Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Ionization of atomic hydrogen in strong infrared laser fields[1]
BRANT ABELN, DANIEL WEFLEN, KLAUS BARTSCHAT, TIMOTHY URNESS, Drake University, ALEXEI N. GRUM-GRZHIMAILO, Moscow State University — We used the matrix iteration method of Nurhuda and Faisal[2] to treat ionization of atomic hydrogen by a strong laser pulse. After testing our predictions against a variety of previous calculations, we obtained ejected-electron spectra as well as angular distributions for few-cycle infrared laser pulses with peak intensities of up to 10^{15} W/cm^2 by using the velocity form of the electric dipole operator in connection with an efficient time-propagation scheme. We demonstrate that our results are converged with the number of partial waves used in the expansion of the total wavefunction and that they are essentially free of numerical artifacts. The results are analyzed with particular emphasis on the effect of the carrier envelope for short pulses, and we produced movies to visualize the time-dependent electron density. Choosing parameters of currently available lasers, our predictions are expected to guide and be tested by ongoing experimental investigations.

[1]Work supported by the NSF under PHY-0757755.
[2]M. Nurhuda and F.H.M. Faisal, Phys. Rev. A **60** (1999) 3125.

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Date submitted: 27 Jan 2010 Electronic form version 1.4