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Monitoring Attosecond Electron Motion by High Order Harmonic Generation ANDRE D. BANDRAUK, Canada Research Chair, Universite de Sherbrooke, SCZEPAN CHELKOWSKI, Universite de Sherbrooke —
Pump-probe schemes are proposed from numerical solutions of Time Dependent Schroedinger Equations' in nonBorn Oppenheimer (nonstatic nuclei) simulations of H2+ to measure and monitor electron motion in molecules.A weak few cycles XUV pump pulse is first used to create a coherent superposition of electron-nuclear wave packets in bound and dissociative electronic states followed by a short intense 800 nm probe pulse which generates harmonics via ionization and recollision of electrons with the initial coherent electron-nuclear wavepacket [1]. We show that by varying the time delay between pump and probe on attosecond time scale induces large suppression of the harmonic signal with an attosecond time periodicity corresponding to the electronic time periodicities in the coherent wavepacket. The three step model of harmonic generation concomitant with the SFA approximation [2] are used to explain the periodic change of harmonic signal and incipient decoherence due to vanishing of nuclear function overlap between different electronic potentials populated in the coherent wave packet. The mechanism is further confirmed by a time-series analysis.

[1] T Bredtmann, S Chelkowski, A D Bandrauk, Phys Rev A 84,021401(2011)
[2] A D Bandrauk, S Chelkowski, Intnl Rev Atom Molec Phys, 2,1-22(2011)

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