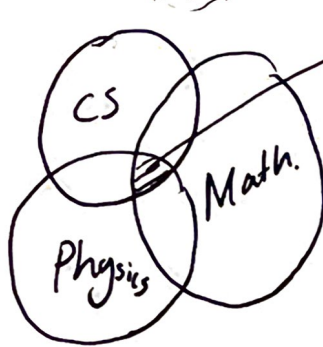


→ 2nm → → 0.1nm
 ↑
 diameter of hydrogen atom

CENG487 Introduction to Quantum Computing ①



Quantum Computing

: Forget about the reality* that we are familiar with.

*: every object exist in a unique place and state.

Determinism does not work in quantum computing.

classical bit
 ↓
 0 1

Quantum qbit
 ↓
 {0, 1}

A quantum system can be in a superposition of many different states at the same time and spatially separated quantum systems may be entangled with each other and operations might have non-local effects.

Some History:

- | | | |
|---------------------------|---|---|
| Analog Quantum computing | { | 1980s : Yuri Marin "Computable and Noncomputable" Soviet radio, pp. 13-15, 1980 |
| | | 1982: Richard Feynman |
| | | 1982: Paul Benioff |
| Digital Quantum computing | { | 1985: David Deutsch : Quantum Turing machine |
| | | 1992 : Deutsch and Jozsa : Algorithm |
| | | 1997 : Simon |
| | | 1997: Bernstein and Vazirani : Quantum Complexity Theory |

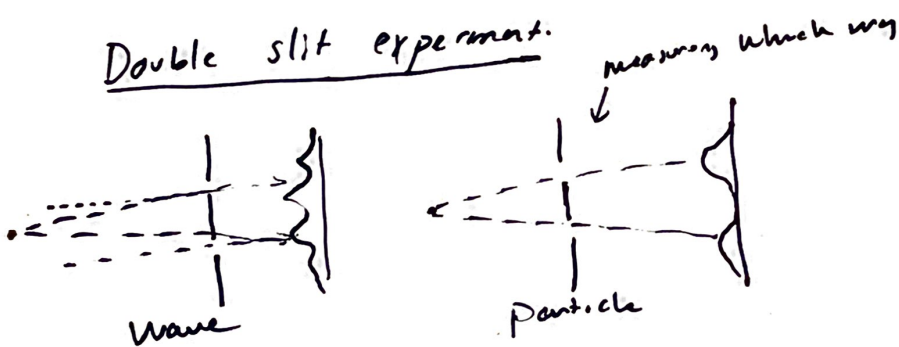
Physics side* (where the strangeness begins) (2)

"Quantum computation will be the first technology that allows useful tasks to be performed in collaboration between parallel universes." - David Deutsch

"It is safe to say nobody understands quantum mechanics." - Feynman

... , Photons, electrons, atoms, ... all behave ~~based on the~~ strangely

Double slit experiment.



2)

