Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Short pulse phenomena produced with long pulses[1] J.V. HERNÁNDEZ, B.D. ESRY, J.R. Macdonald Laboratory, Kansas State University, Manhattan, Kansas 66503 — We have found a way to produce to phenomena usually associated with ultrashort laser pulses using surprisingly long pulses. For example, the spatial asymmetry of a dissociating molecule has been observed to vary with the CEP for very short intense pulses [1-3]. By using chirped pulses with large bandwidths, however, our calculations show large, CEP-dependent asymmetry in dissociating H_2^+ even for 100 fs long pulses. This effect is also shown in the spatial asymmetry of an ionized atomic target. We also find varying the bandwidth and the direction of the chirp of the pulse can affect another multi-photon process, zero-photon dissociation of H_2^+ [4]. While it is not obvious how these unexpected phenomena can be explained in the usual time-dependent, field-based picture, their explanation in terms of a photon picture is rather straightforward, underscoring its utility even in the strong field regime. [1] M. F. Kling *et al.*, Science **312**, 246 (2006). [2] M. Kremer *et al.*, Phys. Rev. Lett. **103**, 213003 (2009). [3] V. Roudnev, B. D. Esry, and I. Ben-Itzhak, Phys. Rev. Lett. **93**, 163601 (2004). [4] J. H. Posthumus *et al.* J. Phys. B: At. Mol. Opt. Phys. **28**, 623 (2004).

[1]Supported by the Chemical Sciences, Geosciences, and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy.

Jesus V. Hernandez
J.R. Macdonald Laboratory, Kansas State University,
Manhattan, Kansas 66503

Date submitted: 07 Feb 2011 Electronic form version 1.4