

Seminar

Viewing Rotation of Majorana Qubit on Bloch Sphere by Microwave Radiation due to Josephson Effects

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Time: 4:00pm, Oct. 18, 2016 (Tuesday) 2016 10 18 4:00 Venue: Room w563, Physics Building, Peking University

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Abstract

We propose a new way for manipulating Majorana qubits in nanowire topological superconductors [1]. The prototype setup consists of two one-dimensional topological superconductors coupled by a quantum tunneling junction [2]. We show theoretically that injecting current into the system induces a Landau-Zener-Stuckelberg interference between the parity states of Majorana qubit. Adjusting the current pulse and the gate voltage at junction, one can build a Landau-Zener-Stuckelberg interferometry as a universal gate for the Majorana qubit. The rotation of Majorana qubit on Bloch sphere can be monitored by analyzing spectra of microwaves radiated from the system, which includes a novel spectrum peak induced by the fractional Josephson effect associated with Majorana quasiparticles, in addition to that due to conventional Josephson effect of Cooper pairs. Our work is expected to enhance the exploration of Majorana physics [3,4] and eventually the implementation of topological quantum computation.

References:

[1] S. M. Albrecht et al., Nature 531, 206 (2016).

[2] Z. Wang, W.-C. Huang, Q.-F. Liang and X. Hu,

About the speaker