

# Spin-polarized photoemission from topological insulators thin films

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Spin polarized photoemission spectra from surfaces of Bi<sub>2</sub>Te<sub>3</sub> [1] and Sb<sub>2</sub>Te<sub>3</sub> [2] topological insulator (TI) thin films [3] prepared by the optimized procedure under the UHV [4] show up to 45% in-plane spin polarization in the Dirac cone near the Fermi level. We will discuss the spin-orbit entanglement mechanism behind the non-100% spin polarization in topologically protected surface states, and propose possible surface engineering solutions to secure intrinsic semiconductor properties in films grown by the MBE. Furthermore we will compare analytical band structure models with the DFT-based slab calculations. First angle-resolved photoemission results on TI heterostructures, and on bulk and surface doping of the TI thin films will also be presented and in the outlook we will provide ideas for future spectroscopic research directions on TI thin films.

## References:

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