



Contribution ID: 186

Type: Talk

Optimisation of Quantum Evolution Algorithms

Thursday, 26 June 2014 14:15 (20 minutes)

A specific unitary evolution operator can be constructed in many different ways, corresponding to different Hamiltonian trajectories between the desired end-points. An optimal trajectory can then be selected to make the evolution have the best computational complexity and control over errors. Using Grover's quantum search algorithm as an explicit example, it is shown that the complexity has a power-law dependence on error when a straightforward Lie-Trotter formula is used, and it becomes logarithmic in error when reflection operators are used. The exponential change in error control is surprising, and can be used to improve importance sampling methods. The key concept is to make the evolution steps as large as possible while obeying the constraints of the problem. In particular, we can understand why overrelaxation algorithms are superior to small step size algorithms.

Primary author: Prof. PATEL, Apoorva (Indian Institute of Science, Bangalore, India)

Presenter: Prof. PATEL, Apoorva (Indian Institute of Science, Bangalore, India)

Session Classification: Theoretical Developments

Track Classification: Algorithms and Machines