

[Look Up Full Text](#)

Full Text from Publisher



Save to EndNote online

Add to Marked List

1 of 1

Rotation Gates with Controlled Adiabatic Evolutions in Open Systems

By: Benmachiche, A (Benmachiche, Abderrahim)^[1]; Bahloul, D (Bahloul, Derradji)^[2]; Mahmoud, GS (Mahmoud, Gharib Subhi)^[3]; Messikh, A (Messikh, Azeddine)^[1]

OPEN SYSTEMS & INFORMATION DYNAMICS

Volume: 25 Issue: 3

Article Number: 1850013

DOI: 10.1142/S1230161218500130

Published: SEP 2018

Document Type: Article

[View Journal Impact](#)

Abstract

Single quantum rotation gates can be perfectly implemented in a closed system using the controlled adiabatic evolutions process proposed by Itay Hen that may lead to build some quantum circuit blocks [Phys. Rev. A, 022309 (2015)]. These adiabatic evolutions yield to vanishing geometric phases. In this work, we extended Itay's work by considering a more realistic model where the qubits are subjected to decoherence effects during the adiabatic evolution process. We demonstrate that, in the case of an open system, the decoherence leads to nonvanishing geometric phases and drastically reduces the performance of the quantum rotation gates below the fidelity target (0.999).

Keywords

Author Keywords: [Single quantum rotation gates](#); [controlled adiabatic evolutions](#); [geometric phases](#); [open system](#); [decoherence](#)

KeyWords Plus: [QUANTUM](#); [PASSAGE](#)

Author Information

Reprint Address: Benmachiche, A (reprint author)

+ Int Islamic Univ Malaysia, Dept Comp Sci, Kuala Lumpur 53100, Gombak, Malaysia.

Addresses:

+ [1] Int Islamic Univ Malaysia, Dept Comp Sci, Kuala Lumpur 53100, Gombak, Malaysia

+ [2] Univ Batna 1, Dept Phys, Route Biskra, Batna 05010, Algeria

+ [3] Int Islamic Univ Malaysia, Dept Engr Sci, Kuala Lumpur 53100, Gombak, Malaysia

E-mail Addresses: abderrahim.benmachiche@gmail.com; dbahloul@gmail.com; gharib@iium.edu.com; messikh@iium.edu.com

Funding

Funding Agency	Grant Number
Sheikh Thani Bin Abdullah Foundation	
Humanitarian Services (RAF)	

[View funding text](#)

Publisher

WORLD SCIENTIFIC PUBL CO PTE LTD, 5 TOH TUCK LINK, SINGAPORE 596224, SINGAPORE

Journal Information

Impact Factor: [Journal Citation Reports](#)

Categories / Classification

Research Areas: Physics; Mathematics

Web of Science Categories: Physics, Mathematical; Statistics & Probability

Citation Network

In Web of Science Core Collection

0

Times Cited

[Create Citation Alert](#)

21

Cited References

[View Related Records](#)

Use in Web of Science

Web of Science Usage Count

0

Last 180 Days

0

Since 2013

[Learn more](#)

This record is from:

Web of Science Core Collection
- Science Citation Index Expanded

Suggest a correction

If you would like to improve the quality of the data in this record, please suggest a correction.

[See more data fields](#)

◀ 1 of 1 ▶

Cited References: 21Showing 21 of 21 [View All in Cited References page](#)*(from Web of Science Core Collection)*

1. **Adiabatic Quantum Computation Is Equivalent to Standard Quantum Computation** Times Cited: **44**
By: Aharonov, Dorit; van Dam, Wim; Kempe, Julia; et al.
SIAM REVIEW Volume: 50 Issue: 4 Pages: 755-787 Published: DEC 2008
2. **ELEMENTARY GATES FOR QUANTUM COMPUTATION** Times Cited: **1,820**
By: BARENCO, A; BENNETT, CH; CLEVE, R; et al.
PHYSICAL REVIEW A Volume: 52 Issue: 5 Pages: 3457-3467 Published: NOV 1995
3. Title: [not available] Times Cited: **11**
By: Carmichael, H. J.
STAT METHODS QUANTUM Volume: 2 Published: 2009
Publisher: Springer Science & Business Media
4. **WAVE-FUNCTION APPROACH TO DISSIPATIVE PROCESSES IN QUANTUM OPTICS** Times Cited: **1,129**
By: DALIBARD, J; CASTIN, Y; MOLMER, K
PHYSICAL REVIEW LETTERS Volume: 68 Issue: 5 Pages: 580-583 Published: FEB 3 1992
5. **A quantum adiabatic evolution algorithm applied to random instances of an NP-complete problem** Times Cited: **825**
By: Farhi, E; Goldstone, J; Gutmann, S; et al.
SCIENCE Volume: 292 Issue: 5516 Pages: 472-476 Published: APR 20 2001
6. Title: [not available] Times Cited: **136**
By: FICEK Z
QUANTUM INTERFERENCE Pages: 3111 Published: 2005
7. Title: [not available] Times Cited: **11**
By: Ficek, Z.; Wahiddin, M. R.
Quantum Optics for Beginners Published: 2014
Publisher: CRC Press
8. Title: [not available] Times Cited: **1**
By: Giannelli, L.; Arimondo, E.
Phys. Rev. A Volume: 89 Article Number: 055402 Published: 2014
9. **Quantum gates with controlled adiabatic evolutions** Times Cited: **19**
By: Hen, Itay
PHYSICAL REVIEW A Volume: 91 Issue: 2 Article Number: 022309 Published: FEB 12 2015
10. **On the power of coherently controlled quantum adiabatic evolutions** Times Cited: **9**
By: Kieferova, Maria; Wiebe, Nathan
NEW JOURNAL OF PHYSICS Volume: 16 Article Number: 123034 Published: DEC 15 2014
11. **Implementation of single-qubit quantum gates by adiabatic passage and static laser phases** Times Cited: **22**
By: Lacour, X.; Guerin, S.; Vitanov, N. V.; et al.
OPTICS COMMUNICATIONS Volume: 264 Issue: 2 Pages: 362-367 Published: AUG 15 2006
12. **GENERATORS OF QUANTUM DYNAMICAL SEMIGROUPS** Times Cited: **3,290**
By: LINDBLAD, G
COMMUNICATIONS IN MATHEMATICAL PHYSICS Volume: 48 Issue: 2 Pages: 119-130 Published: 1976