European XFEL

THEORY GROUP MEETING

Thursday, 17th September 2015

11:00

AER 19 Seminar Room 4.14

Theoretical description of ARPES on the basis of the one-step model – Spin polarisation of surface states

by

Jan Minar

LMU University of Munich, Germany
NTC, University of Pilsen, Czech. Rep.

Various technical developments enlarged the potential of angle-resolved photo-emission (ARPES) tremendously during the last one or two decades. In particular improved momentum, energy and spin resolution as well as the use of photon energies from few eV up to several keV makes ARPES a rather unique tool to investigate the electronic properties of solids and surfaces [1,2,3]. These experimental developments needs to be closely followed by corresponding theoretical description beyond simple interpretations like e.g. spectral function or DOS. Here, we present a generalization of the state of the art description of the photoemission process, the so called one-step model that describes excitation, transport to the surface and escape into the vacuum in a coherent way. Within this approach we account for correlation effects by LSDA+DMFT, disorder by means of CPA. In this presentation I will concentrate on the spin polarised surface states as probed by the ARPES such as topological surface states in Bi_2Se_3 and Bi_2Te_3 [4] and their manipulation by using pump-probe spin resolved ARPES [5].

[1] A. Gray, etl al. Nat. Mat. 10, 759 (2011), A. Gray etal. Nat. Mat. 11, 957 (2012)

[2] Minar et al., J. El. Spec. Rel. Phen. 190, 159 (2013)

[3] M. Jourdan et al., Nat. Com. 5, 3974 (2014)

[4] Barriga et al. PRL 110, 216801 (2013) and PRX 4, 011046 (2014)

[5] Cacho et al., Phys. Rev. Lett. 114, 097401 (2015)