Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Observing molecular dynamics with time-resolved 3D momentum imaging[1] F.P. STURM, T. WRIGHT, I. BOCHAROVA, D. RAY, N. SHIVARAM, J. CRYAN, A. BELKACEM, T. WEBER, Lawrence Berkeley National Lab, R. DÖRNER, Geothe University Frankfurt — Photo-excitation and ionization trigger rich dynamics in molecular systems which play a key role in many important processes in nature such as vision, photosynthesis or photoprotection. Observing those reactions in real-time without significantly disturbing the molecules by a strong electric field has been a great challenge. Recent experiments using Time-of-Flight and Velocity Map Imaging techniques have revealed important information on the dynamics of small molecular systems upon photo-excitation. We have developed an apparatus for time-resolved momentum imaging of electrons and ions in all three spatial dimensions that employs two-color femtosecond laser pulses in the vacuum and extreme ultraviolet (VUV, XUV) for probing molecular dynamics. Our COLTRIMS style reaction microscope can measure electrons and ions in coincidence and reconstruct the momenta of the reaction fragments in 3D. We use a high power 800 nm laser in a loose focusing geometry gas cell to efficinetly drive High Harmonic Generation. The resulting photon flux is sufficient to perform 2-photon pump-probe experiments using VUV and XUV pulses for both pump and probe. With this setup we investigate non-Born-Oppenheimer dynamics in small molecules such as C_2H_4 and CO_2 on a femtosecond time scale.

[1]Supported by Chemical Sciences, Geosciences and Biosciences division of BES/DOE.

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Date submitted: 31 Jan 2014 Electronic form version 1.4