PHYSICS AND ASTRONOMY
COLLOQUIUM

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"Topological Materials at the Nanoscale"

Abstract

Once or twice per decade, the discovery of a new class of electronic materials takes the world by storm, generating thousands of scientific publications per year, and broad hopes for practical applications. In this category are the so-called "topological materials," typically insulators hosting topologically protected metallic surface states whose strongly coupled spin and momentum degrees of freedom have prompted numerous proposals for nanoscale devices. After an introduction to topological materials, I will describe efforts in my laboratory to measure their properties via low temperature scanning tunneling microscopy. In the topological semimetal antimony (Sb), we study the effects of single-atom defects, we quantify parameters relevant to spintronics applications, and we establish new techniques for nanoscale band structure measurements. We further apply these techniques to SmB6, whose anomalous electronic properties have remained mysterious for almost 50 years, but may finally be explained as arising from a topological Kondo insulator phase.

Wednesday, November 20, 2013
3:30 p.m.
Bob Wright Centre
Room A104