

Optical control of electronic motion at solid interfaces

Agustin Schiffrin

Max-Planck-Institut für Quantenoptik, Hans-Kopfermann-Str. 1, D-85748 Garching, Germany
Quantum Matter Institute, University of British Columbia, Vancouver, B.C. V6T 1Z1, Canada

The advent of intense few-cycle visible/near infrared (VIS/NIR) laser pulses with stable and tunable carrier-envelope phase (CEP) has enabled the control of electromagnetic fields with attosecond time precision.¹ Here I will show how the strong electric field of these ultrashort light bursts with well-defined CEP is exploited to generate and manipulate an electronic signal in an insulator. When exposed to such radiation, the conductivity of the large bandgap material increases transiently and reversibly within ~ 1 fs. This allows to switch electric currents on and off, as well as to control their polarity, at near petahertz frequencies.

I will also discuss prospects for accessing the few- to sub- femtosecond dynamics of photo-induced charge redistribution in molecular systems adsorbed on surfaces via attosecond photoelectron spectroscopy.

1. Baltuska, A. et al. Attosecond control of electronic processes by intense light fields. *Nature* **421**, 611-615 (2003).