Physikalisches Kolloquium des Fachbereich Physik
Arnimallee 14, D-14195 Berlin
Freitag, 23. Mai 2014, 15 h c.t., Hörsaal A (R. 1.3.14)

Electron Dynamics in Topological Insulators

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Topological insulators are small gap semiconductors in the bulk and have topological surface states imposed by symmetry. These surface states show a linear dispersion (Dirac cone) and due to the spin-orbit interaction (Rashba effect) the momentum and spin are locked. This property reduces backscattering and makes topological insulators promising candidates for spintronics. Time- and angle-resolved two-photon photoemission is used to study the dispersion and the electron dynamics of unoccupied topological surface states.

With circular polarized light information on the spin structure is obtained. Experimental results for bismuth chalcogenides and antimony tellurides are presented.