Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Phase-dependent ionization suppression in atoms and molecules
DAVID B. FOOTE, JANE LEE, GUAN-YEU CHEN, WENDELL T. HILL, III, University of Maryland, College Park — Evolving methods in ultrafast laser pulse shaping allow a more complete investigation into the role of both the carrier envelope phase (CEP) and chirp in quantum control experiments. Recent investigations suggest that phase is one of the key parameters in quantum control mechanisms. To reveal the nature of the role phase plays we have employed a phase-only spatial light modulator (SLM) to shape 800 nm, sub-60 fs transform-limited pulses into a pair of transform-limited pulses ($\sim$ 60 fs) where the relative phase and temporal separation can be adjusted independently. At a fixed temporal separation, approximately three times the pulse width, the ionization signal was measured as the phase was varied over $2\pi+$. The ionization signals show a periodic dependence on the phase; at specific phase values the second pulse was rendered impotent, leading to an ionization suppression in both atomic and molecular systems. When the temporal separation was adjusted, a propensity for the relative phase between the two carriers to remain fixed was observed. This suggests that the phase difference could be responsible for "trapping" population in states inaccessible to ionization. These results and their implication will be presented in this poster.

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Date submitted: 31 Jan 2014 Electronic form version 1.4