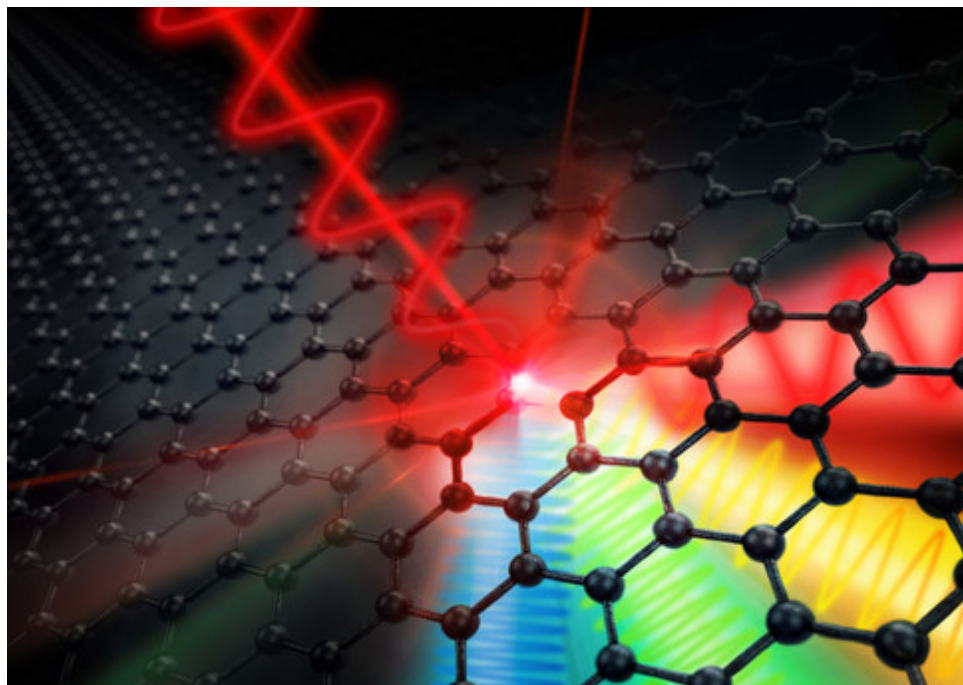


Ultrafast Science



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The scientific scope of Ultrafast Science research unit (D4 - [Prof. D. Turchinovich](#), [Prof. W. Pfeiffer](#)) is the studies of dynamics of electrons, lattice, and spins in condensed matter on the ultrafast timescales ranging from attoseconds (10^{-18} s) to picoseconds (10^{-12} s). Advanced experimental techniques used in our research unit range from attosecond XUV spectroscopy to femtosecond nano-optics to terahertz spectroscopy, implemented in many different modalities. All our research methods rely on highly-elaborate femtosecond laser infrastructure, established within the research unit.

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Selected Publications

W. Zhang et al., *Ultrafast terahertz magnetometry*
[Nature Commun. 11, 4247 \(2020\)](#)

H. A. Hafez et al., *Extremely efficient terahertz high-harmonic generation in graphene by hot Dirac fermions*

[Nature **561**, 507 \(2018\)](#)

X. Li et al., *Observation of Dicke cooperativity in magnetic interactions*

[Science **361**, 794 \(2018\)](#)

A. Tomadin et al., *The ultrafast dynamics and conductivity of photoexcited graphene at different Fermi energies*

[Science Advances **4**, eaar5313 \(2018\)](#)

M. Grechko et al., *Coupling between intra- and intermolecular motions in liquid water revealed by two-dimensional terahertz-infrared-visible spectroscopy*

[Nature Communications **9**, 885 \(2018\)](#)

K.-J. Tielrooij et al., *Out-of-plane heat transfer in van der Waals stacks through electron–hyperbolic phonon coupling*

[Nature Nanotechnology **13**, 41 \(2018\)](#)

H. Kim et al., *Direct observation of mode-specific phonon-band gap coupling in methylammonium lead halide perovskites*

[Nature Communications **8**, 687 \(2017\)](#)

T. Seifert et al., *Efficient metallic spintronic emitters of ultrabroadband terahertz radiation*

[Nature Photonics **10**, 483 \(2016\)](#)

H. Tu et al., *Stain-free histopathology by programmable supercontinuum pulses*

[Nature Photonics **10**, 534 \(2016\)](#)

Z. Jin et al., *Accessing the fundamentals of magnetotransport in metals with terahertz probes*

[Nature Physics **11**, 761 \(2015\)](#)

Z. Mics et al., *Thermodynamic picture of ultrafast charge transport in graphene*

[Nature Communications **6**, 7655 \(2015\)](#)

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