Recycling Quantum Computation.

Noa Viner, David Ponarovsky

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Abstract

Quantum feasibility hinges on the assumption that the basic gate's noise rate is below a certain threshold. Here we are studying the behavior of computation models when the noise is slightly greater than that threshold. In particular, We ask if one can design a fault tolerance schema such that if the noise is above the threshold, it is still grunted that the final generated state would have a value.

1 Introduction.

.. bla bla bla.. bla bla .. [AB99]

To Do. Short term tasks:

1. Add an initial generalized entanglement definition.
2. Describe the quantum teleportation as an example for a simple Local-Measure-Circuit. "prove" something about it. Explain the importance of EPR pairs a computation resource. And present the question above as "is that possible to embed the teleportation inside a general circuit".
3. Given $|\psi\rangle$ and a local circuit C_0, What can we say about the $C_0|\psi\rangle$. What does it mean in terms of complexities class?

Definition 1 (General Entanglement State)**.** *We say that $|\psi\rangle$ is general entanglement if ..*

Definition 2 (Local-Measure-Circuit)**.** *We say that a quantum circuit C is a local measure circuit if it's can be described as a decomposition of poly classical circuit and a constant depth quantum circuit which contains only 1-qubit gates and measurements.*

We would think about local measure circuits as chip circuits.

Definition 3 ($p_0 - \Delta$ Fault Tolerance Circuit)**.** *We say that $\mathcal{C}$ is $p_0 - \Delta$ fault tolerance presentation of abstract circuit C if there exists a local measure circuit C_0 2 such it's grunted that for noise $p < p_0$ $\mathcal{C}$ compute C w.h.p, And in addition, if $p \in (p_0, p_0 + \varepsilon)$ then by applying a C_0 on $\mathcal{C}$ output yields a general entanglement state 1*

[COMMENT] *We would like to add a complexity parameter for the above definition, for example, "a general entanglement state over more than $\frac{1}{5}$ of the qubits.*

References

[AB99] Dorit Aharonov and Michael Ben-Or. *Fault-Tolerant Quantum Computation With Constant Error Rate*. 1999. arXiv: quant-ph/9906129 [quant-ph].