复旦大学物理系 物质科学报告

Time: 2:00pm, Tuesday, 2019.3.12
Location: C108, Jiangwan Physics Building

Quantum materials under extreme conditions

Shiyan Li
Department of Physics, Fudan University

Superconductors, spin liquids, and topological semimetals are typical quantum materials currently under intensive study. In this talk, I will present our investigation of these quantum materials in recent few years by putting them under extreme conditions, such as ultralow temperature, high magnetic field, high pressure, and ultrathin flake. By measuring the ultralow-temperature thermal conductivity and specific heat, we may judge the superconducting gap structure of a novel superconductor and whether a frustrated quantum magnet has a spin liquid ground state. By measuring the quantum oscillation of the magnetoresistance under high field, we may reveal the Fermi surfaces of a topological semimetal and judge whether it is topologically nontrivial or not. By applying high pressure, we expect to induce superconductivity in a topological semimetal and get a topological superconductor candidate. Finally, by gating the ultrathin flake of a quasi-two-dimensional material, we can finely tune its ground state over a broad carrier doping range and study the quantum phase transitions.

Prof. Shiyan Li got his B.S. in 1997 and Ph. D in 2002 under the supervision of Prof. Xianhui Chen at USTC. Then he did postdoc research for four and half years in Prof. Louis Taillefer's group at University of Toronto/University of Sherbrooke, Canada. In 2007, he came back to join the Department of Physics/Laboratory of Advanced Materials at Fudan University. In 2010, he was appointed "Eastern Scholar" at Shanghai Institutions of Higher Learning. In 2012, he was appointed the "Xie Xide" Young Chair Professor. He was awarded the 2015 Sir Martin Wood China Prize for Research of Physical Science. His research was supported by National Science Foundation for Excellent Young Scientists. His current research interests include superconductors, spin liquids, and topological materials. He has published more than 100 papers, including 16 in Physical Review Letters, 4 in Physical Review X, 1 in Nature Physics, 1 in Nature Nanotechnology, 2 in Nature Communications, and 2 in PNAS.