UNIKASSEL VERSITÄT

Physikalisches Kolloquium

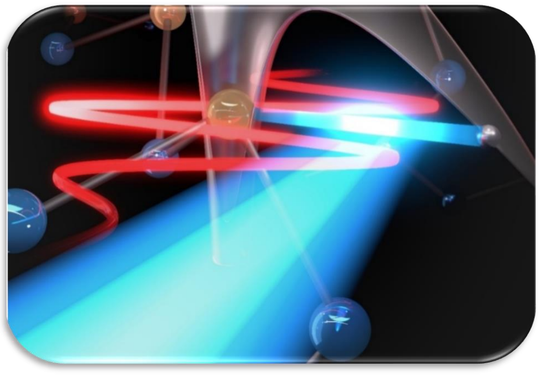
Thursday, 26.01.2023, 16:15, HS 100
Reception with coffee & cookies 16:00
(For university staff: please bring your own cup for sustainability reasons)

Prof. Dr. Thomas Fennel, Universität Rostock,
Strong-Field Nanophysics Group:

Light from Inside the Tunnel – Modelling and Imaging Ultrafast Electron Dynamics in Dielectrics

Abstract

Kerr-type nonlinearities form the basis of our physical understanding of nonlinear optical phenomena in moderately intense fields. In strong laser fields, additional higher-order nonlinearities enable high-harmonic generation, which is currently understood as the interplay of light-driven intraband charge dynamics and interband recombination. Remarkably, the nonlinear response emerging from the subcycle injection dynamics of electrons into the conduction band, i.e. from ionization, has been almost completely overlooked in solids and only partially investigated in the gas phase. In the talk I will illustrate the significance and impact of this ionization-induced nonlinearity in SiO_2 as a typical wide-bandgap dielectric and will show that, close to the material damage threshold, the so far unexplored injection current provides the leading contribution [1]. The ultrafast plasma dynamics following massive ionization can be traced via time-resolved coherent-diffractive imaging, as will be discussed for the case of SiO_2 nanospheres [2].



References

[1] P. Jürgens, B. Liewehr, B. Kruse, C. Peltz, D. Engel, A. Husakou, T. Witting, M. Ivanov , M. J. J. Vrakking, T. Fennel, A. Mermillod-Blondin, *Origin of strong-field induced low-order harmonic generation in amorphous solids*, Nat. Phys. 16, 1035 (2020)

[2] C. Peltz, J. A. Powell, P. Rupp, A. Summers, T. Gorkhover, M. Gallei, I. Halfpap, E. Antonsson, B. Langer, C. Trallero-Herrero, C. Graf, D. Ray, Q. Liu, T. Osipov, M. Bucher, K. Ferguson, S. Möller, S. Zherebtsov, D. Rolles, E. Rühl, G. Coslovich, R. N. Coffee, C. Bostedt, A. Rudenko, M. F. Kling and T. Fennel, *Few-femtosecond resolved imaging of laser-driven nanoplasma expansion*, New J. Phys. 24, 043024 (2022)

All of you interested in physics are cordially invited!

Contact: Prof. Dr. Jochen Mikosch, Structural Molecular Dynamics, More Information: uni-kassel.de/go/physikalisches_kolloquium