Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Strong-field electron tunnelling dynamics in atomic hydrogen

ROBERT SANG, U.SATYA SAINADH, HAN XU, ATIA-TUL NOOR, WILLIAM WALLACE, Australian Attosecond Science facility, Centre for Quantum Dynamics, Griffith University, Nathan, QLD 4111, Australia, XIAOSHAN WANG, School of Nuclear Science & Technology, Lanzhou University, Lanzhou, 730000, China, ANATOLI KHEIFETS, Research School of Physical Sciences and Engineering, The Australian National University, Canberra, ACT 0200, Australia, IGOR IVANOV, Centre for Relativistic Laser Science, Institute for Basic Science, Gwangju 500-712 Republic of Korea, KLAUS BARTSCHAT, NICOLAS DOUGUET, Department of Physics and Astronomy, Drake University, Des Moines, Iowa, 50311, USA, IGOR LITVINYUK, Australian Attosecond Science facility, Centre for Quantum Dynamics, Griffith University, Nathan, QLD 4111, Australia — An atom in the presence an ultra-short pulse of light can significantly distort the binding potential and it is possible for an electron to tunnel though the atomic binding potential. The 'Attoclock' technique, proposed by [Nat.Phys **4**, 565 (2008)] has facilitated the experimental measurements of tunnelling dynamics, such as tunneling time of an electron through the binding atomic potential. Previous attoclock experiments hinted at zero-tunnelling delays, however, exact theoretical solutions were not available to study the ionization dynamics in detail. Atomic Hydrogen (H) is the simplest atomic system and can be solved exactly using 3D-TDSE. We use the attoclock technique to investigate tunnelling dynamics with H using COLTRIMS and 770nm, 6fs pulses at intensities from 0.165-0.39 PW/cm^2. We compare these results with the full solution of 3D-TDSE.

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Date submitted: 26 Jan 2017 Electronic form version 1.4