1-1-2006

Atomic physics with attosecond pulses

A. L'Huillier
Lunds Universitet

T. Remetter
Lunds Universitet

P. Johnsson
Lunds Universitet

J. Mauritsson
Lunds Universitet

K. Varjú
Lunds Universitet

See next page for additional authors

Atomic Physics with Attosecond Pulses

A. L'Huillier[1], T. Remetter[1], P. Johnsson[1], J. Mauritsson[1,2], K. Varjú[1], T. Ruchon[1], Y. Ni[3], F. Lépine[3], E. Gustafsson[1], M. Kling[3], J. Khan[3], R. López-Martens[4], K. J. Schafer[2], M. J. J. Vrakking[3]

[1]Department of Physics, Lund University, P. O. Box 118, SE-221 00 Lund, Sweden
[2]Department of Physics and Astronomy, Louisiana State University, Baton Rouge, Louisiana 70803-4001, USA
[3]FOM-Institute AMOLF, Kruislaan 407, 1098 SJ Amsterdam, The Netherlands
[4]Laboratoire d'Optique Appliquée, Ecole Nationale Supérieure des Techniques Avancées (ENSTA) - Ecole Polytechnique CNRS UMR 7639, 91761 Palaiseau Cedex, France

The availability of light sources of attosecond duration and of spectroscopic techniques that are capable of measuring three-dimensional electron/ion momentum maps opens new avenues for measurements of fundamental atomic and molecular properties.

In the work presented, we study the angular and energy-resolved electron emission from atoms exposed to a train of attosecond pulses in presence of a strong infrared laser field, using a velocity map imaging technique. The angular distributions depend on the timing of injection of the electron wave packets in the continuum relative to the laser cycle. We observe interference effects between wave packets created at a given time in the infrared cycle and those created half a cycle later. Information on the phase of the electron wave packet can be extracted by analyzing interference patterns obtained when two momentum-sheared electron wave packets interfere, in a way resembling spectral-shearing interferometry.