Accepted Manuscript

Research paper

Capturing atomic-scale carrier dynamics with electrons

Peter Baum, Ferenc Krausz

PII: S0009-2614(17)30300-7
DOI: http://dx.doi.org/10.1016/j.cplett.2017.03.073
Reference: CPLETT 34673

To appear in: *Chemical Physics Letters*

Received Date: 14 February 2017
Revised Date: 23 March 2017
Accepted Date: 27 March 2017

Please cite this article as: P. Baum, F. Krausz, Capturing atomic-scale carrier dynamics with electrons, *Chemical Physics Letters* (2017), doi: http://dx.doi.org/10.1016/j.cplett.2017.03.073

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Capturing atomic-scale carrier dynamics with electrons

Peter Baum[1,2] and Ferenc Krausz[1,2]

[1]Ludwig-Maximilians-Universität München, Am Coulombwall 1, 85748 Garching, Germany
[2]Max-Planck-Institute of Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany

Light-driven electronic motion unfolds on times as short as the cycle period of light and on length scales as small as the distance between two neighboring atoms in a molecule. Visualizing fundamental light-matter interactions therefore requires access to attosecond and picometer dimensions. Here we report on a potential unification of electron diffraction and microscopy with attosecond spectroscopy, which could provide a full space-time access to elementary electronic processes in matter and materials. We review recent progress in ultrafast diffraction and microscopy towards temporal resolutions approaching 10 fs by use of state-of-the-art microwave technology and discuss our latest findings on all-optical compression approaches offering the potential for sub-femtosecond, sub-optical-cycle resolution. Four-dimensional electron diffraction with attosecond-picometer resolution will access all dynamics outside the atomic core, offering an all-embracing insight into fundamental electron-nuclear dynamics of complex materials.

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/5377672

Download Persian Version:

https://daneshyari.com/article/5377672

Daneshyari.com