Abstract Submitted
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Detecting a Majorana-Fermion Zero Mode Using a Quantum Dot[1] DONG E. LIU, HAROLD U. BARANGER, Duke University — We propose an setup for detecting a Majorana zero mode consisting of a spinless quantum dot coupled to the end of a p-wave superconducting nanowire [1]. The conductance through the dot is monitored by adding two external leads. We find that the Majorana bound state at the end of the wire strongly influences the conductance through the quantum dot: driving the wire through the topological phase transition causes a sharp jump in the conductance by a factor of 1/2. In the topological phase, the zero temperature peak value of the dot conductance (i.e. on resonance and symmetric coupling) is $e^2/2h$. In contrast, if the wire is in its trivial phase, the peak is e^2/h, or if a regular fermionic zero mode occurs, the conductance is 0. We also consider coupling the dot to both ends of the wire (two MBS), with a magnetic flux f through the loop. The conductance as a function of phase shows peaks at f/f0 = (2n+1)*pi which can be used to tune Flensberg's qubit system [PRL (2011)] to the energy degeneracy point.

[1] D. E. Liu and H. U. Baranger, PRB in press (2011); arXiv/1107.4338.

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