DEPARTAMENTO DE FÍSICA FUNDAMENTAL
ÁREA DE FÍSICA TEÓRICA

Unpaired Majorana modes in Josephson junctions arrays with gapless bulk excitations.

Dr. Manuel Pino García

Department of Physics and Astronomy,
Rutgers The State University of New Jersey,
Piscataway, New Jersey 08854, USA.

The search for Majorana bound states in solid-state physics has been limited to materials which display a gap in their bulk spectrum. Recently, we have shown that Majorana can also appear in certain quasi-one-dimensional Josephson junctions arrays with gapless bulk excitations [1]. The bulk modes mediate a coupling between unpaired Majorana via the Ruderman-Kittel-Yosida-Kasuya mechanism. As a consequence, the lowest energy doublet acquires a finite energy difference. For realistic set of parameters this energy splitting remains much smaller than the energy of the bulk eigenstates even for short chains of length L~10. In this talk, I explain the JJA system and how to model it with an Ising-like Hamiltonian. A qualitative argument is employed to obtain the low-energy effective theory using unpaired Majorana modes. Numerical results are shown to confirm the validity of this effective theory and I will discuss problems that may arise in the experimental realization of our proposal.

[1] M. Pino, A. M. Tsvelik, and L. B. Ioffe, Phys. Rev. Lett. 115, 197001 (2015)

Día: Viernes 5 de enero de 2016 ; HORA: 12:30
Aula. V - FACULTAD DE CIENCIAS (TRILINGÜE)