



Phase transitions in solids induced by ultrafast-laser: an overview of time- and angle-resolved photoemission spectroscopy (trARPES) and optical pump-probe studies

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报告摘要:

Angle-resolved photoemission spectroscopy (ARPES) is a powerful tool of probing electronic structures in solids, however static/conventional ARPES fails to visualize ultrafast dynamic processes and interactions, which are fundamental to understand intrinsic physics in condensed matter, e.g., light-matter interaction, electron-electron interplay and electron coupling with various collective modes. To directly study such interesting phenomena, one of the directions is time- and angle-resolved photoemission spectroscopy (trARPES), by implementing ultrafast pump-probe beams: a first infrared (IR) pulse as pump to stimulate/drive the system, and then a second ultraviolet (UV) / extremely ultraviolet (XUV) pulse as probe to detect transient electronic states from femtosecond to picosecond time scales. Here I will briefly introduce a high resolution trARPES, with its applications. Then I will talk about its applications and perspectives. In addition, I will show some of our newly studies of transient phase transitions in charge-density-wave (CDW) materials induced by mid-IR pumping. This might interpret the suppression of CDW, which competes with superconducting order in high- T_c cuprate superconductors.

报告人简介:

刘海云, 博士, 2005年毕业于上海复旦大学物理系, 获得学士学位; 同年加入中国科学院物理研究所超导实验室, 于2010年获得理学博士学位; 2010-2013年在德国汉堡自由电子激光中心与汉堡大学从事博士后研究; 2014-2015年获得马谱动态与物质结构研究所束线科学家位置; 2016年受聘为汉堡大学高级研究员。主要研究: 角分辨光电子能谱 (angle-resolved photoemission spectroscopy, ARPES) 与时间分辨角分辨光电子能谱(time-resolved ARPES, trARPES)系统研制和应用, 超导材料 (包括铜基与铁基超导体) 合成与电子结构研究, 以及超快光学方法研究电荷密度波 (charge-density-wave) 材料以及光致相变瞬态电子结构研究。

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