16 Dec **Thursday** **12:45 – 1:30** **Chair: HO Wen Wei (何文维)**

Controllable Majorana Platform with Topological Band Structure

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Professor LIU Xin got his B.S. degree from Nankai University and an M.S. degree from Chern Institute of Mathematics, Tianjin. He received his Ph. D. from Texas A&M University in 2012. After graduation, he had worked as a postdoctoral researcher at the Pennsylvania State University from 2012 to 2014 and Condensed Matter Theory Center, the University of Maryland from 2014-2015. He joined Huazhong University of Science and Technology in 2015.

Abstract:

There has been experimental evidence for the Majorana zero modes (MZMs) in solid-state systems, which are building blocks for potential topological quantum computing. It is important to design devices, in which MZMs are easy to manipulate and possess a broad topological non-trivial parameter space for fusion and braiding. Here, we propose that the Majorana vortex states in iron-based superconducting nanowires fulfill these desirable conditions. This system has a radius-induced topological phase transition, giving a lower limit to the radius of the nanowire. In the topological phase, there is only one pair of MZMs in the nanowire over a wide range of radius, chemical potential, and external magnetic field. The wavefunction of the MZM has a sizable distribution at the side edge of the nanowire. This property enables one to control the interaction of the MZMs in neighboring vortex nanowires and paves the way for Majorana fusion and braiding.