

Abstract Submitted
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Unveiling the critical role of phase in optimal control pulses H.U. JANG, J. LEE, G.-Y. CHEN, W.T. HILL, III, University of Maryland — Theory purports optimal control problems either have a perfect control solution or no solution. Experimental searches often produce multiple solutions that are not the same. This apparent inconsistency has inhibited a quantitative description of how an optimal pulse (OP) achieves its goal. We now have evidence that suggests the relative phase between the components of OPs (temporal and spectral), which has garnered little attention in optimal control discussions, is a key to solving this paradox. Exploiting an ability to adjust the relative phase (RP), intensity and temporal separation (TS) of a pair of peaks independently, we have compared OP solutions generated by closed-loop searches to a two-peak optimization adjusting only RP and TS. Three distinct phenomena concomitant with strong-field enhanced ionization of three-atom systems were monitored – propensity for bending, explosion strength and branching into degenerate channels. In all cases, the response was altered significantly when RP and TS were varied. Multiple specific values for the (RP, TS)-pair were found to produce optimal responses. The optimal values were consistent with those associated with the OP solutions producing the same result, possibly explaining the paradox. Results and ramification will be presented.

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