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Physikalisches Kolloquium
Einladung

Physics Colloquium
Invitation

Monday, 13 October 2025

Lecture Hall N24/H13, at 16:15

Coffee and cookies will be served in front of the lecture hall from 16:00

Strong-field nano-optics

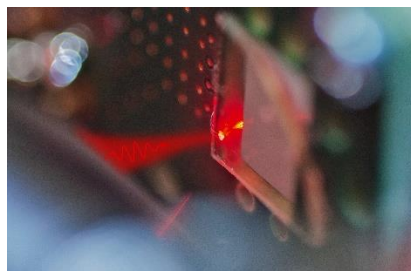
Prof. Dr. Péter András Dombi
HUN-REN Wigner Research Centre for Physics
Institute for Solid State Physics and Optics



 <https://wigner.hu/en/infopages/dombi.peter>

A nonperturbative regime of light-matter interactions is reached when the amplitude of the external electromagnetic fields that are driving a material approach or exceed the field strengths that bind the electrons inside the medium. In this strong-field regime, light-matter interactions depend on the amplitude and phase of the field, rather than its intensity, as in more conventional perturbative nonlinear optics [1]. Traditionally such strong-field interactions have been intensely investigated in atomic and molecular systems, and this has resulted in the generation of high-harmonic radiation and laid the foundations for contemporary attosecond science. Recently, a new field of research has emerged, the study of strong-field interactions in solid-state nanostructures. By using nanostructures, specifically those made out of metals, external electromagnetic fields can be localized on length scales of just a few nanometers, resulting in significantly enhanced field amplitudes that can exceed those of the external field by orders of magnitude in the vicinity of the nanostructures. I will review this highly interesting field of research, including our recent results [2], as well as some new development in ultrafast current control in solids [3].

- [1] P. Dombi et al., Rev. Mod. Phys. 92, 025003 (2020).
- [2] B. Bánhegyi et al., Phys. Rev. Lett. 133, 033801 (2024).
- [3] B. Fehér et al., Science Adv. 11, eadv5406 (2025).



Host: Prof. Dr. Wolfgang Schleich, Institute of Quantum Physics

Organisation: Prof. Dr. Jens Michaelis, Institute of Biophysics, jens.michaelis@uni-ulm.de, +49-731-50-23050