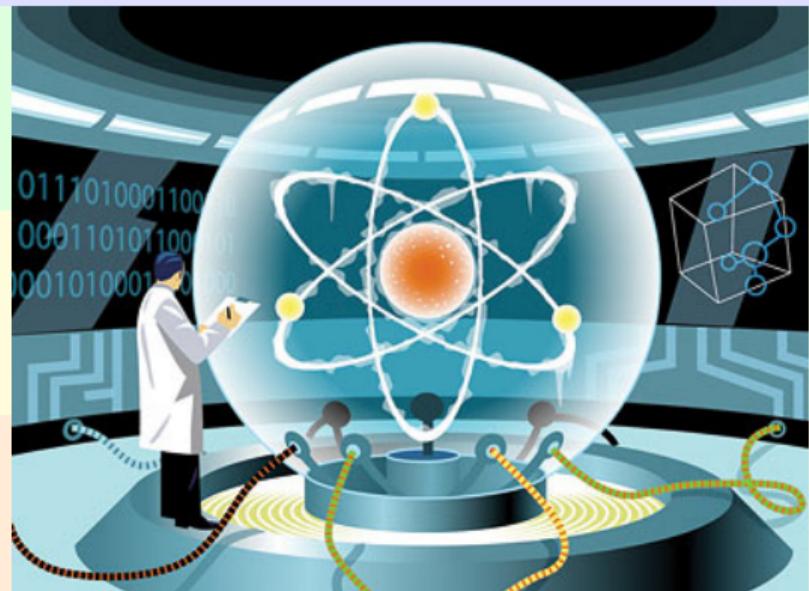


QUBIT.ZONE

QUANTUM COMPUTERS

Scientists around the world are racing to build the first *quantum computer*.

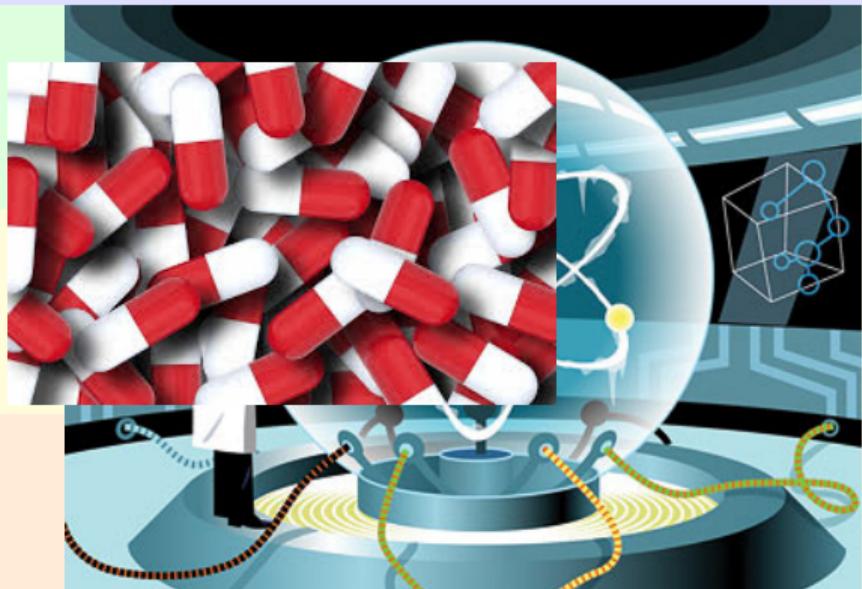


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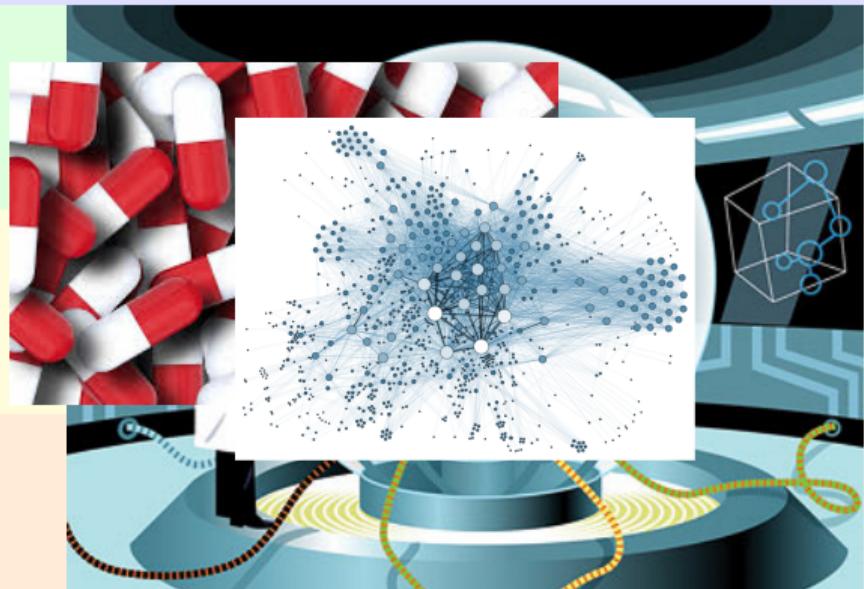


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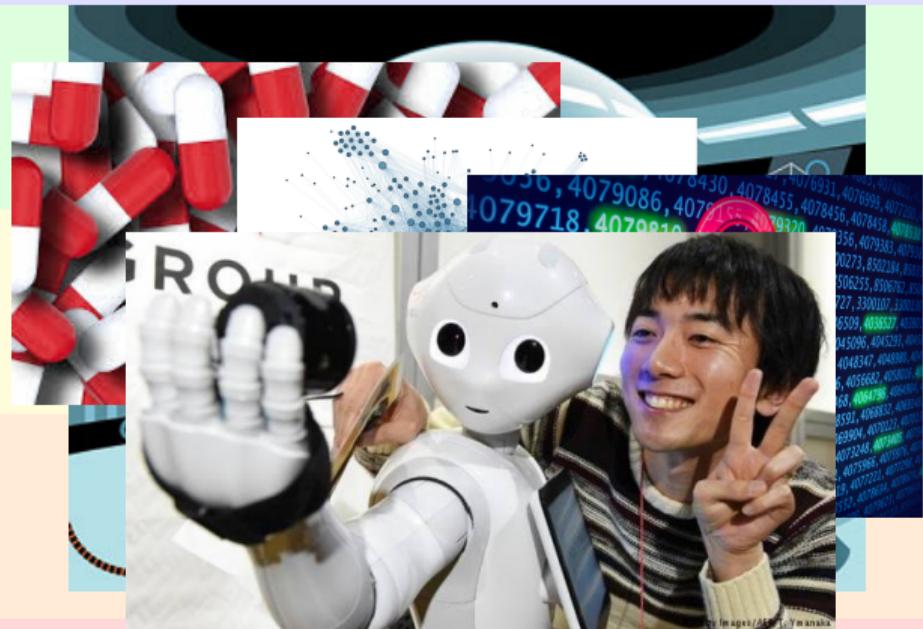


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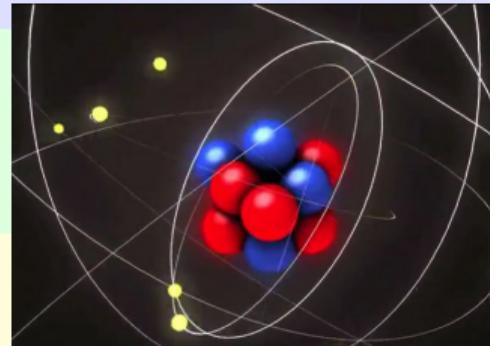
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But what *are* quantum computers?



THE QUANTUM WORLD

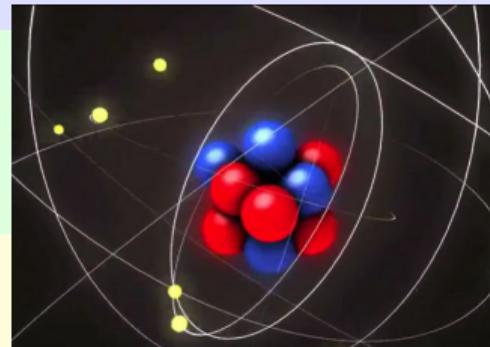
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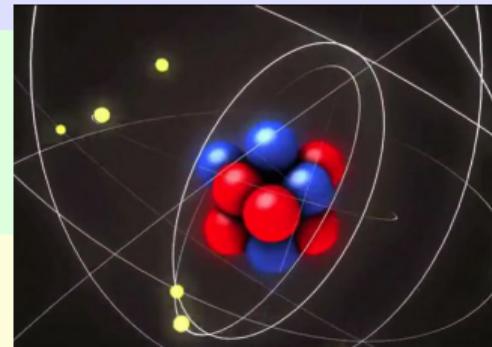
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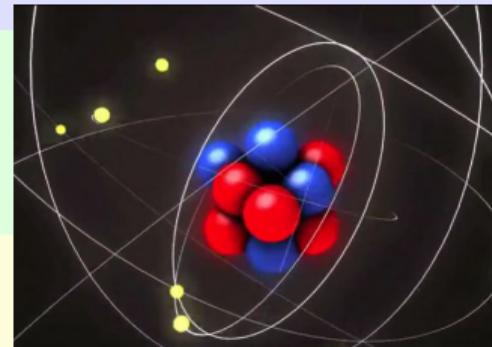


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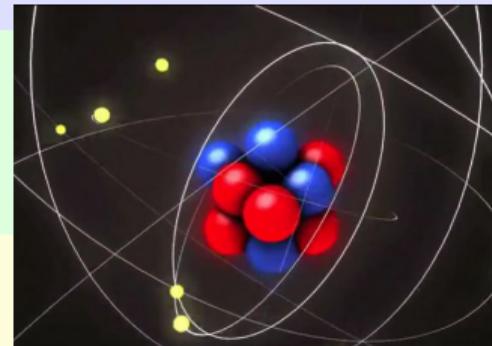
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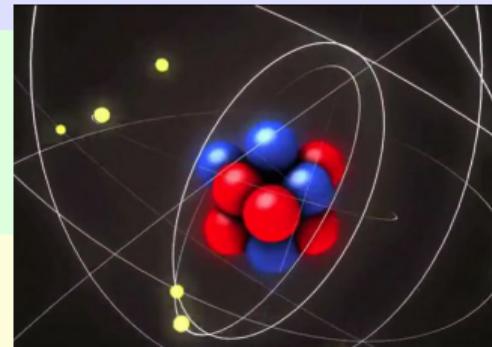
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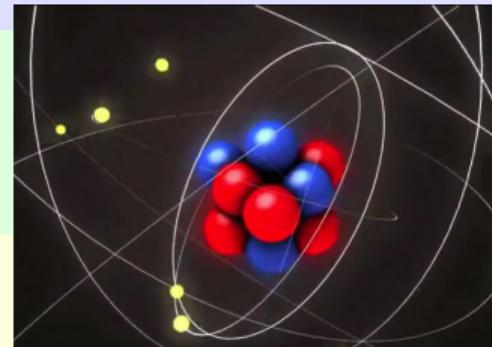
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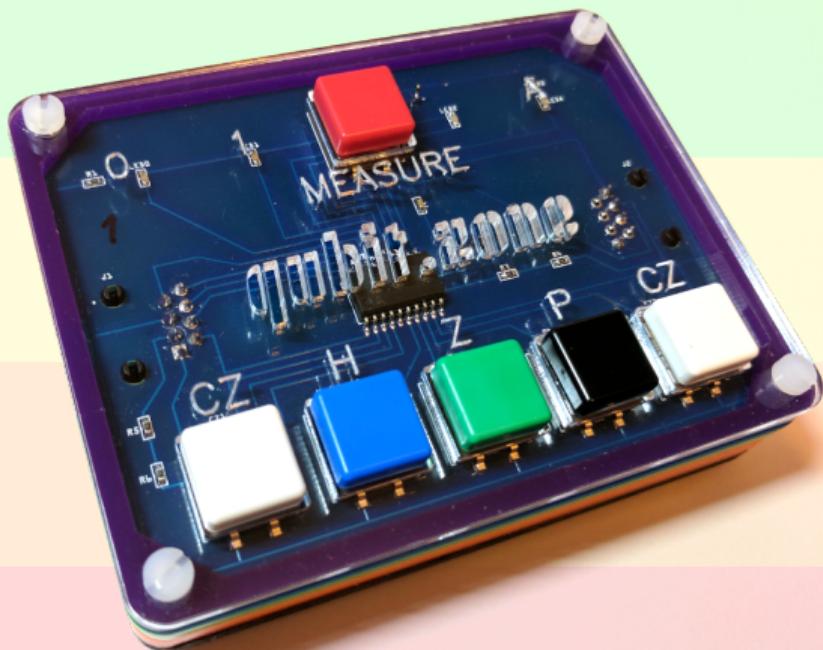
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Quantum computers will exploit these to perform their amazing tasks.

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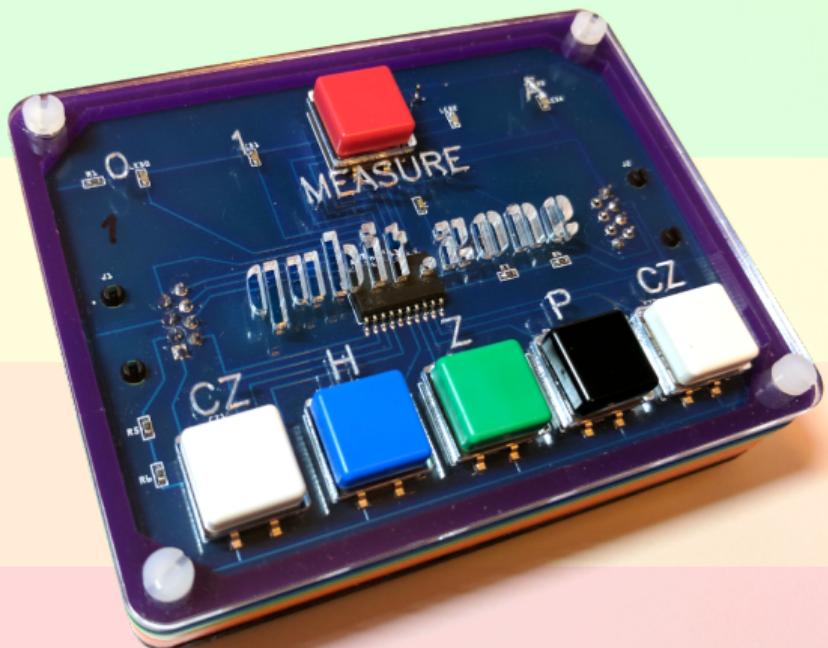
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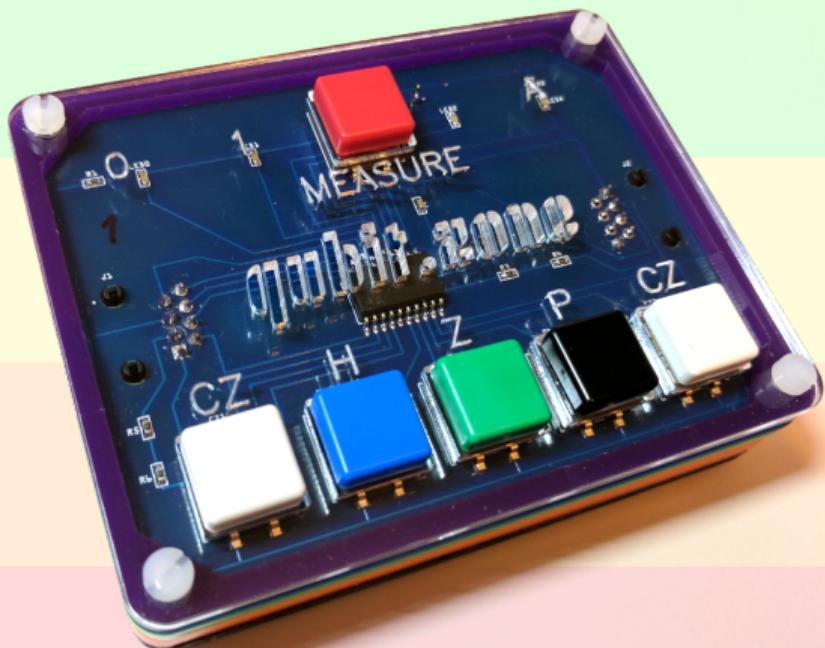
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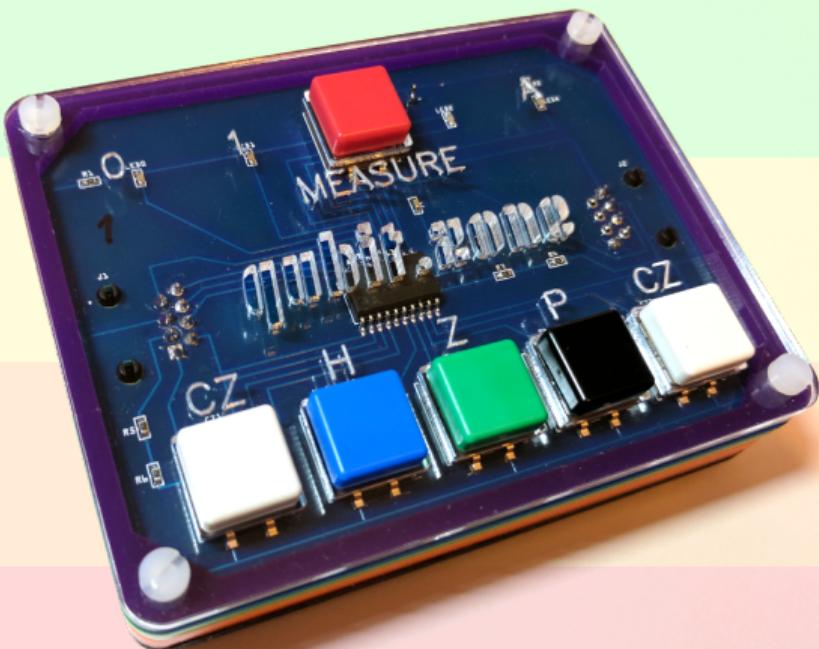
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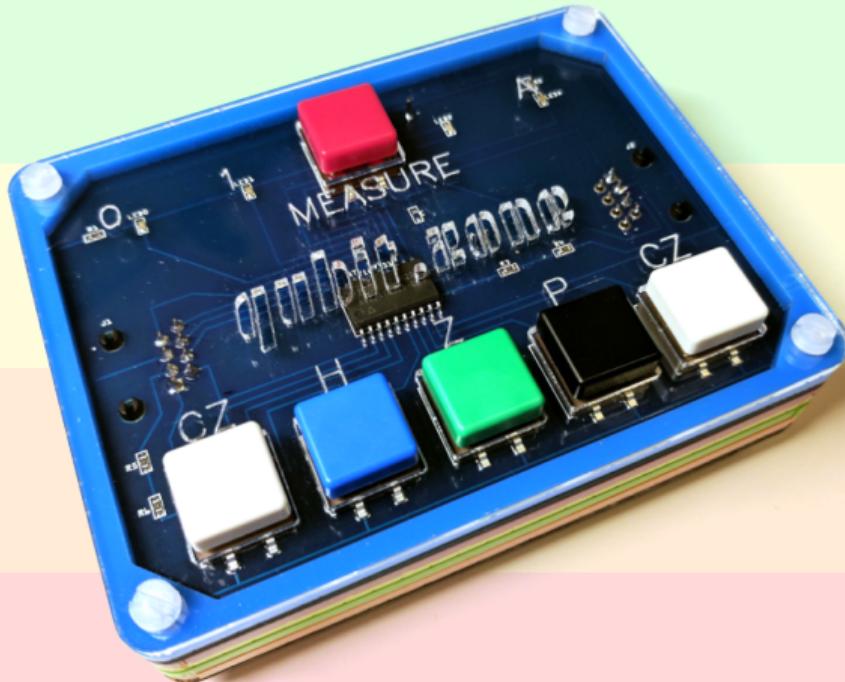
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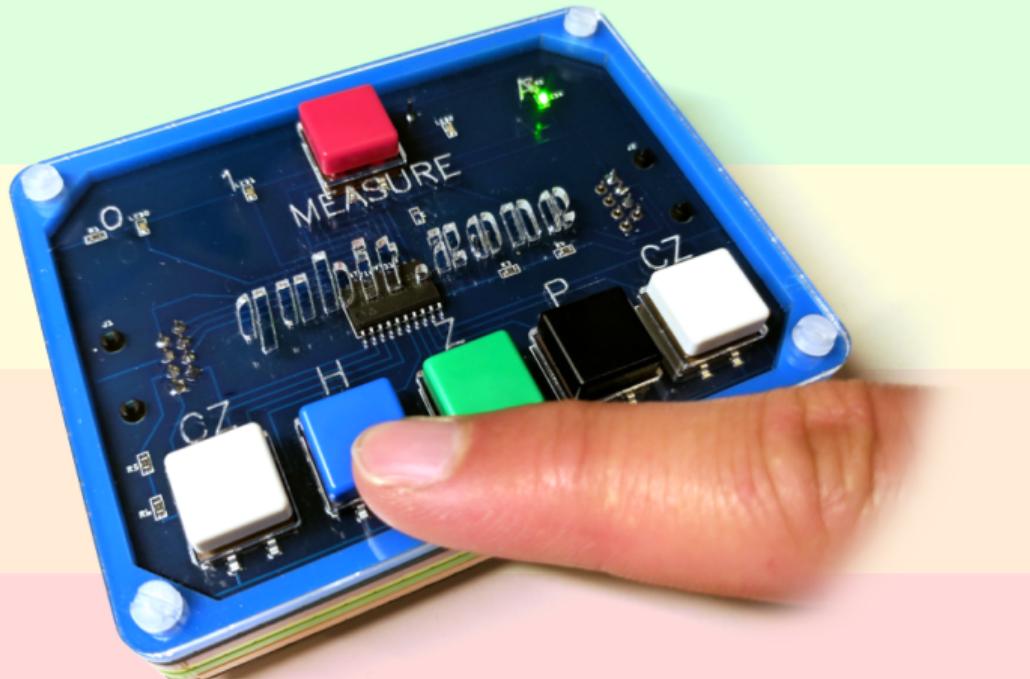


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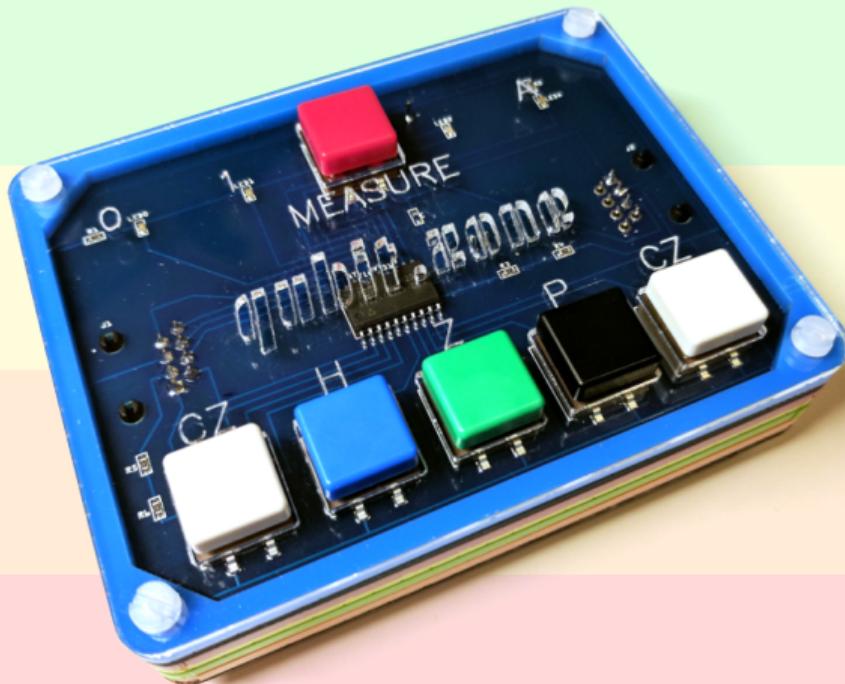


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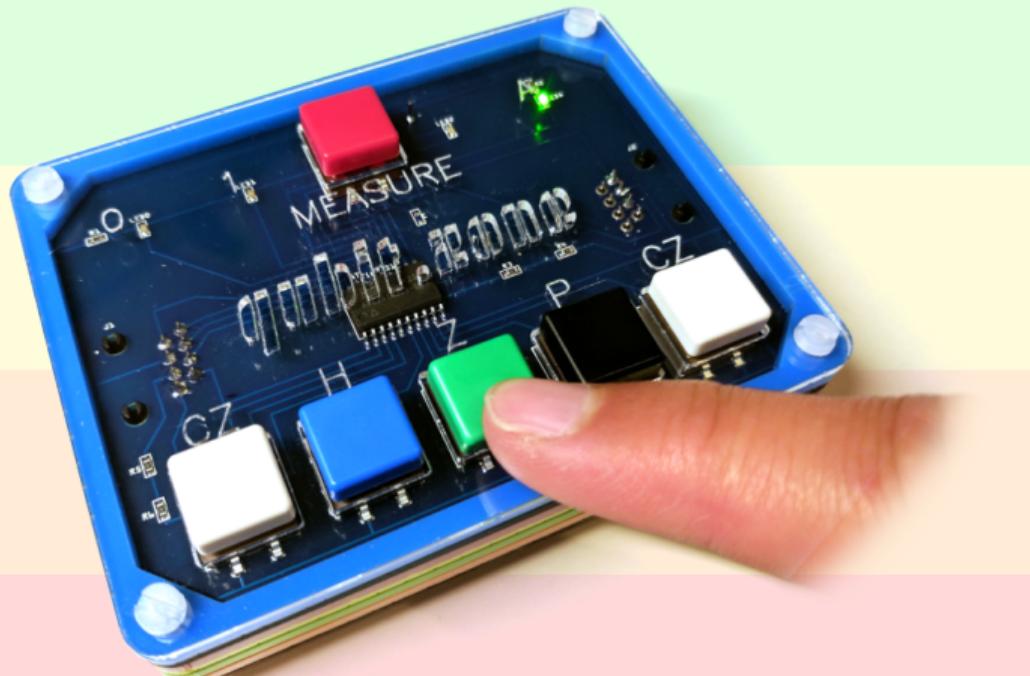


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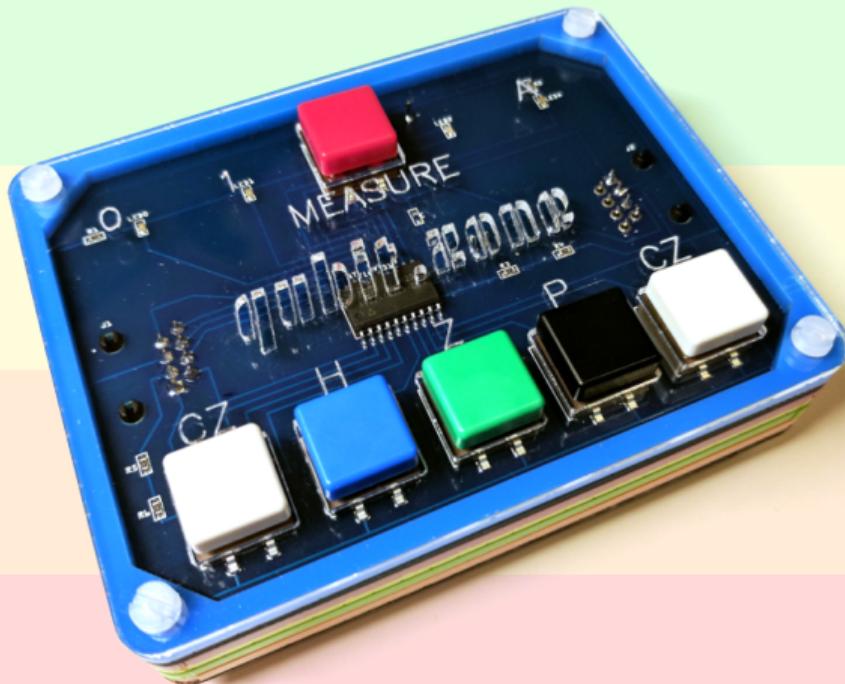


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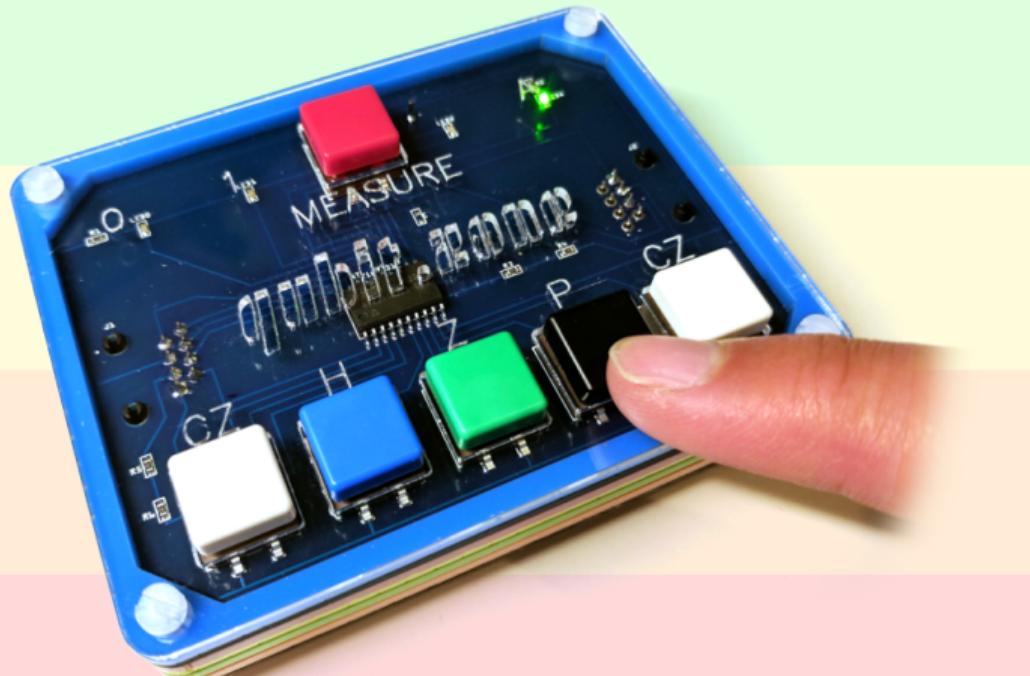


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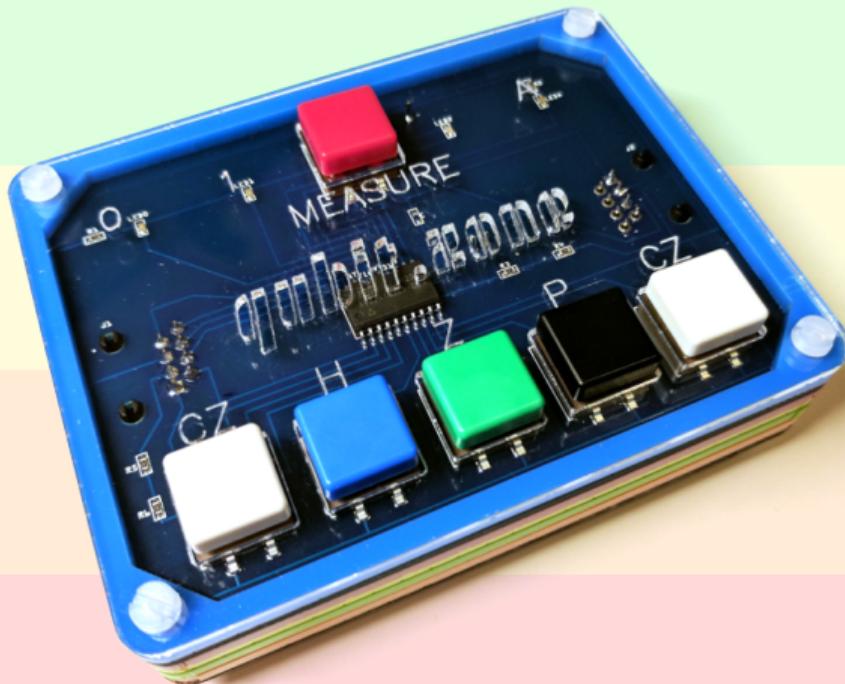


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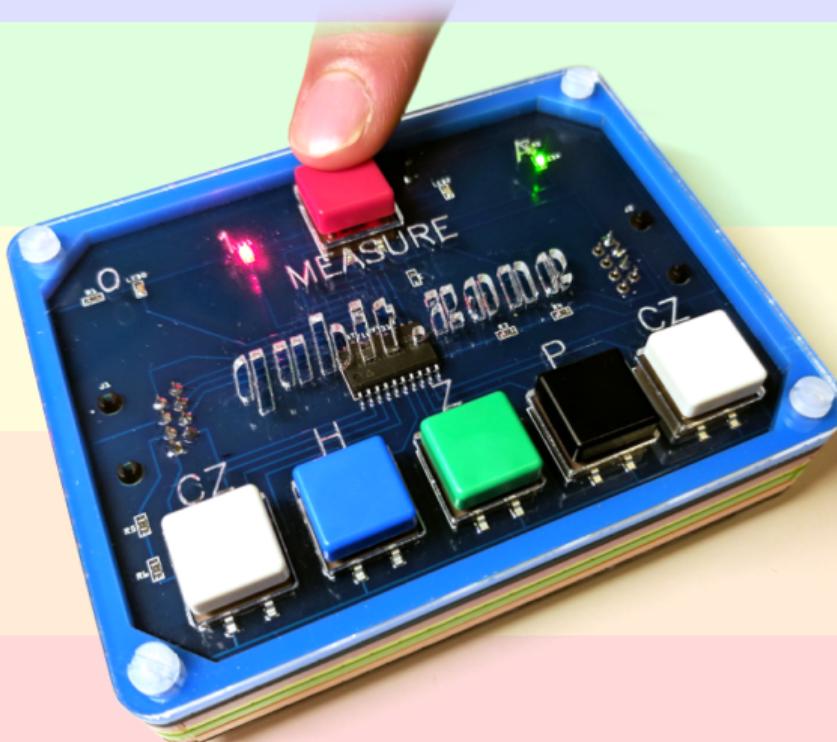
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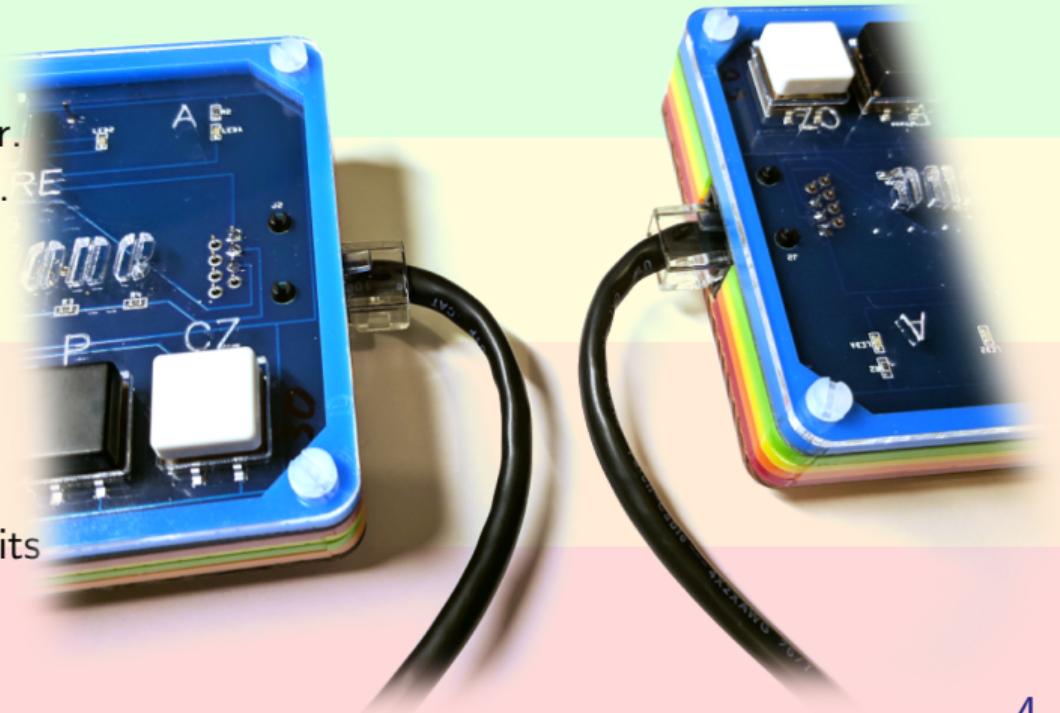
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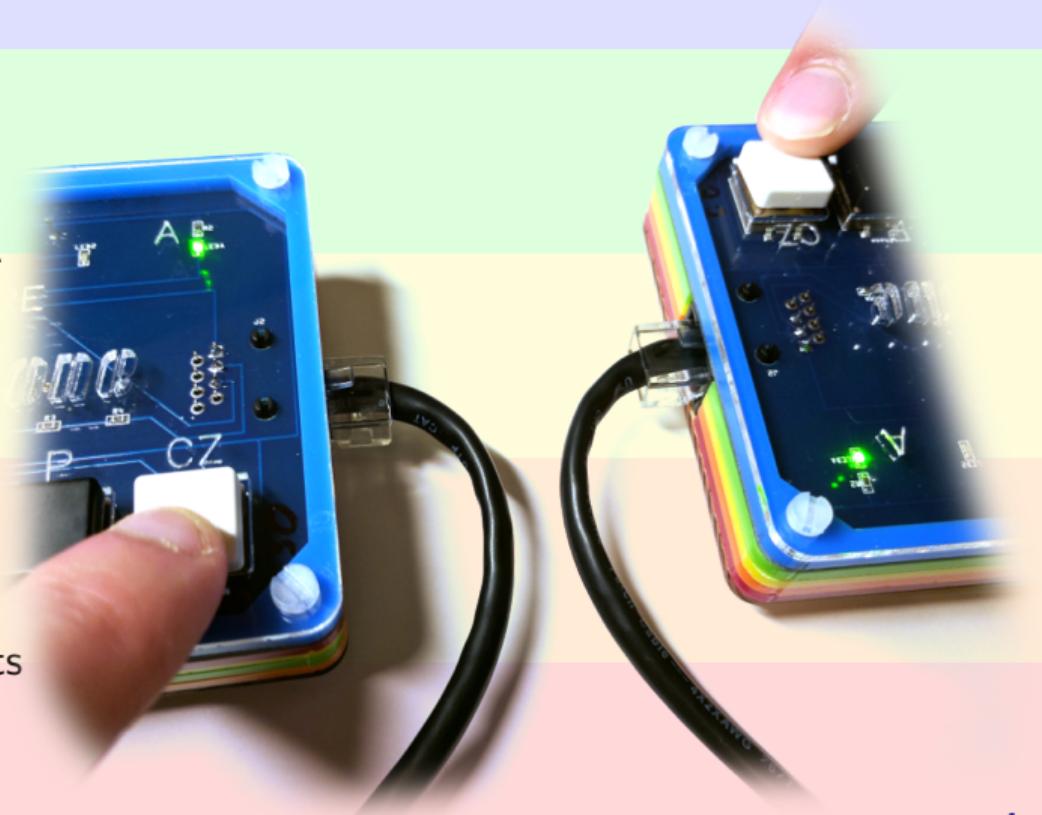
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On each qubit, press **CZ** buttons
by the cable at the same time.



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Scientists call this measurement. It *destroys* superposition.



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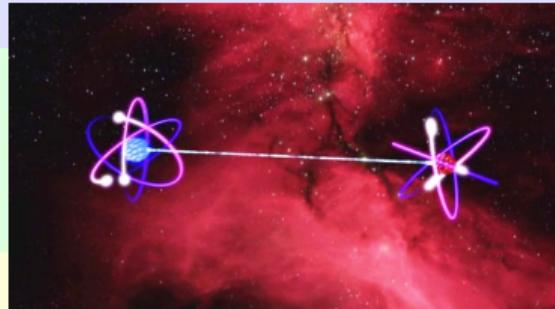
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Do this by pressing **H** then **M** repeatedly, until you get 0.

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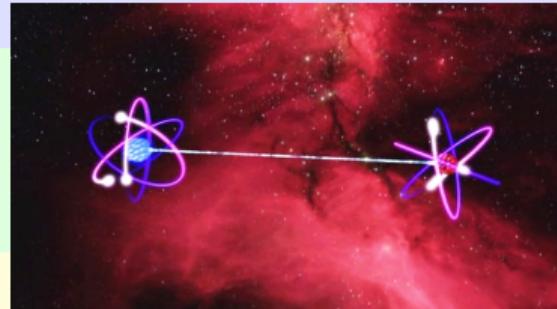
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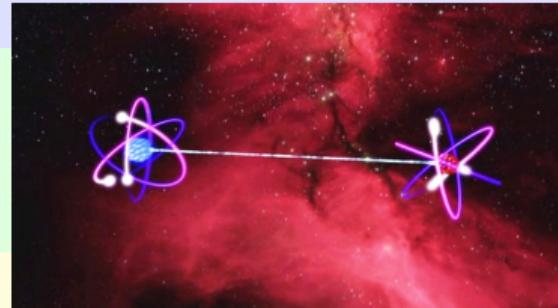


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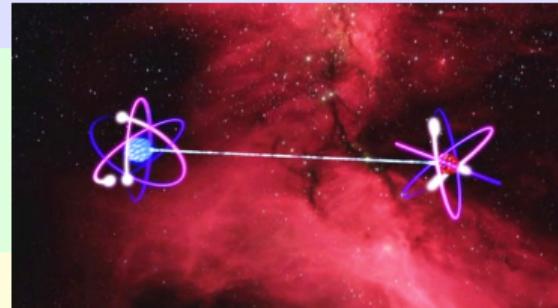


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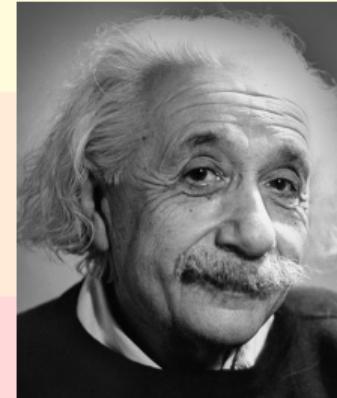
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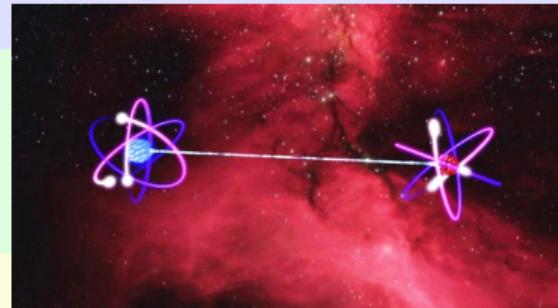


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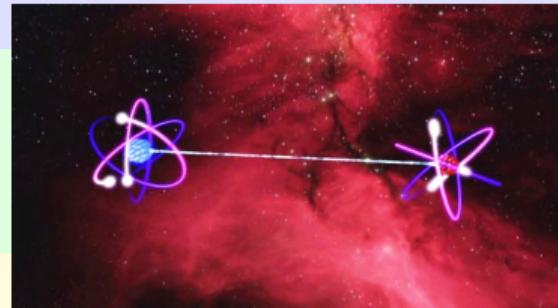
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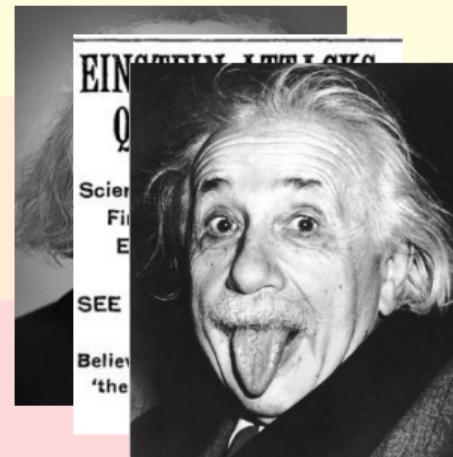
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You should get the same result!

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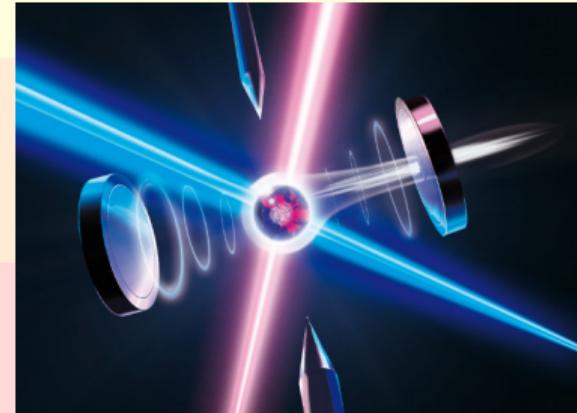
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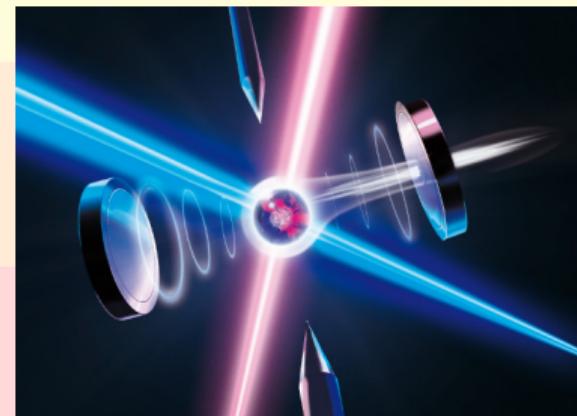
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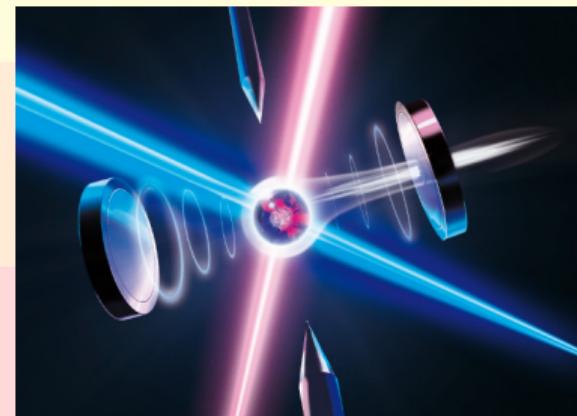
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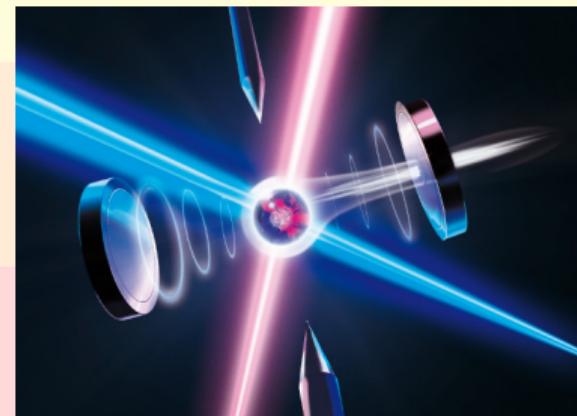
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There's a catch: the entanglement is *destroyed*.



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- ④ Press 

- ⑤ If your second number is 1 press 

- ⑥ Give your qubit to Bob

Bob's program:

- ⑦ Connect a cable and do  on both qubits

SUPER CODING

Let's try it! Get into pairs called Alice and Bob.

- ① Entangle your qubits

Alice's program:

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- ③ If your first number is 1 press Z

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We've encoded two bits in a single qubit!

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It seems like sending a qubit should transmit a *single number*.

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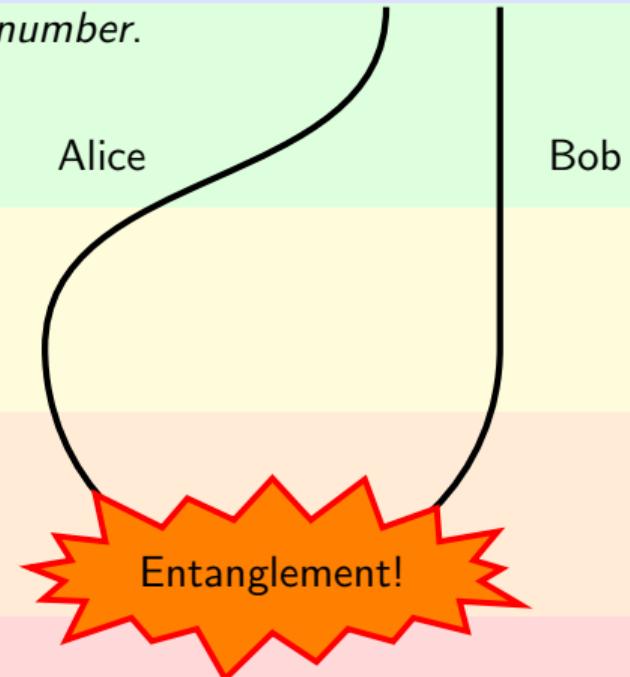
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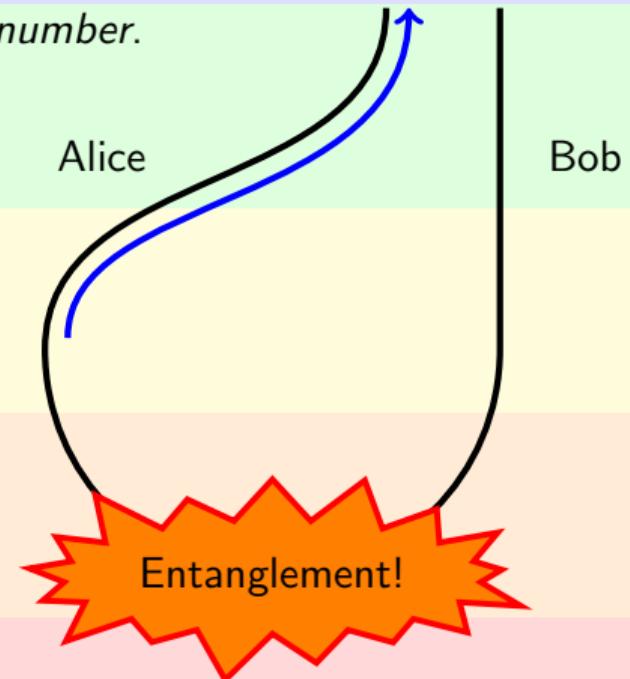
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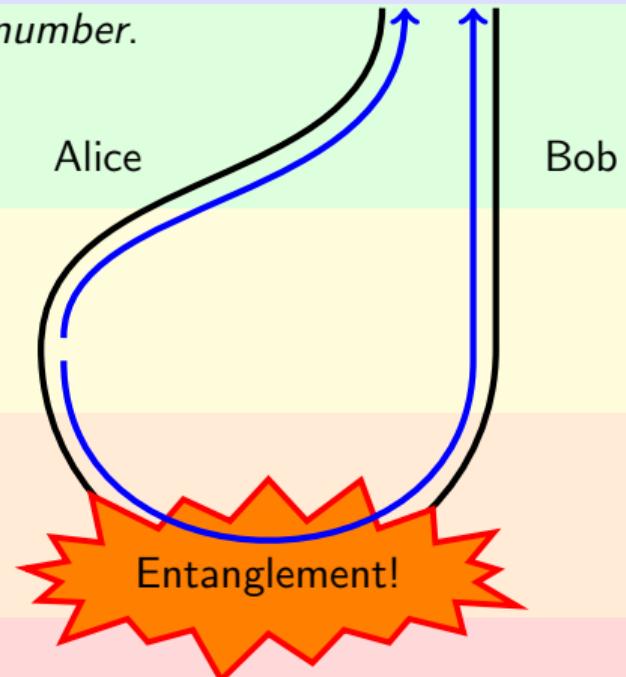
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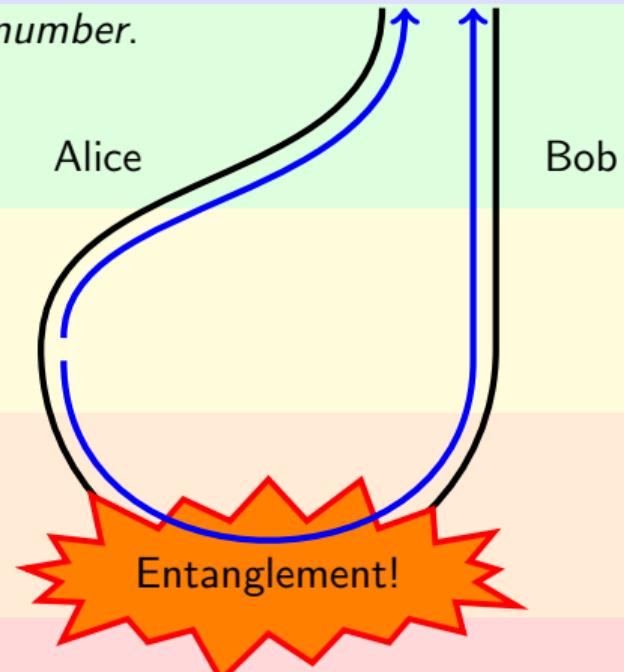
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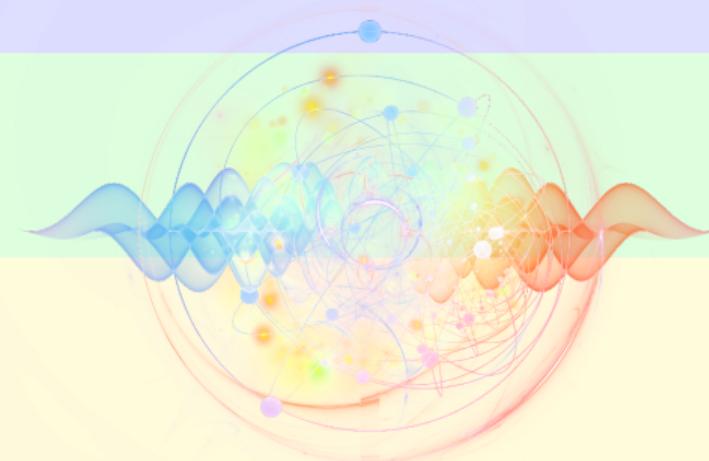
One number gets transmitted when Alice passes her qubit to Bob.

Some scientists have suggested the other number travels *back in time*, through the entangled state.

Probably not true. But it shows the difficulty scientists have understanding quantum computing.

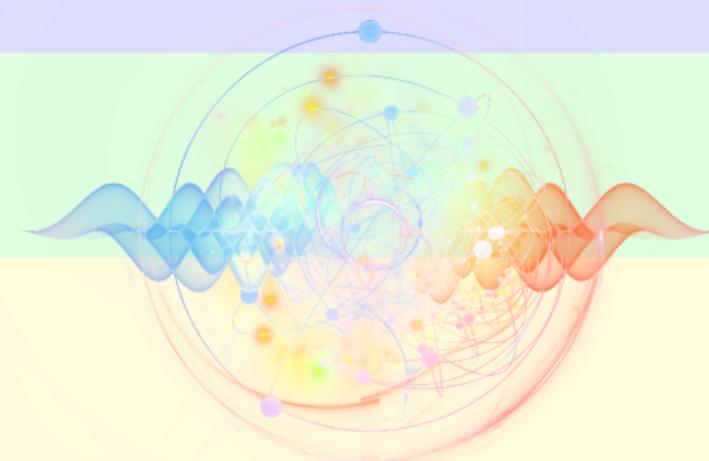


THE END

A circular illustration on the left side of the slide depicts a complex quantum system. It features concentric rings in various colors (blue, red, yellow, green) representing different energy levels or orbits. Numerous small, colorful dots (representing particles like electrons or photons) are scattered throughout the rings. From the bottom right, two wavy lines extend upwards and outwards, one in blue and one in red, symbolizing wavefunction collapse or interference patterns.

We've explored some incredible quantum phenomena:

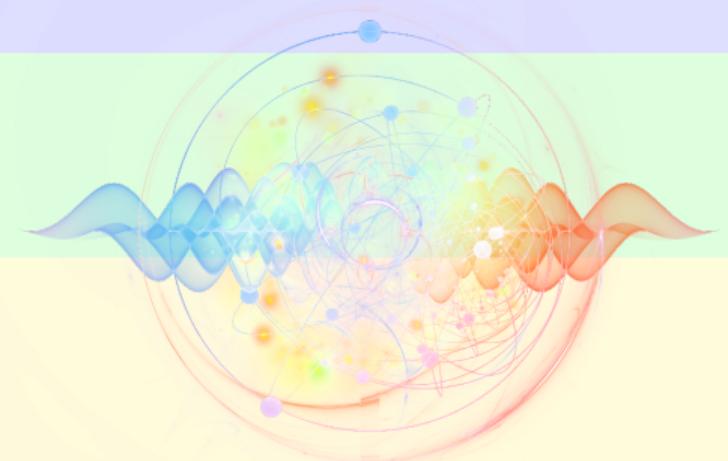
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- Superposition

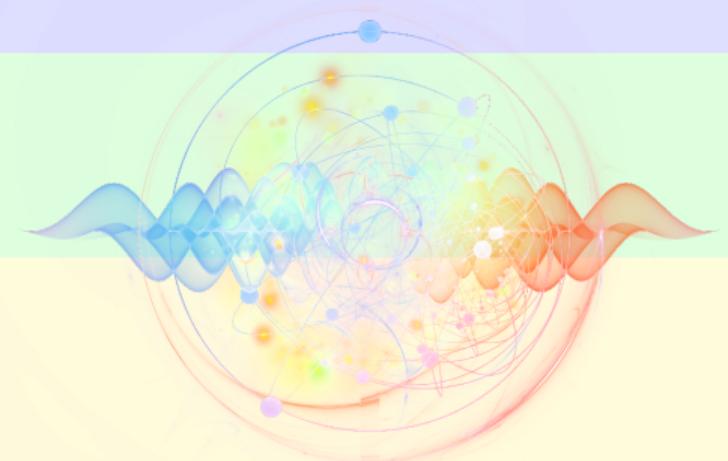
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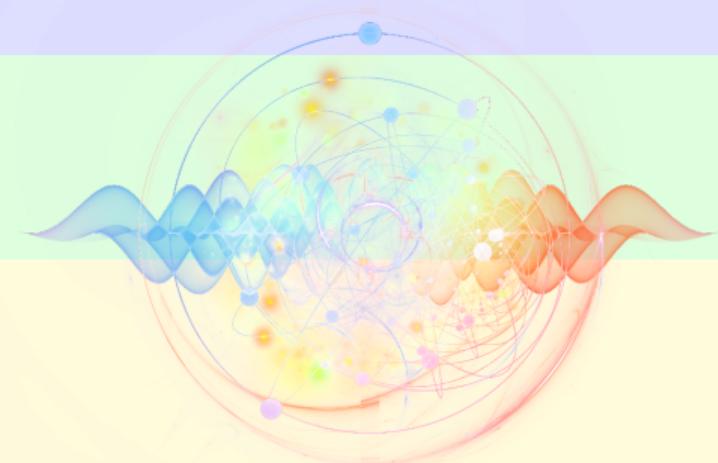
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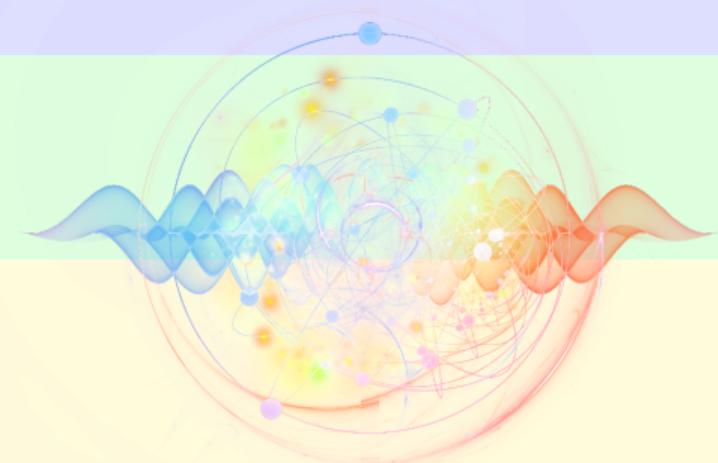


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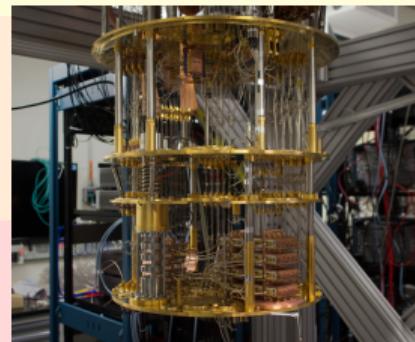


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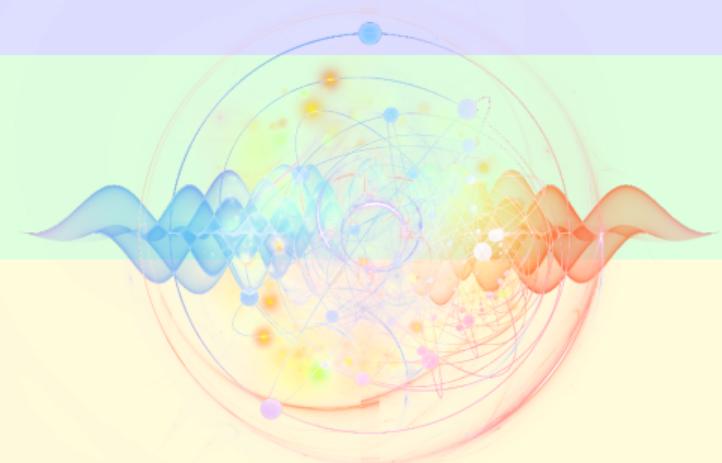
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Just last month, IBM launched a 16-qubit quantum computer you can use over the internet.



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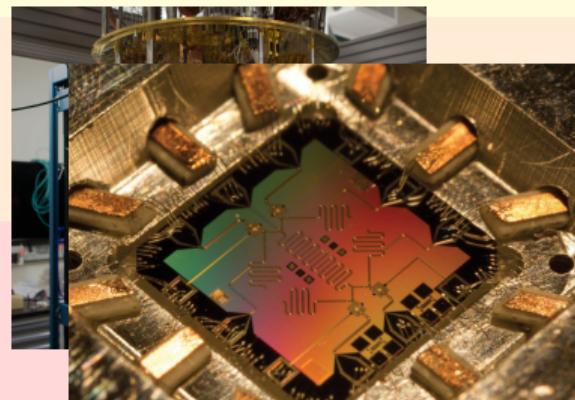
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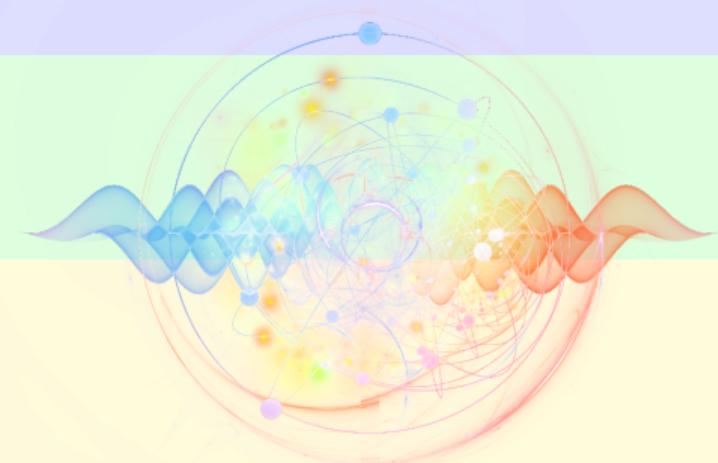
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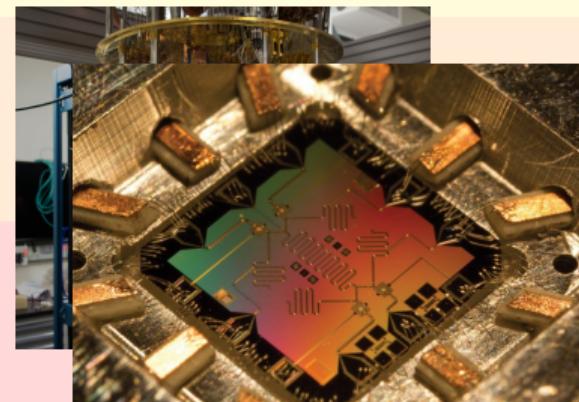
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The quantum revolution is about to begin!

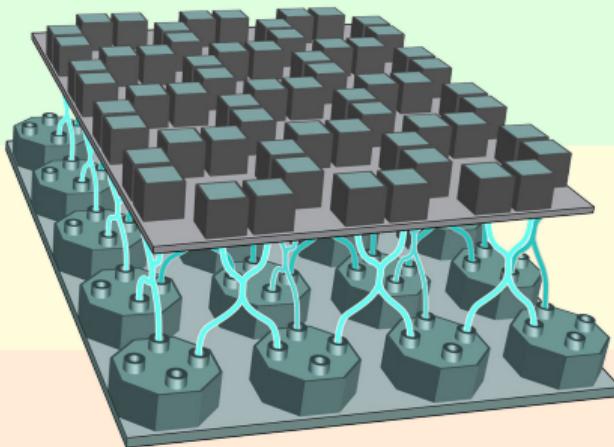


REAL QUANTUM COMPUTERS

Real quantum computers don't exist yet.

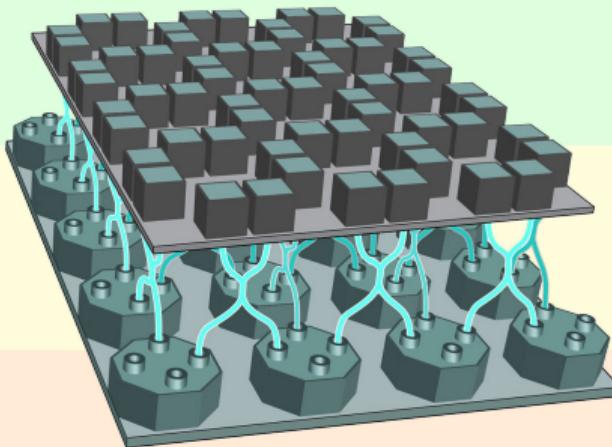
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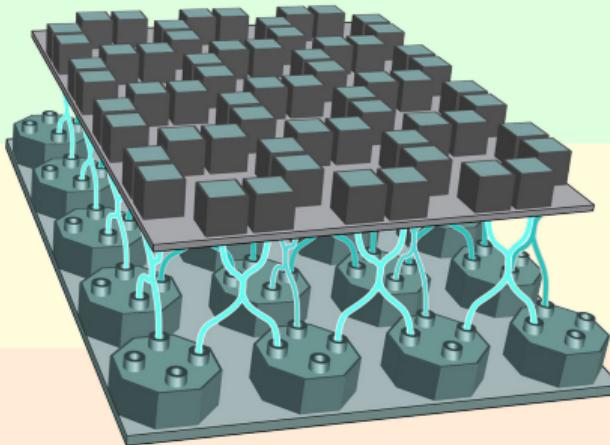
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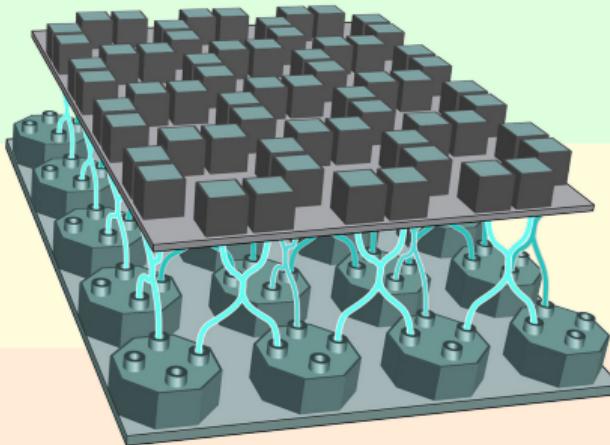


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It's hard because *errors* can easily accumulate.

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Let's try it!

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- ① Arrange your qubits in a single line, connected by cables

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Last Step. Last two qubits press CZ, then last qubit press H

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All the qubits are entangled! Or have errors destroyed the quantum effects?

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Everybody, press M to measure your qubit!