

Einladung zum
Laser- und Quantenoptikseminar

Am Freitag, 30.06.2017, um 10:00 Uhr

Raum 46-387/388

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**Accessing microscopic coupling in solids
with momentum-resolving ultrafast techniques**

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Microscopic coupling phenomena in solids, e.g. the coupling of electronic and vibrational degrees of freedom, are typically described on the level of ensemble averages, based on the assumption of thermal distribution functions. In nanoscale materials and heterostructures, however, a refined understanding of electron-phonon interaction is required. Ultimately, a quantum state-resolved picture of microscopic coupling is desired. This is achievable with pump-probe techniques providing momentum-resolved information on ultrafast electron and phonon dynamics. We employ XUV-based time- and angle-resolved photoelectron spectroscopy (trARPES) and femtosecond electron diffraction (FED) to obtain a state-resolved understanding of microscopic coupling beyond ensemble-average descriptions [1,2,4]. Specifically, I will discuss electron and phonon dynamics in the semiconducting transition metal dichalcogenide WSe₂. TrARPES reveals the distribution and evolution of excited states in the Brillouin zone and their potential spin- and pseudospin-polarization [3]. The complementary momentum-resolved view on phonon dynamics is obtained by FED [4]. By combining this information, a microscopic picture of electron-lattice coupling and energy flow emerges.

References:

- [1] L. Waldecker, R. Bertoni, R. Ernstorfer, and J. Vorberger, [Phys. Rev. X 6, 021003 \(2016\)](#).
- [2] L. Waldecker, T. Vasileiadis, R. Bertoni, R. Ernstorfer, T. Zier, F. Valencia H., M.E. Garcia, and E.S. Zijlstra, [Phys. Rev. B 95, 054302 \(2017\)](#).
- [3] R. Bertoni, C.W. Nicholson, L. Waldecker, H. Hübener, C. Monney, U. De Giovannini, M. Puppin, M. Hoesch, E. Springate, R.T. Chapman, C. Cacho, M. Wolf, A. Rubio, and R. Ernstorfer, [Phys Rev. Lett. 117, 277201 \(2016\)](#).
- [4] L. Waldecker, R. Bertoni, H. Hübener, T. Brumme, T. Vasileiadis, D. Zahn, A. Rubio, and R. Ernstorfer, [Phys. Rev. Lett. in print, arXiv:1703.03496 \(2017\)](#).

Der Gast wird betreut von JProf. Dr. B. Stadtmüller

GÄSTE SIND HERZLICH WILLKOMMEN!