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Attosecond electron emission probes of ultrafast nanolocalized fields¹

MATTHIAS KLING, Max Planck Institut of Quantum Optics, Garching, Germany & J.R. Macdonald Laboratory, Kansas-State University, KS, USA

Ongoing experimental and theoretical work on the temporal and spatial characterization of nanolocalized plasmonic fields will be presented. Because of their broad spectral bandwidth, plasmons in metal nanoparticles undergo ultrafast dynamics with timescales as short as a few hundred attoseconds. So far, the spatiotemporal dynamics of optical fields localized on the nanoscale has been hidden from direct access in the real space and time domain. Our ultimate goal is to characterize the nanoplasmonic fields not only on a nanometer spatial scale but also on ~ 100 attosecond temporal scale. Information about the nanoplasmonic fields, which are excited by few-cycle laser pulses with stable electric field waveform, can be obtained by the measurement of photoemitted electrons. We will present recent results on the large acceleration of recollision electrons in nanolocalized fields near dielectric nanoparticles following the excitation by 5-fs near-infrared laser pulses with controlled electric field waveforms.

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