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Dynamic imaging of a nonlinear polyatomic molecule in ultrashort intense laser pulses. CATHERINE LEFEBVRE, HUIZHONG LU, SZCZEPAN CHELKOWSKI, ANDRÉ D. BANDRAUK, Université de Sherbrooke — The exact correlated electron-nuclear dynamics of a nonlinear polyatomic molecule in ultrashort intense laser pulses is studied. A numerical model, based on the quantum description of a triangular molecule, beyond the Born-Oppenheimer approximation, is developed and applied to monitor the coupled electron-nuclear dynamics, from attosecond to femtosecond time scale, of the dissociating one-electron molecular ion, H_3^{2+} . Our results using a 6 optical cycles, 800nm linearly polarized laser pulse at $3 \times 10^{14} \text{ W/cm}^2$, show the importance of the nuclear motion in the photoionization and harmonic generation processes. Indeed, all the vibrational modes, in the plane of the molecule, contribute to the electron recollision events. Depending on the recollision time, the harmonics are generated from different fragments of the ion, associated with different vibrational modes. Furthermore, the dynamics of fragmentation of the ion and electron recollision is influenced by the orientation of the pulse, allowing to control whether an isolated attosecond pulse or a train of attosecond pulses is generated.

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