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Coherent control of CO_2 bending vibration with phase-locked twin-peaked pulses DAVID B. FOOTE, GUAN-YEU CHEN, JANE LEE, HYOUNGUK JANG, WENDELL T. HILL, III, University of Maryland — Other than the simplest cases, the mechanisms by which an optimal control pulse (OCP) guides a target system to its final state are generally not intuitive. Attempts to deconstruct these OCPs by isolating dominant pulse features have had limited success. We have previously found OCPs, consisting of phase-locked pulse trains as a dominant feature, that maximized CO_2 bending vibration during strong field Coulomb explosion. Beyond the dominant feature, the OCPs also contained smaller features (e.g., satellite pulses, pedestals), which had an unknown effect on the bending dynamics. In light of this observation, we studied the CO_2 bending response to a pair of pulses with variable interpeak delay τ and relative phase $\Delta\phi$. Each peak was ~ 70 fs duration with an intensity of $\sim 9 \times 10^{14}$ W/cm^2. We observed changes in the bending amplitude by changing both τ and $\Delta\phi$; the bending was smaller, however, than the bending induced by the OCPs. In this presentation, we will discuss the mechanisms by which the relative phase and delay of a twin-peak pulse can change the bending response, as well as the role that more subtle features play in controlling the dynamics.

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