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Detecting Majorana Fermions in Ferromagnetic Atomic Chains in Proximity to Spin-orbit Coupled *s*-wave Superconductor TONG ZHOU, NOAH FANQI YUAN, JAMES JUN HE, YAO LU, VIC KAM TUEN LAW, Department of Physics, Hong Kong University of Science and Technology, Clear Water Bay, Hong Kong, China, PATRICK LEE, Department of Physics, Massachusetts Institute of Technology, Cambridge MA 02139, USA — Recently, it was proposed that Majorana bound states could be observed experimentally in ferromagnetic atomic chains on the surface of two-dimensional superconducting lead (Pb). Using the scanning tunneling microscope (STM), the experimental group obtained the spatially resolved density of states and observed zero bias peaks at the end of the chains. In this work, we study the topological phases of the proposed system. With realistic parameters, we study the transport properties at different positions along the chains. At zero temperature, resonant zero bias peaks emerge at the ends of the chains in the topological regimes, thus confirming the existence of Majorana bound states in the system. However, our transport calculation shows that at finite temperature, conductance peaks at zero bias also arise in the trivial regime due to the presence of low-energy fermionic end states in the system. Therefore, this would suggest that the experimentally observed zero bias peaks can have alternative theoretical explanations.

Tong Zhou
Dept of Physics, Hong Kong University of Science and Technology,
Clear Water Bay, Hong Kong, China

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