



Weekly Seminar

Majorana fermion induced Equal Spin Andreev reflections heterostructures



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Time: 4:00pm, April. 16, 2014 (Wednesday)

时间: 2014年4月16日 (周三) 下午4:00

Venue: Room 607, Conference Room A, Science Building 5

地点: 理科五号楼607会议室

Abstract

It has been shown theoretically that Majorana fermions induce resonant Andreev reflections and cause zero bias conductance peaks (ZBCP) in electron spectroscopy measurements. The Majorana induced ZBCP has been possibly observed in semi-conductor/superconductor heterostructures but the origin of the ZBCP is still under debate.

In this talk, we show that Majorana fermions induce a special type of Andreev reflection processes whereby electrons with certain spin polarization are reflected as holes with the same spin. On the other hand, electrons with opposite spin cannot undergo Andreev reflections and are reflected as electrons [1]. We call these processes Majorana fermion induced selective equal spin Andreev reflections (SESARs). We show that SESARs can be used to detect Majorana fermions. In a related work, we show that Majorana fermions in a special type of BDI class topological superconductors can be used to generate correlated spin-polarized currents [2].

[1] J. He, T. K. Ng, P. A. Lee and K. T. Law, Phys. Rev. Lett. 112, 037001 (2014).

[2] J. He, J. S. Wu, T.P. Choy, X. J. Liu, Y. Tanaka and K. T. Law, Nat. Comm. 5:3232 (2014).

About the Speaker

Prof. Law did his graduate work at Brown University and received his PhD in 2008. After spending one year as a joint postdoc fellow of HKUST-IAS and MIT, he moved to MIT in 2009. He joined the HKUST physics department in 2011 as an assistant professor.