## SPIN STRUCTURE OF NON-MAGNETIC SURFACES BY ANGLE RESOLVED PHOTOEMISSION

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Theory of angle and spin-resolved photoelectron spectroscopy of systems with strong spin-orbit interaction will be presented, in particular, photoemission from spin-split and spin-polarized states will be discussed.

Starting with a complex-band-structure view on the Rashba splitting of surface states, a qualitative analysis of the Rashba effect for surface as well as for bulk continuum states will be given within a one-dimensional model [1]. Special attention will be paid to the spin polarization of the photocurrent from bulk continuum states, which has been recently experimentally observed on Bi(111) [2] and W(110) [3]. The role of photoemission final states and dichroism effects will be discussed.

Calculations of the spin-resolved photocurrent from Bi(111), W(110), and the  $Ag_2Bi$  surface alloy within an *ab initio* theory of photoemission will be presented based on the one-step formalism, in which the final states are treated as time-reversed LEED states. The theory employs the Bloch waves approach to electron scattering within the augmented plane waves formalism [4]. Relativistic effects are included within the two-component approximation. The spin-orbit coupling is shown to lead to a Rashba-type spin polarization of the angle-resolved photocurrent from bulk continuum states of a non-magnetic system.

## References

- [1] E.E. Krasovskii and E.V. Chulkov, Phys. Rev. B 83, 155401 (2011).
- [2] A. Kimura, E.E. Krasovskii, R. Nishimura, K. Miyamoto, T. Kadono, K. Kanomaru, E.V. Chulkov, G. Bihlmayer, K. Shimada, H. Namatame, and M. Taniguchi, Phys. Rev. Lett. **105**, 076804 (2010).
- [3] A.G. Rybkin, E.E. Krasovskii, D. Marchenko, E.V. Chulkov, A. Varykhalov, O. Rader, and A.M. Shikin, Phys. Rev. B 86, 035117 (2012).
- [4] E.E. Krasovskii, Phys. Rev. B 70, 245322 (2004).