



Weekly Seminar

Observation of topological superconductivity and Majorana bound state in iron-based superconductor

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Time: 4:00pm, Aug. 30, 2017 (Wednesday)

时间: 2017年8月30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

The search for Majorana bound state (MBS) has recently emerged as one of most active research areas in condensed matter physics, due to its non-Abelian statistics which can be used for robust quantum computation. Currently, most experimental platforms for searching for MBS use the idea of topological insulator in proximity to BCS superconductor or similar ideas. Recently we discovered a new platform of Fe-based superconductor Fe(Te,Se) single crystal. By using spin-resolved and angle-resolved photoelectron spectroscopy, we observe that the iron-based superconductor $\text{FeTe}_{1-x}\text{Se}_x$ ($x = 0.45$, $T_c = 14.5$ K) hosts Dirac-cone type spin-helical surface states at Fermi level, which open an s-wave SC gap below T_c . By using scanning tunneling microscope on the same material, we clearly observe a pristine MBS inside a vortex core, well separated from non-topological bound states. These observations offer a robust platform for realizing and manipulating Majorana bound states at a relatively high temperature.

About the speaker

丁洪, 北京凝聚态国家实验室常务副主任和首席科学家。1990年毕业于上海交通大学, 1995年获美国伊利诺伊大学芝加哥分校的物理博士。长期在美国工作, 曾是美国波士顿学院大学物理系的教授。2008年至今为中科院物理所的全职研究员。长期从事凝聚态物理的实验研究, 主要利用光电子能谱研究高温超导体和拓扑材料的电子结构和物理机理。1996年在铜基高温超导体发现赝能隙, 2008年在铁基超导体中首次观察到s-波超导序参量, 2015年实验上首次在固体材料中发现外尔费米子。在学术期刊上发表了200多篇学术论文, 被SCI引用超过11000次。1999年获美国的斯隆奖, 2008年入选首批国家“千人计划”, 2011年被选为美国物理学会会士。