

Abstract:

Topological insulators (TI) represent an unusual state of matter. While they are insulators in the bulk they are metals at the surface characterized by a linearly dispersing topologically protected surface state ("Dirac cone") bridging the bulk band gap. Owing to its large band gap, Bi₂Se₃ is an archetype TI and tremendous interest has emerged to investigate the electronic structure and transport properties of its pristine and adsorbate covered (0001) surface. The latter is motivated by the search for new exotic quantum effects and the question whether the topological state is robust against adsorption of magnetic and non-magnetic adsorbates. By contrast, quantitative information concerning the atomically resolved geometric surface structure is surprisingly scarce. This talk gives an overview over recent progress in the analysis of the atomic structure of the pristine and adsorbate covered Bi₂Se₃ (0001) surface as well as its relation to the electronic properties using surface x-ray diffraction, x-ray absorption spectroscopy, scanning tunneling microscopy and angular resolved photoemission spectroscopy experiments.