

Quantum Physics

Classical Interaction Cannot Replace Quantum Nonlocality

Dmitry Gavinsky

(Submitted on 8 Jan 2009)

We present a two-player communication task that can be solved by a protocol of polylogarithmic cost in the simultaneous message passing model with classical communication and shared entanglement, but requires exponentially more communication in the classical interactive model.

Our second result is a two-player nonlocality game with input length n and output of polylogarithmic length, that can be won with probability $1 - o(1)$ by players sharing polylogarithmic amount of entanglement. On the other hand, the game is lost with probability $\Omega(1)$ by players without entanglement, even if they are allowed to exchange up to k bits in interactive communication for certain $k \in \Omega(n^{1/4})$.

These two results give almost the strongest possible (and the strongest known) indication of nonlocal properties of two-party entanglement.

Subjects: **Quantum Physics (quant-ph)**Cite as: **arXiv:0901.0956v1 [quant-ph]**

Submission history

From: Dmitry Gavinsky [[view email](#)]

[v1] Thu, 8 Jan 2009 01:12:30 GMT (17kb)

[Which authors of this paper are endorsers?](#)

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](#)

[1 blog link](#)([what is this?](#))

Bookmark

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