Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Complementary Imaging of the Nuclear Dynamics in Laser-Excited Diatomic Molecular Ions in the Time and Frequency Domains[1]
ALEX KRAMER, Drake University, M. MAGRAKVELIDZE, NWMSU, K. BARTSCHAT, Drake University, U. THUMM, KSU — We investigated the bound and dissociative nuclear motion of vibrationally excited diatomic molecular by numerically calculating fragment-kinetic-energy-release spectra in the time and frequency domains. While the time-domain analysis shows nuclear oscillation periods, revival times, and the nuclear-probability-density evolution, quantum-beat (QB) imaging of the bound nuclear motion in the frequency domain complements time-domain investigations of the nuclear dynamics by revealing (i) QB frequencies and the nodal structure of vibrational states within a given adiabatic molecular potential curve and (ii) laser-electric-field-dressed molecular potential curves [1]. Our study of the variances and uncertainty products indicates increasing classical characteristics of the nuclear wave packet motion and fine-structure effects for increasingly massive dimers [2].

[1] M. Magrakvelidze, A. Kramer, K. Bartschat, and U. Thumm, Submitted to J.Phys. B (2014).
[2] M. Magrakvelidze and U. Thumm, Phys. Rev. A 88, 013413 (2013).

[1]Supported by the Chemical Sciences, Geosciences, and Biosciences Division, Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy under Grant No. DE-FG02-86ER13491 and through NSF grants PHY-1068752 and PHY-1068140.

Maia Magrakvelidze
NWMSU

Date submitted: 31 Jan 2014 Electronic form version 1.4