

Quantum Physics

Quantum Walk-based Generation of Entanglement Between Two Walkers

Salvador E. Venegas-Andraca, Sougato Bose

(Submitted on 26 Jan 2009)

Quantum walks can be used either as tools for quantum algorithm development or as entanglement generators, potentially useful to test quantum hardware. We present a novel algorithm based on a discrete Hadamard quantum walk on a line with one coin and two walkers whose purpose is to generate entanglement between walkers. We provide several classical computer simulations of our quantum algorithm in which we show that, although the asymptotical amount of entanglement generated between walkers does not reach the highest degree of entanglement possible at each step for either coin measurement outcome, the entanglement ratio (entanglement generated/highest value of entanglement possible, for each step) tends to converge, and the actual convergence value depends on the coin initial state and on the coin measurement outcome. Furthermore, our numerical simulations show that, for the quantum walks used in our algorithm, the value towards which entanglement ratio converges also depends on the position probability distribution symmetry of a quantum walk computed with one single walker and the same coin initial state employed in the corresponding quantum walk with two walkers.

Comments: 8 pages, 15 figures

Subjects: **Quantum Physics (quant-ph)**Cite as: **arXiv:0901.3946v1** [quant-ph]

Submission history

From: Salvador Elías Venegas-Andraca [[view email](#)]**[v1]** Mon, 26 Jan 2009 04:27:08 GMT (83kb)*[Which authors of this paper are endorsers?](#)*Link back to: [arXiv](#), [form interface](#), [contact](#).

Download:

- [PDF](#)
- [PostScript](#)
- [Other formats](#)

Current browse context:

quant-ph[< prev](#) | [next >](#)[new](#) | [recent](#) | [0901](#)

References & Citations

- [SLAC-SPIRES HEP](#)
([refers to](#) | [cited by](#))
- [CiteBase](#)

Bookmark([what is this?](#))

 [CiteULike logo](#) [Connotea logo](#) [BibSonomy logo](#) [Mendeley logo](#) [Facebook logo](#) [del.icio.us logo](#) [Digg logo](#) [Reddit logo](#)