Seminar

Novel thermal effects of quantum nanomaterials

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地点: 理科五号楼607会议室

Abstract

In solid materials heat is carried by both lattice vibration (phonons) and mobile charges (electrons or holes). The relative contribution and interplay of these heat carriers have profound implications to the physics of condensed matter as well as its applications in energy technologies. Unlike electronic-magnetic and optical properties of solid materials, thermal and thermoelectric effects are more challenging to characterize, and often overlooked in investigation of materials physics. In this talk I will discuss our recent efforts in exploring exotic thermal and thermoelectric effects in quantum nanomaterials: 1) violation of the Wiedemann-Franz law in the strongly correlated electron material vanadium dioxide, where the electronic contribution to thermal conductivity is much less than what is expected from a Fermi liquid behavior; and 2) point defects-enhanced thermoelectrics, in which we tune the coupling between charge and heat transport in Bi2Te3-Bi2Se3 alloys by controlling their native point defects.

About the Speaker

Professor Junqiao Wu received a B.S. from Fudan University and a M.S. from Peking University, China, both in physics. He obtained a Ph.D. degree in applied physics from the University of California, Berkeley for work on nitride semiconductors and highly mismatched semiconductor alloys. He did postdoctoral research in the Department of Chemistry at Harvard University on phase transitions in transition metal oxides. He began his faculty appointment in the Department of Materials Science and Engineering at the University of California, Berkeley in 2006. His honors include the Berkeley Fellowship, the 29th Ross N. Tucker Memorial Award, the U.S. NSF Career Award, the U.S. DOE Early Career Award, and the U.S. Presidential Early Career Award for Scientists and Engineers (PECASE). He is a Changjiang Adjunct Professor in the School of Physics at Peking University. He has published more than 100 widely cited papers. The Wu group explores novel properties and applications of strongly correlated electron materials, phase transitions at the nanoscale, and optoelectronic, thermal and thermoelectric properties of semiconductors. More information can be found at http://mse.berkeley.edu/~jwu.