

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Mixing and Decoherence in Continuous-Time Quantum Walks

LEONID FEDICHKIN, DMITRY SOLENOV, CHRISTINO TAMON, Clarkson University, VLADIMIR PRIVMAN, Clarkson University — We present analytical results showing that decoherence can be useful for speed-up of mixing in a continuous-time quantum walks on finite cycles. Our treatment of continuous-time quantum walks includes a continuous monitoring of all vertices that induces the decoherence process. We identify the dynamics of the probability distribution and observe how mixing times undergo the transition from quantum to classical behavior as our decoherence parameter grows from zero to infinity. Our results show that, for small rates of decoherence, the mixing time improves linearly with decoherence, whereas for large rates of decoherence, the mixing time deteriorates linearly towards the classical limit. In the intermediate region of decoherence rates, our numerical calculations confirm the existence of a unique optimal rate for which the mixing time is minimized.

Vladimir Privman
Clarkson University

Date submitted: 15 Jan 2006

Electronic form version 1.4