

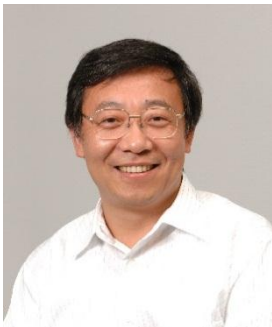


Seminar

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)

时间: 2016年10月18日 (周二) 下午4:00

Venue: Room w563, Physics Building, Peking University

地点: 北京大学物理楼, 西563会议室

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, arXiv.1607.08491.
- [3] T. Kawakami and X. Hu, Phys. Rev. Lett. 115, 117001 (2015).
- [4] Z. Wang, Q.-F. Liang, D.-X. Yao and X. Hu, Sci. Rep. 5, 11686 (2015).

About the speaker

胡晓教授从事理论物理研究，曾先后在日本东京大学、东北大学、美国国家标准技术研究所(NIST)等研究机构从事教学科研工作。1996年加盟日本国立物质材料研究机构。他在铜氧化物高温超导Abrikosov磁通格子的融化相变，本征约瑟夫森结THz电磁波辐射，拓扑超导马约纳拉準粒子探索，新奇拓扑光子晶体和拓扑绝缘体的理论设计等研究领域取得了一系列重要成果。至今已在Superconductor Science and Technology, Advanced Materials, Advances in Physics等重要期刊发表综述文章。