Minicolloque n° OPS33 ☒**Oral** ☐ **Poster**

Spin-, time- and angle-resolved photoemission spectroscopy (STARPES) on the transition metal dicalchogenide WTe_2

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We combined a spin-resolved photoemission spectrometer with a high-harmonic generation (HHG) laser source, which allows to perform spin-, time- and angle-resolved photoemission spectroscopy (STARPES) experiments. We studied bulk WTe2 [1], a well-known transition metal dichalcogenides and a possible Weyl type-II semimetal [2,3,4]. Measurements at different femtosecond pump-probe delays and comparison with spin-resolved one-step photoemission calculations provide insight into the spin polarization of the electrons above the Fermi level in the region where Weyl points of WTe2 are expected [Figure 1]. We observe a spin accumulation above the Weyl points region, that is consistent with a spin-selective bottleneck effect due to the presence of spin polarized cone-like electronic structure. More in general, our results support the feasibility of STARPES with HHG, which despite being experimentally challenging provides a unique way to study spin dynamics in photoemission. Possibilities to move from femtosecond to attosecond time resolution in STARPES will be also discussed.

[1] M. Fanciulli *et al.*, Phys. Rev. Res. 2, 013261 (2020)
[2] A. A. Soluyanov *et al.*, Nature 527, 495 (2015)
[3] M. N. Ali *et al.*, Nature (London) 514, 205 (2014)
[4] X.-C. Pan *et al.*, Nat. Comm. 6, 7805 (2015)

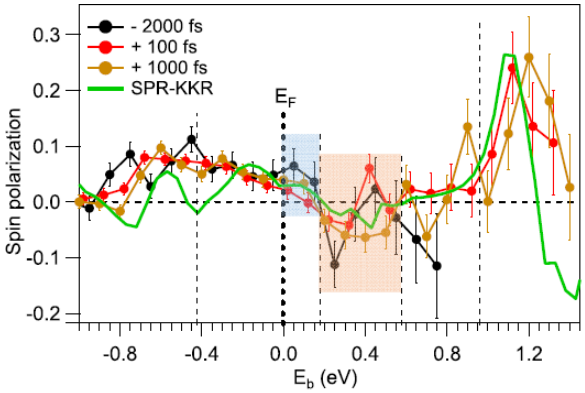

Figure 1 : Spin polarization around the Fermi level along a selected quantization axis and in a selected reciprocal space region corresponding to the Weyl points, as a function of pump-probe time-delay. Comparison with one-step photoemission calculations (SPR-KKR) is also shown.