

O 43: Invited Talk (Jürg Osterwalder)

Time: Thursday 9:30–10:15

Location: HSZ 02

Invited Talk

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Measuring spin polarization vectors with ARPES — •JÜRIG OSTERWALDER¹, HUGO DIL^{1,2}, FABIAN MEIER^{1,2}, JORGE LOBO-CHECA³, LUC PATTHEY², and VLADIMIR N. PETROV⁴ — ¹Physik-Institut, Universität Zürich, CH-8057 Zürich — ²Swiss Light Source, Paul Scherrer Institut, CH-5232 Villigen — ³Departement Physik, Universität Basel, CH-4056 Basel — ⁴St. Petersburg Technical University, 195251 St. Petersburg, Russia

Combining an angle-resolved photoelectron spectrometer equipped with a three-dimensional spin polarimeter [1] and a new two-step fitting routine [2] we can measure absolute spin polarization vectors for individual bands intersected in a particular set of ARPES data. This procedure is crucial when analyzing strongly overlapping peaks or weak

signals sitting on a large unpolarized background, especially in the presence of non-collinear spins. It is robust against strong intensity variations due to matrix element effects because it references the spin polarization contribution of each band to the measured peak intensity. The method is applied to two-dimensional systems where spin-orbit effects lead to spin splittings and complex momentum-dependent spin structures. Presented case studies include surface alloys of Bi and Pb on Ag(111) that show a giant Rashba effect, as well as ultrathin Pb layers on Si(111), where by introducing the electron spin as an additional tag Rashba splittings of the order of 15 meV could be measured. We find in all cases that the states are 100% spin polarized. [1] M. Hoesch et al., *J. Electron Spectrosc. Relat. Phenom.* 124, 263 (2002). [2] F. Meier et al., *Phys. Rev. B* 77, 165431 (2008).