北京大学量子材料科学中心

International Center for Quantum Materials, PKU

Weekly Seminar

Dipolar and Quadrupolar Signatures of Topological Band Structures

Louis Bouchard
University of California, Los Angeles

Time: 4:00pm, Oct. 23, 2014 (Thursday)
时间：2014年10月23日 （周四）下午4:00
Venue: Room 607, Conference Room A , Science Building 5
地点：理科五号楼607会议室

Abstract

In recent years, the emergence of gapless topologically protected edge states in the solid state without the need to apply an external field has led to searches for new phases of condensed matter in new and existing materials. For example, some thermoelectrics and Kondo insulators have been shown to be topological insulators (TIs). The edge states give rise to exotic henomena include the quantum anomalous Hall effect, fractional quantum anomalous Hall effect, topological superconductor, fractional time-reversal invariance, topological crystalline insulator and the topological magneto-electric effect. Because the interesting properties of TIs are found at edges and interfaces, they are challenging to study experimentally. In this talk, I will present new experimental approaches to study the electronic and magnetic properties of such topological materials based on nuclear spin interactions. Among the techniques, we shall discuss a type of radioactive ion beam spectroscopy to resolve properties as function of depth, and with nanoscale resolution. Such studies not only reveal substantial modulations of the materials' properties at these length scales, but also reveal new parameters such as exchange integrals which cannot be obtained by other means. This could have implications in the design of devices and in the search for new topological effects and materials.

About the speaker

Dr. Bouchard obtained degrees in physics (McGill, 1996), biophysics (Toronto, 1999), chemistry (Princeton, 2005) and postdoc'd in materials sciences (Berkeley, 2005-2008) before joining the UCLA faculty in Chemistry and Biochemistry in 2008. At UCLA his research has focused on the development of analytical methodologies for catalysis, biomedical imaging and condensed-matter physics. He received awards from private foundations including the Beckman Foundation, the Dreyfus Foundation and the Spectroscopy Society of Pittsburgh.