Abstract Submitted
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Control of the population and phase dynamics of two-level systems by a single frequency-chirped laser pulse[1] ANDRAS CSEHI, University of Debrecen — We present an analytical electric field expression to simultaneously control the population and phase dynamics of two-level quantum systems. The presented electric field is obtained by a reverse engineering technique after the desired population and phase evolution pathways of the system have been specified. Upon application of this laser field, the system is driven from an arbitrary quantum state superposition to the desired population distribution; meanwhile the phase of one of the states proceeds according to a predefined path (J. Phys. B: At. Mol. Opt. Phys. 52 195004, 2019). The robustness of the engineered electric field is demonstrated by numerical simulations on the example of the 3s-3p transition of atomic sodium. Furthermore, the limitations of the presented technique, which arise due to the application of the rotating wave approximation, are thoroughly analyzed and discussed.

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