

Spin polarisation and dichroism effects of 2D materials

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Angle-resolved photoemission spectroscopy (ARPES) is a leading experimental probe for studying the electronic structure and complex phenomena in 2D quantum materials. On the theoretical side, it is quite common to interpret measured ARPES data by simple comparison with calculated band structure. However, various important effects, like matrix elements and final state effects, are in this way neglected. Here we extended and developed one-step model of photoemission [1,2] in order to describe and understand our experimental ARPES studies of transition metal dichalcogenides with the focus on the linear dichroism in MoS₂ [3], hidden spin polarisation in HfTe₂ [4,5], ultrafast femtosecond spin dynamics of Weyl points of WTe₂ [6] and proximity induced spin-orbit interaction in MoSe₂ over-layered with amorphous Pb films. Finally, we review also by us introduced new type of dichroism measurements, so called time-reversal dichroism in photoelectron angular distributions (TRDAD) to reveal hidden orbital pseudospin texture of WSe₂ and TiTe₂ [8].

References

- [1] Braun et al., *Physics Reports* **740**, 1 (2018).
- [2] H. Ebert et al., *Rep. Prog. Phys.* **74**, 096501 (2011).
- [3] Ryota Ono et al., *Phys. Rev. B* **103**, 125139 (2021)
- [4] J. Schusser, PhD Thesis (2021)
- [5] Youbi et al., *Phys. Rev. B* **101**, 235431 (2020)
- [6] M. Fanciulli et al., *Phys. Rev. Res.* **2**, 013261 (2020)
- [7] F. Alarab, V. Strocov et al., in preparation (2022)
- [8] S. Beaulieu et al. *Phys. Rev. Lett.* **125**, 216404 (2020)
- [9] S. Beaulieu et al, *npj quantum materials* **6**, 93 (2021)