Phase-only laser control in the weak-field limit: Two-pulse control of IBr photofragmentation revisited - DTU Orbit (08/11/2017)

Phase-only laser control in the weak-field limit: Two-pulse control of IBr photofragmentation revisited

We demonstrate theoretically that laser-induced coherent quantum interference control of asymptotic states of dissociating molecules is possible, starting from a single vibrational eigenstate, after the interaction with two laser pulses-at a fixed time delay-both operating in the weak-field limit. Thus, phase dependence in the interaction with the second fixed-energy phase-modulated pulse persists after the pulse is over. This is illustrated for the nonadiabatic process: I + Br ←IBr → I + Br, where the relative yield of excited Br can be changed by pure phase modulation. Furthermore, a strong frequency dependence of the branching ratio is observed and related to the re-crossing dynamics of the avoided crossing in the above-mentioned process.

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