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Dissociation and Coulomb explosion of molecular hydrogen ions by one and two short laser pulses. BERNOLD FEUERSTEIN, UWE THUMM, Dept. of Physics, Kansas State University, Manhattan, KS 66506 — We have investigated the interaction of 25 fs, 0.2 PW/cm², 780 nm laser pulses with H₂⁺ within a reduced dimensionality model, representing both, the nuclear and electronic motion by one degree of freedom. We carefully adjusted adiabatic molecular electronic potentials to reproduce accurate 3D results for i) the known number of 19 bound vibration states in the electronic ground state and ii) the dipole oscillator strength over a large range of internuclear distances. We solve the time-dependent Schroedinger equation within a Crank-Nicholson split-operator scheme and "measure" the flux of emitted electrons and protons using a novel "virtual detector" approach. Our results reproduce the main features of measured kinetic-energy release spectra, support a "charge resonant enhanced" ionization mechanism, and allow us to clearly distinguish between molecular dissociation (MD) into different field-dressed final channels and fast, ionization-induced Coulomb explosion (CE). Two pulses with variable delay allow us to resolve in time the interesting interplay between MD and CE. B. Feuerstein and U. Thumm, to be published. *Supported in parts by DOE, NSF, and DFG.*

Prefer Oral Session
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