Notre Dame Science
Department of Physics

THE SEARCH FOR SURFACE TRANSPORT IN 3D TOPOLOGICAL INSULATORS

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Monday, January 31, 2011
4:00 p.m. NSH 184

In principle, three dimensional topological insulators are bulk insulators with two-dimensional metallic surfaces that have a Dirac-like dispersion and spin chirality. Experimental signatures of these states primarily come from surface measurements: angle-resolved photoemission and tunneling spectroscopy. One important predicted property is “topological protection” of the surface metal against disorder. Yet, in real materials the surface states have proven to be very difficult to reliably study via bulk metals due to defects and the bulk conduction typically dominates that of the surface.

At the University of Maryland, we have synthesized single crystals of Bi_2Se_3 with exceptionally low bulk carrier density and high mobility, which has been uniquely achieved without chemical substitution. These materials have been systematically characterized via magnetoresistance measurements, including in pulsed magnetic fields, and optical reflection and transmission. I will assess the quality of our current evidence for bulk topological surface transport and offer a perspective on the experimental state of the field.

Condensed Matter Seminar

All interested persons are cordially invited to attend.