UPPSALA
UNIVERSITET

Teknisk- naturvetenskaplig fakultet
UTH-enheten

Besöksadress:
Ångströmlaboratoriet
Lägerhyddsvägen 1
Hus 4, Plan 0

Postadress:
Box 536
751 21 Uppsala

Telefon:
018 – 471 30 03

Telefax:
018 – 471 30 00

Hemsida:
http://www.teknat.uu.se/student

Abstract

Holonomic Optimal Control for Qudits

Tomas André

Non-adiabatic Holonomic Quantum Computation (NHQC) is a method used to implement quantum gates with holonomies that arise solely from non-Abelian geometric phases. Due to high noise tolerance, these phases can be used to construct resilient quantum gates. By using dark paths we show how to implement quantum gates for higher dimensional computation elements, qudits, instead of the conventional qubits. This gives higher parameter control compared to earlier implementations. We present a scheme that generalizes and achieves single-qudit universality using controllable high fidelity gates by including an auxiliary state. An explicit example is shown for the Qutrit. The scaling is linear in dimension and we show how any diagonal qudit gate can be implemented efficiently in any dimension.

Handledare: Erik Sjöqvist
Ämnesgranskare: Martin Almquist
Examinator: Salman Toor
IT 22 008
Tryckt av: Reprocentralen ITC