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Quantum rotation gates with controlled nonadiabatic evolutions

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JOURNAL OF PHYSICS B-ATOMIC MOLECULAR AND OPTICAL PHYSICS

Volume: 51 Issue: 7

Article Number: 075503

DOI: 10.1088/1361-6455/aaaf5b

Published: APR 14 2018

Document Type: Article

[View Journal Impact](#)

Abstract

Quantum gates can be implemented adiabatically and nonadiabatically. Many schemes used at least two sequentially implemented gates to obtain an arbitrary one-qubit gate. Recently, it has been shown that nonadiabatic gates can be realized by single-shot implementation. It has also been shown that quantum gates can be implemented with controlled adiabatic evolutions. In this paper, we combine the advantage of single-shot implementation with controlled adiabatic evolutions to obtain controlled nonadiabatic evolutions. We also investigate the robustness to different types of errors. We find that the fidelity is close to unity for realistic decoherence rates.

Keywords

Author Keywords: [quantum rotation gates](#); [controlled rotation gates](#); [adiabatic theorem](#)

KeyWords Plus: [EXPERIMENTAL REALIZATION](#); [OPTICS](#); [COMPUTATION](#)

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Publisher

IOP PUBLISHING LTD, TEMPLE CIRCUS, TEMPLE WAY, BRISTOL BS1 6BE, ENGLAND

Journal Information

Impact Factor: [Journal Citation Reports](#)

Categories / Classification

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