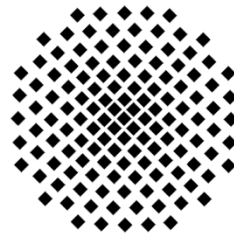


Stuttgarter Physikalisches Kolloquium

Fachbereich Physik, Universität Stuttgart
Max-Planck-Institut für Festkörperforschung
Max-Planck-Institut für Intelligente Systeme

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16:15 Uhr

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Universität Stuttgart, Pfaffenwaldring 57, 70569 Stuttgart-Vaihingen

Gastgeber: Prof. Dr. Harald Gießen, Universität Stuttgart, Telefon: 0711 - 685-65110

Lightwave choreography of electrons in quantum materials

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Abstract

Lightwave electronics has emerged as a vibrant research field at the interface of electronics and optics. The intriguing idea is to exploit the oscillating carrier field of light pulses as an ultrafast bias to accelerate electrons faster than a cycle of light. As these femto- to attosecond time scales are shorter than typical scattering times of electrons, lightwave-driven electrons can move ballistically even in solids, unleashing a fascinating coherent quantum world. We will discuss prominent examples of lightwave-driven dynamics, ranging from Bloch oscillations via topologically non-trivial electron trajectories to optical band-structure engineering and attoclocking of Bloch electrons. We also take slow-motion movies of single molecules and atomic defects and observe the quantum flow of electrons with the first all-optical subcycle microscope reaching atomic resolution. Our results offer a radically new way of watching and controlling elementary dynamics in nature or steer chemical reactions, on their intrinsic spatio-temporal scales.



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