QUANTUM TELEPORTATION

COPYING BITS & QUBITS

IT'S NOT SO EASY FOR QUANTUM COMPUTERS!

CLASSICAL BITS ARE EASILY COPIED
(That's how computers calculate things!)

The NO-CLONING RULE:
A qubit's state cannot be copied to another qubit - without changing the original.

QUANTUM TELEPORTATION

A protocol to move quantum information from one location to another location.

Quantum Teleportation makes it possible to transfer a qubit's complex state to another qubit.

It's a bit like how in Newton's cradle, the balls transfer their movement to each other.

HOW DOES QUANTUM TELEPORTATION WORK?

STEP 1: Alice entangles two qubits and sends one of them to Bob.*
(Bob can be nearby or far away.)

Alice also has a fancy qubit that she wants Bob to have.

* Moving known qubit states is more reliable than unknown states, like Alice's fancy qubit!

STEP 2: Alice entangles the fancy qubit with her half of the entangled pair.

STEP 3: Alice measures her qubits.
(She no longer has a fancy qubit, and her qubits are no longer entangled with Bob's.)

STEP 4: Alice uses classical bits to send her measurements to Bob.

STEP 5: Bob uses this information to adjust his qubit.

NOW, BOB HAS THE FANCY QUBIT!

QUANTUM TELEPORTATION: NECESSARY, NOT FICTION!

Why not just send the fancy qubit?
- Sending measurements is **faster**
- Sending entangled qubits can be done **ahead of time** & **more reliably**

This is how quantum computers move their qubits around to perform calculations!

Without quantum teleportation, the capabilites of quantum computers would be much more limited!

FIND MORE QUANTUM COMPUTING ZINES HERE:

https://www.epiqc.cs.uchicago.edu/resources/

Contributions by Sabine Salnave

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