

# Notes of Physical Challenges of Quantum Computation

Taper

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## Abstract

This is a note to the dissertation [1] by professor MH Wong in SUSTC.

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## 1 Chapter 1 Overview

### 1.1 1.1 Introduction to quantum computing

Here he presents some differences between the classical and quantum computers. Keywords: **quantum parallelism, reversible computation process, simulation of quantum dynamics.**

### 1.2 1.2 1.3 Physical implementations and challenges of quantum computing

These two parts do as the title suggests. The methods are summarized in the following table:

Table 1: Different Quantum Computing Approaches		
Name	Method	Error Prevention
gate model	$U  \text{Input}\rangle =  \text{Output}\rangle$	quantum error correction, analogous to its classical counterparts.
adiabatic model	Keep the quantum states of qbits in ground state.	Prevent thermalization.
one-way quantum computing/measurement-based quantum computing	Initialized in cluster state. Computation achieved via a series of adaptive measurements.	High quality cluster state. Precision in measurement.

It should be noted that the above classification is not exclusive, there are certainly overlap between the three approaches.

## References

- [1] From UIUC: [https://www.ideals.illinois.edu/bitstream/handle/2142/14565/yung\\_manhong.pdf?sequence=1&isAllowed=y](https://www.ideals.illinois.edu/bitstream/handle/2142/14565/yung_manhong.pdf?sequence=1&isAllowed=y)

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