

Abstract Submitted  
for the DAMOP14 Meeting of  
The American Physical Society

**Carrier-envelope phase dependences of  $D_2$  dissociation into Rydberg deuterium fragments**<sup>1</sup> M. ZOHRABI, BEN BERRY, U. ABLIKIM, NORA G. KLING, TRAVIS SEVERT, BETHANY JOCHIM, SHUO ZENG, D. URSREY, K.D. CARNES, B.D. ESRY, I. BEN-ITZHAK, J. R. Macdonald Laboratory, Physics Dept., Kansas State University, Manhattan, KS, USA — Control via the carrier-envelope phase (CEP) has been observed experimentally as asymmetries in the molecular dissociation direction, and more rarely as oscillations in the dissociation yield. A general theory of CEP dependences attributes these oscillations to interference of dissociation pathways involving a different net number of photons [1]. The laser-induced dissociation of  $D_2$  provides an excellent test bed for the generality of this theory. Our measurements of long-lived  $D^*$  fragments exhibit strong oscillations of the asymmetry and yield with CEP in both low- and high-energy dissociation. As predicted, the periodicity shows 1-photon difference in the asymmetry and 2-photon difference in the yield. Moreover, at some dissociation energies we can identify smaller contributions from interfering dissociation paths with a larger net photon-number difference.

[1] V. Roudnev and B. D. Esry, Phys. Rev. Lett. **99**, 220406 (2007)

<sup>1</sup>Supported by the Chemical Sciences, Geosciences, and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy, Grants DE-FG02-86ER1349 and DE-FG02-09ER16115.

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Date submitted: 31 Jan 2014

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