



Weekly Seminar

Ionic gate tuning of superconductivity in thin films

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Time: 4: 00 pm, Oct. 16, 2019 (Wednesday)

时间: 2019年10月16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

Traditional field effect transistors employ oxides as the gate dielectrics; the tuning capability is limited by the break down field of the oxides. Recently, another technique—ionic gating, was developed in which ionic liquid is used as the gating media. The tuning capability is enhanced by 1-2 orders of magnitude compared with that of traditional oxide dielectrics. As a result, novel physical phenomena emerge in this high carrier density regime, e.g. layered semiconductors are turned into superconductors, the transition temperature of high- T_c superconductors can be effectively tuned in a wide range, etc.

In the first part of my talk, I will present our research in a layered semiconductor— MoS_2 , in which we integrate ionic gating with other tuning techniques to achieve various device functionalities, such as double side gating in a vertical configuration, and superconducting-normal (SN) junction in a planar configuration. Accordingly, we realized an ambipolar superconducting field effect transistor; continuous switching between super/non-superconducting states at low temperatures; characterizing the microscopic parameters of the superconductivity in MoS_2 .

In the second part I will briefly introduce our recent efforts in tuning the superconductivity of a high- T_c superconductor—FeSe thin film. The relationship among T_c enhancement, Lifshitz transition and orbital effect is discussed.

About the speaker

陈其宏, 2010年本科毕业于中国科学技术大学, 2017年荷兰格罗宁根大学 (University of Groningen) 和香港科技大学 (The Hong Kong University of Science and Technology) 联合培养博士, 2017-2019年荷兰格罗宁根大学博士后, 于2019年8月加入中科院物理所超导国家重点实验室工作, 任特聘研究员。主要从事低维材料的生长及电子器件制备, 过渡金属硫族化合物半导体场效应诱发超导, 高温超导的离子液体原位调控等研究。