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# How Photoelectron Spectroscopy can reveal THz-Driven Dynamics

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Low-energy Terahertz (THz) excitation at surfaces offers resonant access to a multitude of fundamental modes, e.g., lattice vibrations, molecular rotations, spin precession and the motion of free electrons [1]. The TELBE THz facility at HZDR aims at controlling and manipulating these degrees of freedom in the nonlinear regime and thereby resolving the resulting dynamics on a femtosecond timescale [2]. A highly promising method for probing THz-driven dynamics is THz pump –time-resolved ARPES probe, which is currently implemented at TELBE. Once established, this technique may offer a direct view on THz-induced changes of the electronic structure in highly relevant processes from metal-insulator-transitions [1] to superconductivity [3] and catalytic activity [4, 5]. The TELBE facility with its unparalleled high repetition rate of 100 kHz quasi-CW repetition rate offers ideal prerequisites for the duty-cycle-hungry ARPES probe. Along the path towards a THz-ARPES facility, a number of experimental challenges have to be mastered, such as residual THz streaking of the nascent photoelectrons.

[1] T. Kampfrath et al. Nat. Photonics 7, 680–690 (2013)

[2] B. Green et al., Sci. Rep. 6, 22256 (2016)

[3] D. Nicoletti, and A. Cavalleri, Adv. Opt. Photon. 8, 401 (2016)

[4] L. A. Pellouchoud and E. J. Reed, Phys. Rev. A 91, 052706 (2015)

[5] J. LaRue et al., Phys. Rev. Lett. 115, 036103 (2015)

**Primary author:** Dr DEINERT, Jan-Christoph (Helmholtz-Zentrum Dresden-Rossendorf)

**Presenter:** Dr DEINERT, Jan-Christoph (Helmholtz-Zentrum Dresden-Rossendorf)

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