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Nichtgleichgewichtsdynamik kondensierter
Materie in der Zeitdomäne

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Open-Minded

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Decoding the Ultrafast Formation of a Fermi-Dirac Distributed Electron Gas

Gerald Rohde

Christian-Albrechts-Universität zu Kiel

A photoexcited electron gas is phenomenologically often described within multitemperature models, which consider the electronic system being internally thermalized for all times. Ultrafast nonthermal phenomena taking place right after photoexcitation are still largely unexplored. Time- and angle-resolved photoemission spectroscopy operated near the Fourier-limit and at a temporal resolution of ≈ 10 fs is used to sample the ultrashort time frame of 50 fs in the formation of a Fermi-Dirac distributed electron gas in graphite following an impulsive photoexcitation [1]. We identify and dissect experimentally characteristic stages associated with different interaction processes among the involved degrees of freedom, which have been predicted theoretically in the past [2,3]. The scenario involves electron-photon, electron-electron, and electron-phonon interaction affecting the response of the system on different timescales. Our results reveal experimentally the complexity of the transition from a nascent nonthermal towards a thermal electron distribution in a graphitic material with reduced screening.

References

- [1] G. Rohde et al., Phys. Rev. Lett. **121**, 256401 (2018).
- [2] M. Mittendorff et al., Nano Lett. **14**, 1504 (2014).
- [3] T. Winzer et al., J. Phys. Condens. Matter **25**, 054201 (2013).

Für diese Zeit steht eine Kinderbetreuung nach vorheriger Anmeldung zur Verfügung.

Contact: Prof. Dr. Björn Sothmann, Faculty of Physics
Phone: +49 (203) 37-91578 / Mail: bjoerns@thp.uni-due.de