HOW DID QUANTUM COMPUTING COME TO BE?

From atoms to algorithms:
A brief history of quantum computing

IN THE EARLY 1900s, THE WORLD OF PHYSICS WAS TURNED...

Scientists found out that as things get smaller and smaller, classical physics does not hold!

Energy is quantized!

Planck

You can never know both the position and momentum of a particle with certainty!

Heisenberg

Quantum mechanics was born.

Bohr

The idea that so many things were probable and uncertain was bizarre...

But even with greatly renowned skeptics,...

God does not play dice with the universe!

Einstein, stop telling God what to do with his dice!

Quantum mechanics was born.

While computers advanced, simulating even simple molecular systems with so many probabilities was nearly impossible!

Then, Richard Feynman proposed an interesting idea

If you want to make a simulation of nature, you better make it quantum mechanical!

Feynman

Instead of bits set to 0's or 1's like normal computers,

A quantum bit (qubit) would make up a quantum computer

A photon or other small particle with quantum mechanical properties that can represent a 0 and a 1 at the same time!

And so computers would mimic nature's probabilities...

David Deutsch laid out a basic theoretical structure of a quantum computer (1985)

And I developed one of the first quantum algorithms with Josza!

Deutsch

D-1 algorithm

I'm exponentially faster than any deterministic classical algorithm!

And the world went berserk because RSA encryption schemes were built on the assumption that classical computers would take ages to factor such numbers!

Then in 1994...

Shor

I developed a quantum algorithm to factor multiples of large prime numbers!

And the world went berserk because RSA encryption schemes were built on the assumption that classical computers would take ages to factor such numbers!

But with rapid advances, quantum computing is constantly showing new possibilities...

And the quantum computing race has only just begun

Ahhhhh!

Quick! More research into quantum computing!

A photon or other small particle with quantum mechanical properties that can represent a 0 and a 1 at the same time!

Energy is quantized!!

Until measured, an electron can be in many places at the same time!

You can never know both the position and momentum of a particle with certainty!

And we need stable machines!

Oh wow, we need many thousands of Shor's algorithm!

But is it stable? Universal?

How many gates?

Hey, we got a 72-qubit processor!

But is it stable? Universal?

How many gates?

2017

I think we got a 20-qubit processor!

2018

Hey, we got a 50-qubit computer!

I think we got a 72-qubit processor!

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