

THEODORE MAIMAN SEMINARS on physics 2018

IMPRS **APS**



Ultrafast electron control: from the particle accelerator on a chip to attosecond charge transfer in a Schottky junction

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11:30 h, Lecture Hall of Max Planck Institute of Quantum Optics

<https://www.attoworld.de/>

<http://www2.mpg.de/APS/>

<https://www.en.physik.uni-muenchen.de/>

The first part of the talk will deal with a new way of accelerating charged particles based on femtosecond laser pulses and nanophotonic structures. The concept is exactly the same as in classical RF and microwave accelerators, only with roughly five orders of magnitude faster oscillating driving fields and structures that are smaller by the same factor. With the help of such small lithographically produced dielectric structures we have demonstrated not only efficient acceleration of electrons, but also deflection and focusing. Currently, we are building a prototype "accelerator on a chip". The current status will be reported. In the second part of the talk, we will discuss ultrafast physics in graphene. Recently, we have reported lightfield-driven effects in graphene. We have observed Landau-Zener-Stückelberg interferometry in graphene, so repeated coherent Landau-Zener transitions of strongly driven electrons, which allow us to switch on a current within 1fs - the fastest turn-on of a current in any conductor reported. Furthermore, we will discuss ultrafast charge transfer over a graphene-SiC Schottky junction. This particular material combination has allowed us to observe charge transfer times as fast as 800as.