



### Weekly Seminar

#### Majorana nanowires and topological quantum computation

**Hao Zhang**

*Tsinghua University*

**Time: 4:00Pm, Oct. 10, 2018 (Wednesday)**

**时间: 2018年10月10日 (周三) 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

Majorana zero-modes hold great promise for topological quantum computing. A semiconductor nanowire coupled to a superconductor can be tuned into a topological superconductor with two Majorana zero-modes localized at the wire ends. Tunneling spectroscopy in electrical transport is the primary tool to identify the presence of Majorana zero-modes, which manifests itself as a zero-bias peak (ZBP) in the differential conductance. The Majorana ZBP-height is predicted to be quantized at the universal conductance value of  $2e^2/h$  at zero temperature. Previous experiments, however, have shown ZBPs much smaller than  $2e^2/h$ . In this talk, I will show how the experimental progress gradually leads to the quantization of the Majorana conductance. Finally I will discuss the progress and challenge towards the first topological qubit based on these Majorana zero modes.

#### About the speaker

Hao Zhang received his B.S. in Physics from Peking University in 2010. He obtained his PhD in Physics (Albert Chang group) from Duke University in 2014, working on electron correlation effects in quantum point contacts. He then did his postdoc on Majorana nanowires in Leo Kouwenhoven group at TU Delft from 2014 to 2018. From 2018 August, he became an associate professor in the Physics Department of Tsinghua University. His research focuses on quantum transport in semiconductor/superconductor nano-devices, and their potential application in quantum information processing.