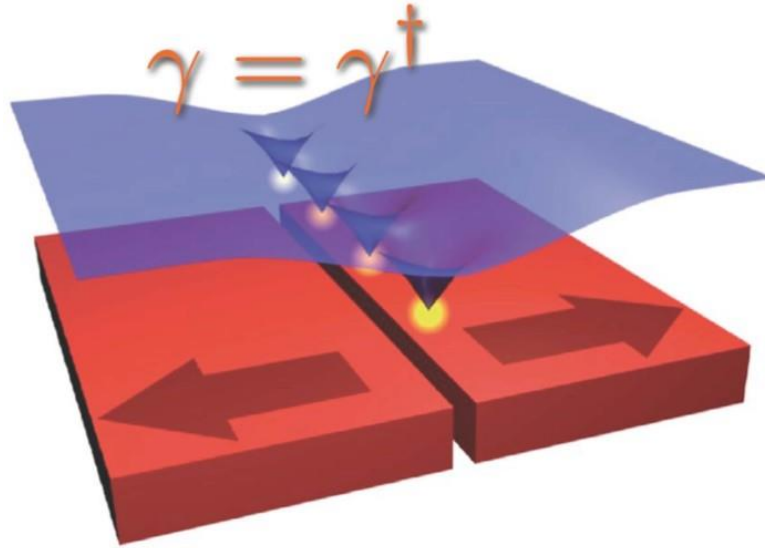


COLLOQUIUM



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Neutral fermions and a new state of matter: weird metals disguised as electrical insulators

Abstract

From an early age, we are taught that metals are good conductors of electricity and heat but that insulators are not. Over the past five years, this comforting picture has been upset by experiments on the compounds YbB_{12} and SmB_6 at high magnetic fields and low temperatures. In this talk I will describe our recent data from YbB_{12} in magnetic fields of up to 75 T. These and earlier results suggest a new state of matter that includes mobile, electrically neutral fermions. The latter may be Majorana fermions, particles that are their own antiparticle hypothesised by Ettore Majorana in 1937; they remain a controversial and active topic in particle physics (e.g., is the neutrino a Dirac or Majorana fermion?). In condensed-matter physics, interactions may cause electrons to masquerade as Majorana fermions. If this is true, it would be another instance of the fruitful cross-fertilization between condensed-matter physics and particle physics that has enhanced our knowledge of magnetic monopoles, Dirac and Weyl fermions and Higgs bosons.

3:00 p.m. – 4:00 pm Friday, October 2nd Virtual
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