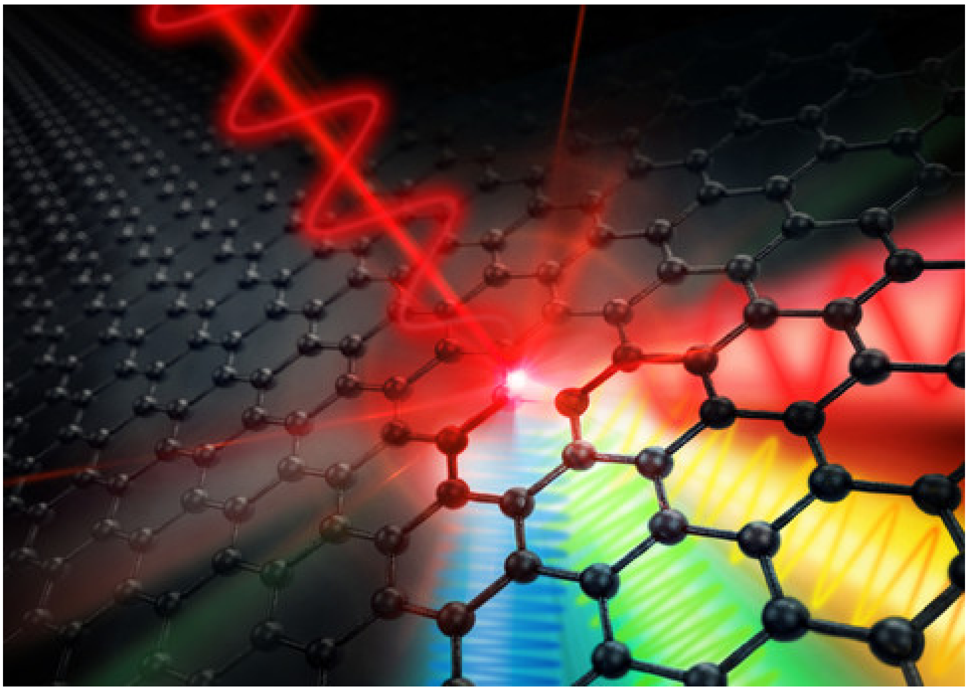
Ultrafast Science



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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)

Group Admin

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