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Designing single-qutrit quantum gates via tripod adiabatic passage

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Abstract

In this paper, we use stimulated Raman adiabatic passage technique to implement single-qutrit quantum gates in tripod systems. It is shown by using the Morris-Shore (MS) transformation, the six-state problem with 5 pulsed fields can be reduced to a basis that decouples two states from the others. This imposes three pulses not connected to the initial condition with have the same shape. Using this method, the six-state penta-pod system is reduced to a tripod system. We can design single-qutrit quantum gates by ignoring the fragile dynamical phase, and by suitable design of Rabi frequencies of the effective Hamiltonian.

Keywords: qutrit, Morris-Shore transformation, stimulated Raman adiabatic passage, dynamical phase, geometric phase

For full article, refer to the Persian section