

Colloquium
Dahlem Center for Complex Quantum Systems

One-dimensional edge modes of three-dimensional topological insulators

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Location: Hörsaal A (1.3.14)

Abstract:

I will discuss two instances of one-dimensional conducting edge channels that can appear on the boundary of three-dimensional topological crystalline insulators, one supported by an experimental observation and the second one being a theoretical prediction. For the first part, I will discuss channels that appear at step edges on the surface of (Pb,Sn)Se. These conducting channels can be understood as arising from a Berry curvature mismatch between Dirac surface states on either side of the step edge. Experimentally, they have been found to be remarkably robust against defects, magnetic fields and elevated temperature. Second, I will introduce the concept of higher-order three-dimensional topological insulators, which have gapped surfaces, but support topologically protected gapless states on their one-dimensional physical edges.