Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Quantum-beat analysis of the rotational-vibrational dynamics in $\mathbf{D}_2^{+}$[1] UWE THUMM, Kansas State University, MARTIN WINTER, RUEDIGER SCHMIDT, TU Dresden — The rapid ionization of D_2 in a short and intense laser pulse generates a rotational-vibrational nuclear wave packet in D_2^+. By solving the time-dependent Schrödinger equation in full dimensionality, we simulate the coherent evolution of such wave packets and discuss their ro-vibrational dynamics. Within a harmonic time-series analysis of the evolving nuclear probability density [1], we characterize the ro-vibrational dynamics in D_2^+ in an external intense linearly polarized infrared laser field in terms of quantum-beat spectra in which both, the internuclear distance and molecular orientation relative to the laser field are resolved. In particular, we discuss quantum-beat spectra that reveal 1) the transition frequencies between stationary vibrational and rotational states, 2) the nodal structure of stationary vibrational rotational states, 3) ro-vibrational couplings, and 4) the imaging of field-dressed electronic potential curves of the molecular ion. [1] U. Thumm *et al.*, Phys. Rev. A **77**, 063401 (2008).

[1]Supported by the US DOE and NSF.

Uwe Thumm
Kansas State University

Date submitted: 27 Jan 2009 Electronic form version 1.4