El auge de la computación cuántica

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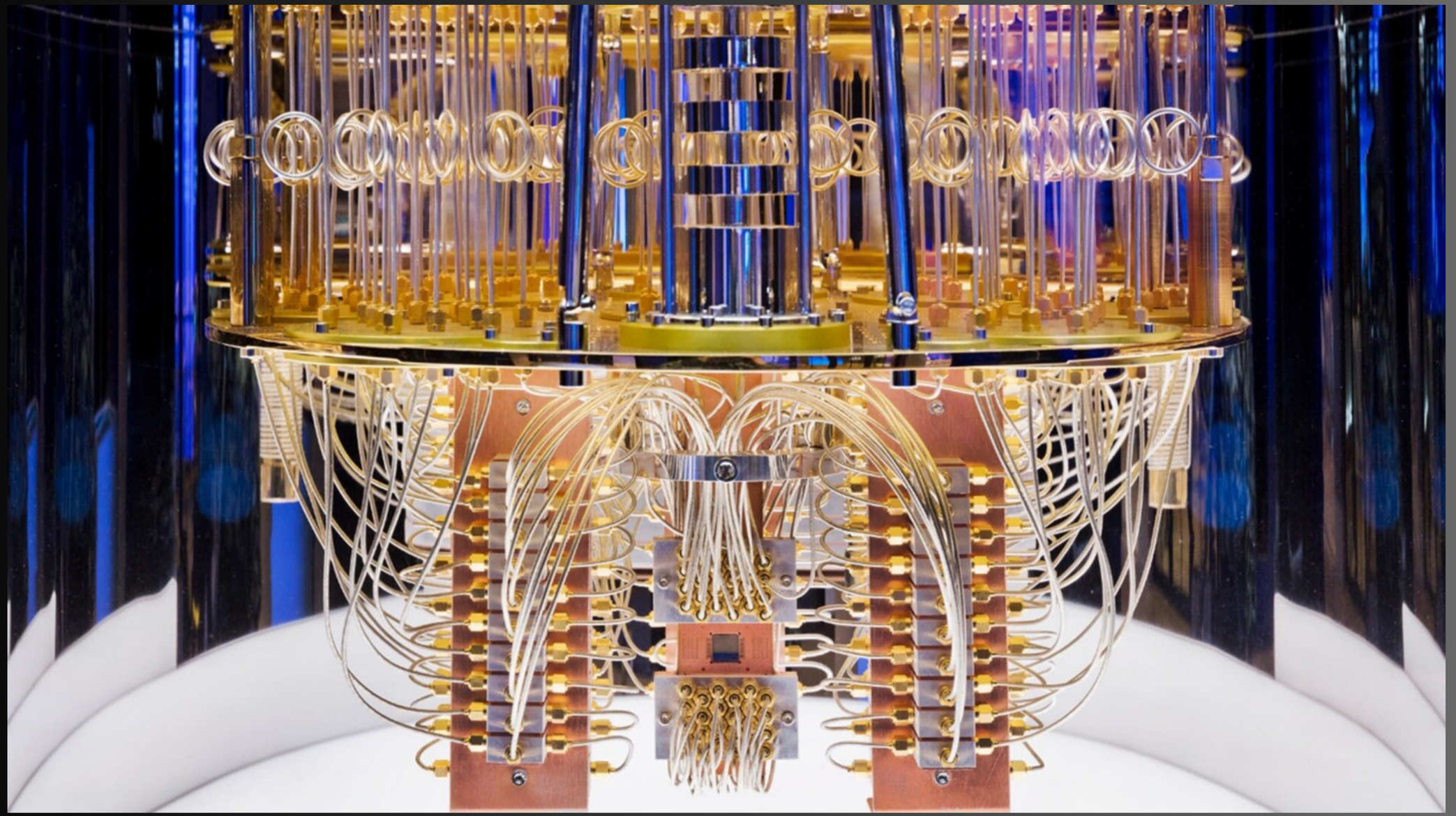
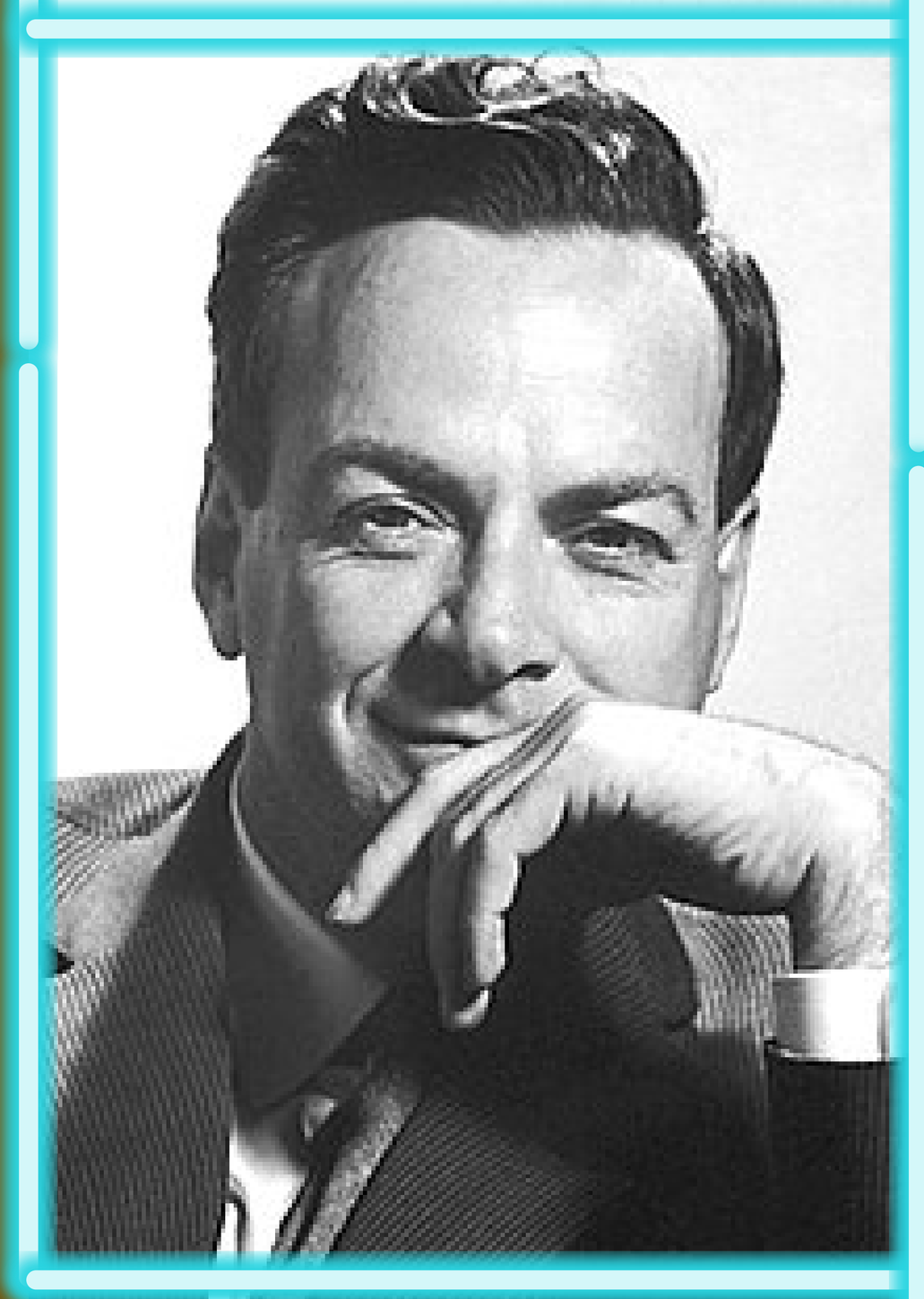


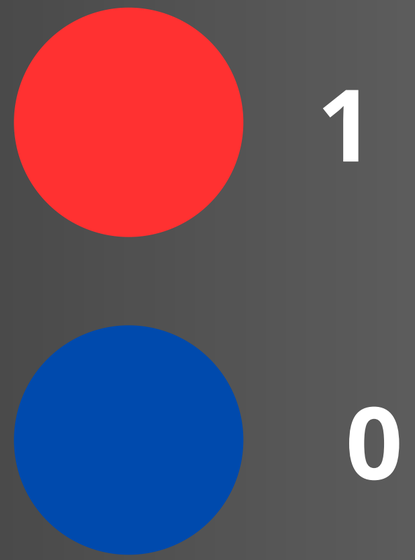
Tomada de ESA, *Interior of IBMs quantum computer*

Los inicios

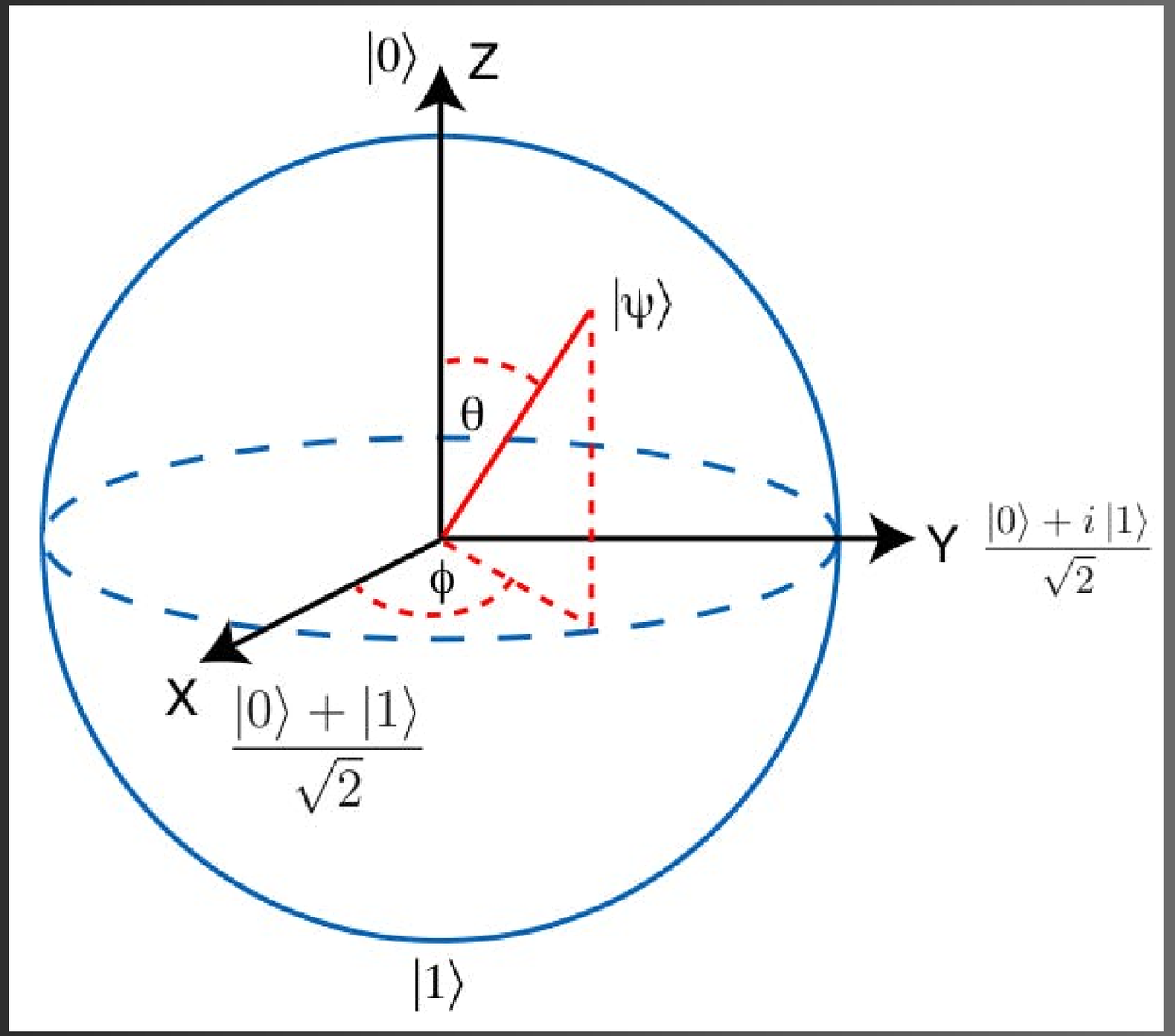
- Richard Feynman en 1982

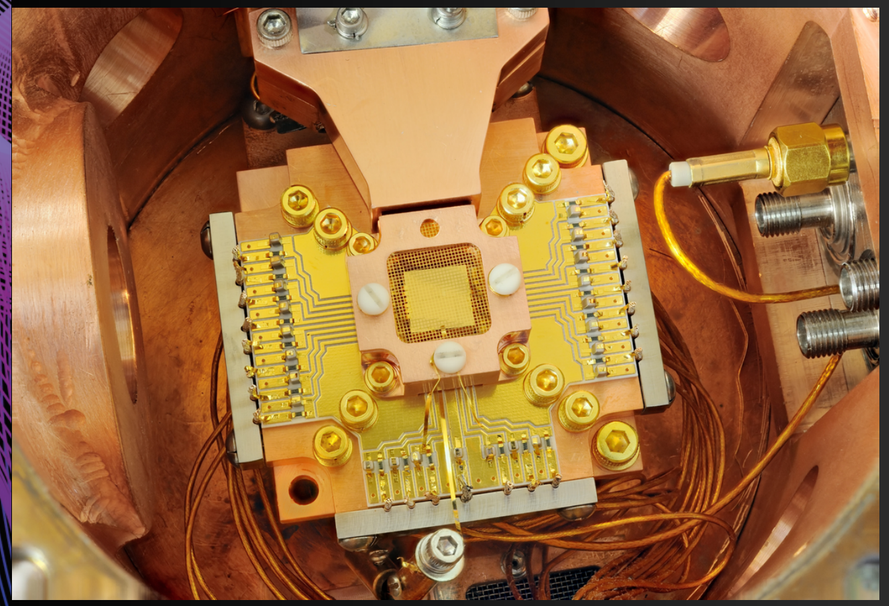


BIT CLÁSICO

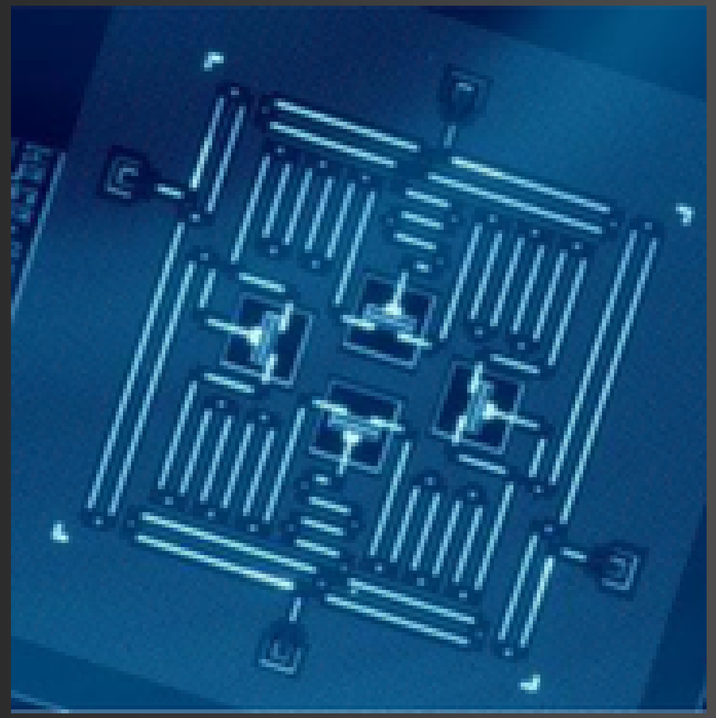


CÚBIT (BIT CUÁNTICO)





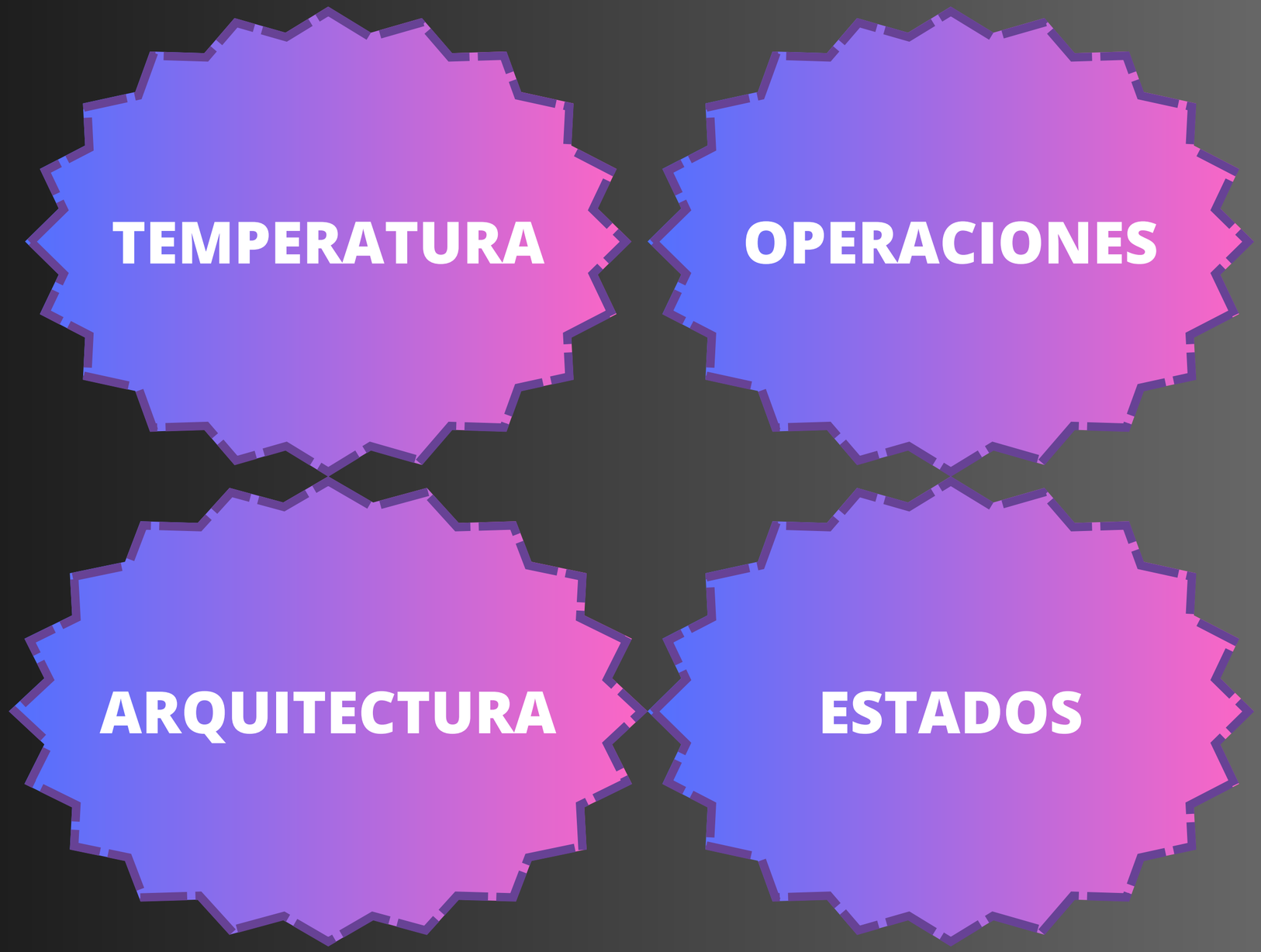
Iones atrapados



Superconductores

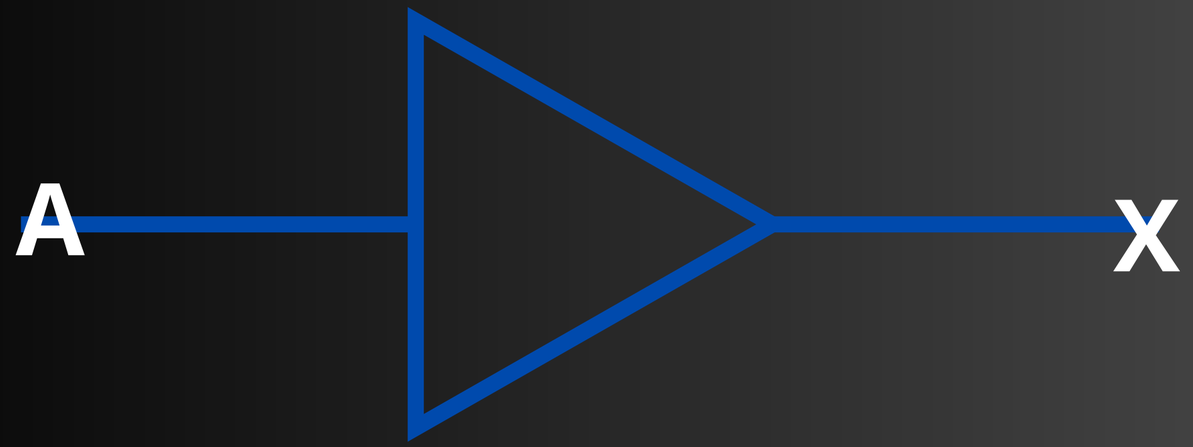
Resonancia magnético nuclear

RETOS



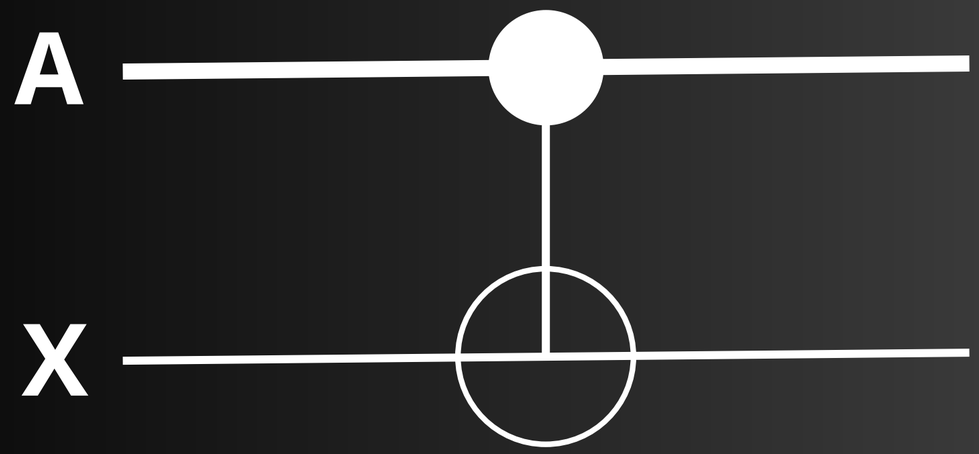
ALGORITMO CUÁNTICO

COMPUERTA NOT



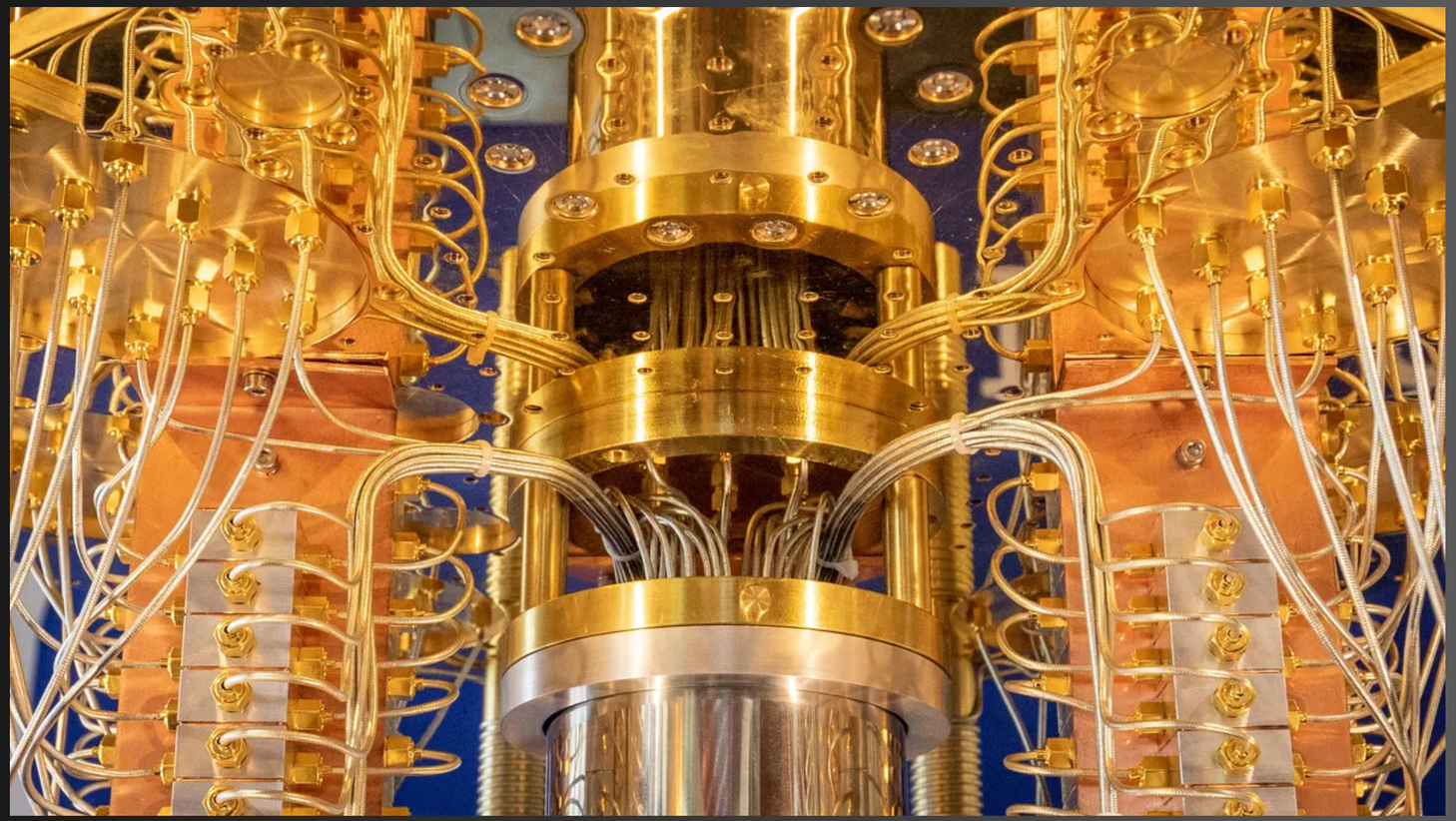
A	X
0	1
1	0

COMPUERTA CNOT

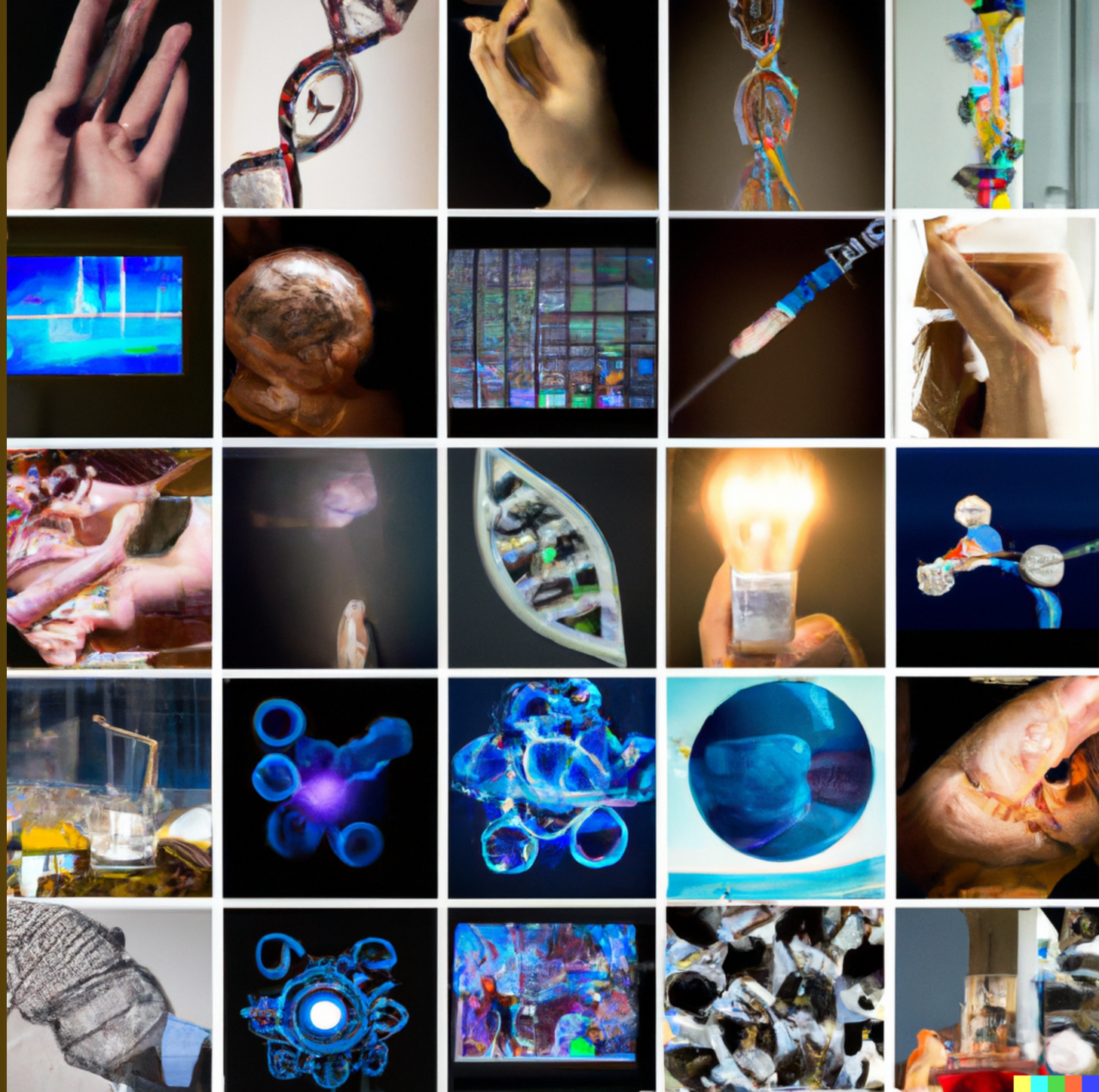


A	X
|00>	|00>
|01>	|01>
|10>	|11>
|11>	|10>

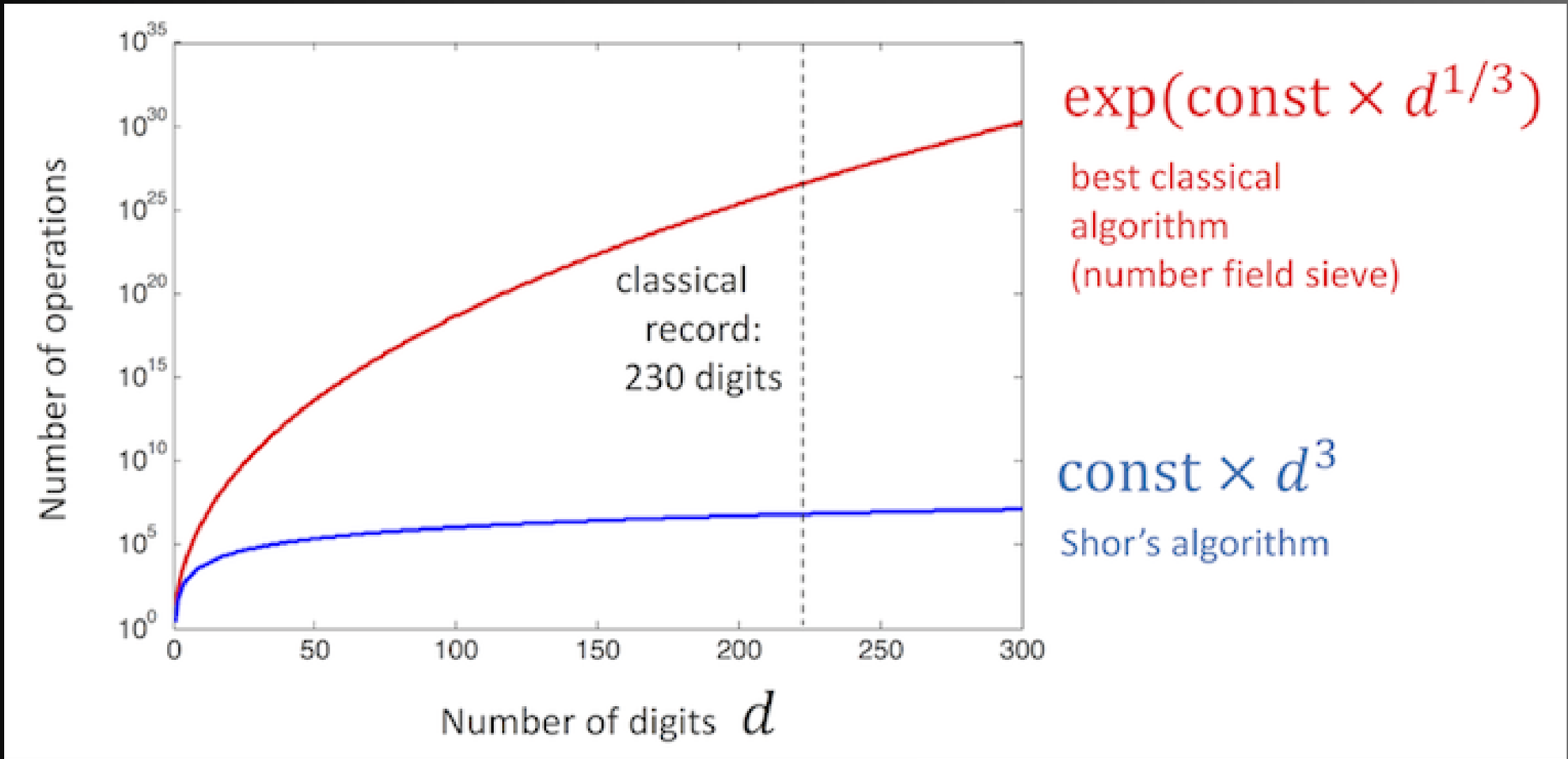
¿LA ARQUITECTURA Y HARDWARE IMPORTA?



La importancia de la computación cuántica



ALGORITMO DE SHOR



Tomada de IBM Shor's algorithm

FACTORIZACIÓN DE NÚMEROS RSA

RSA-240	CLÁSICA	953 años-core
RSA-250	CLÁSICA	2 700 años-core
RSA-1024	CLÁSICA	476 500 años-core

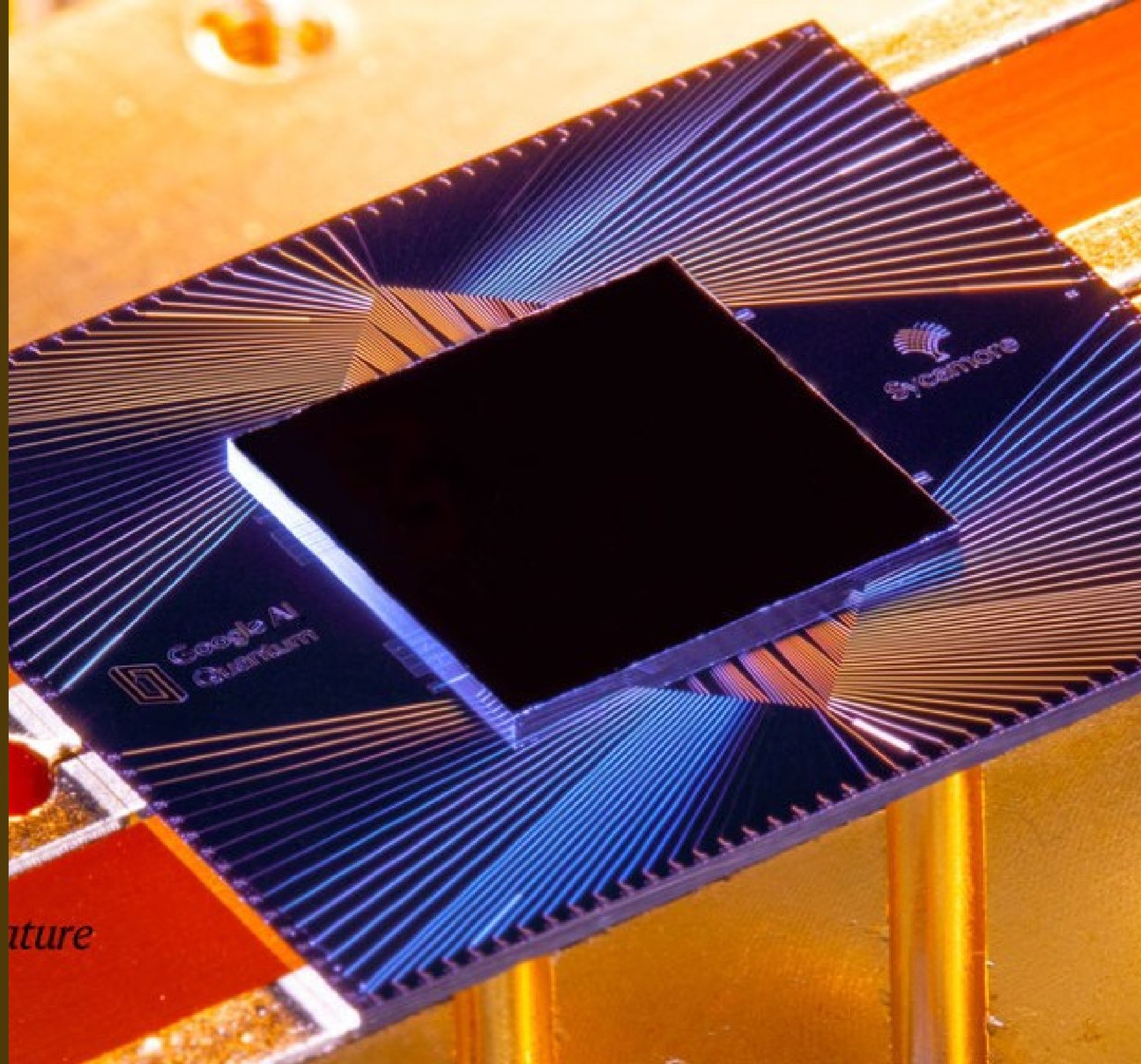
ALGORITMO DE GROVER

Clásico: N/2 ó N intentos

Groover: (N)^1/2

ACTUALIDAD

Tomada de Nature
volume 574, pages505–510
(2019)



APLICACIONES POTENCIALES

- Machine learning cuántico
- Simulación de moléculas
- Encriptación cuántica
- Optimización
- Gaming
- Blockchain
- ...

"I’m staring at a bunch of blocky, low-resolution trees on a desert island. In the distance, dozens of jagged rocks are sticking out of the sea. To anyone who has played Minecraft, the virtual landscape looks familiar, but this one is different: it was designed by a quantum computer"

- James Wootton

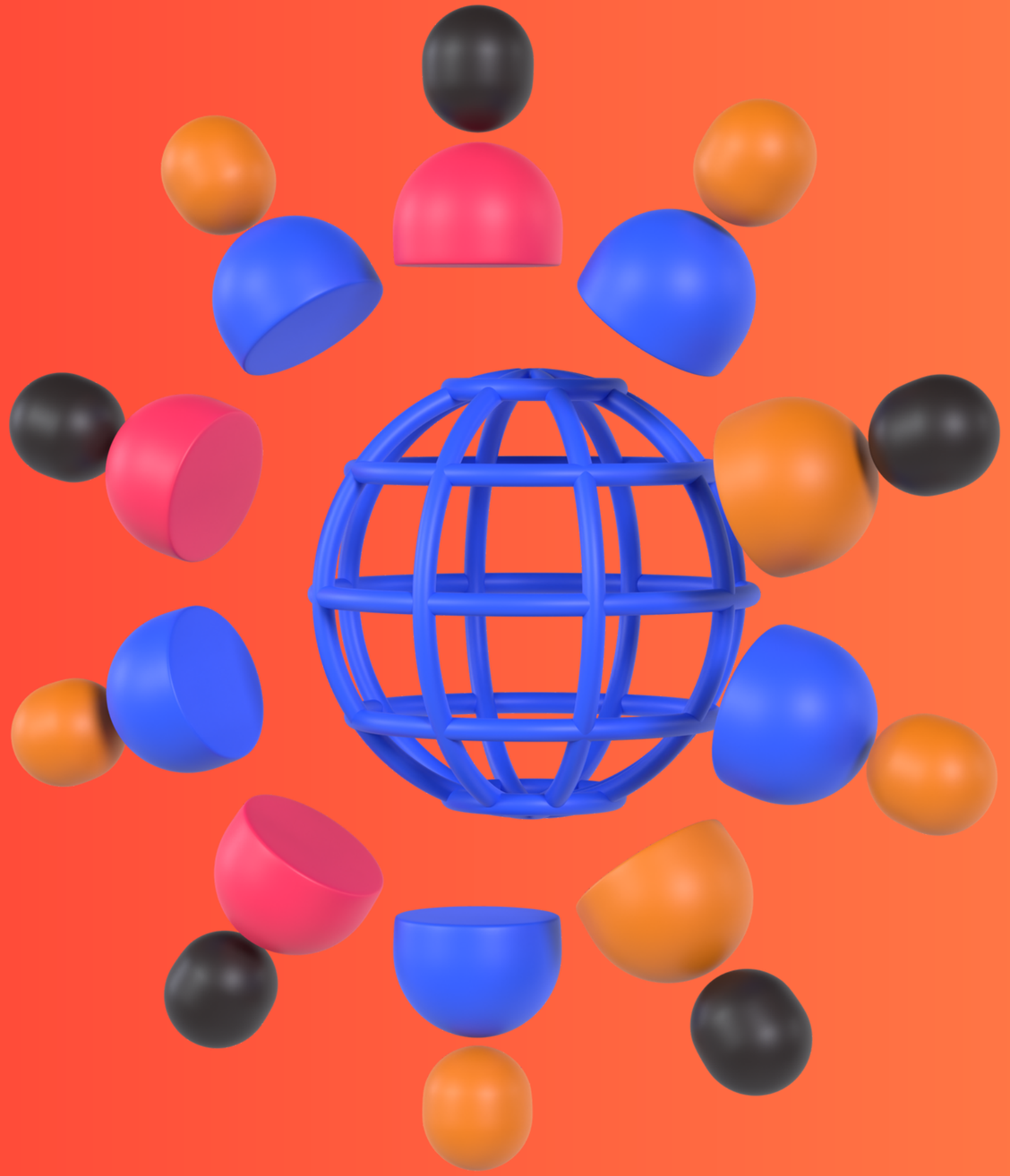
QPong

This is a quantum version of classic game Pong using IBM Qiskit and PyGame. This game was initiated in IBM Qiskit Camp 2019 by Huang Junye, Jarrod Reilly, Anastasia Jeffery and James Weaver based on James Weaver's quantum-circuit-pygame package: https://github.com/JavaFXpert/quantum-circuit-pygame

NEW! Unity version is being actively developed over here: https://github.com/HuangJunye/QPong-Unity

https://github.com/QPong/QPong

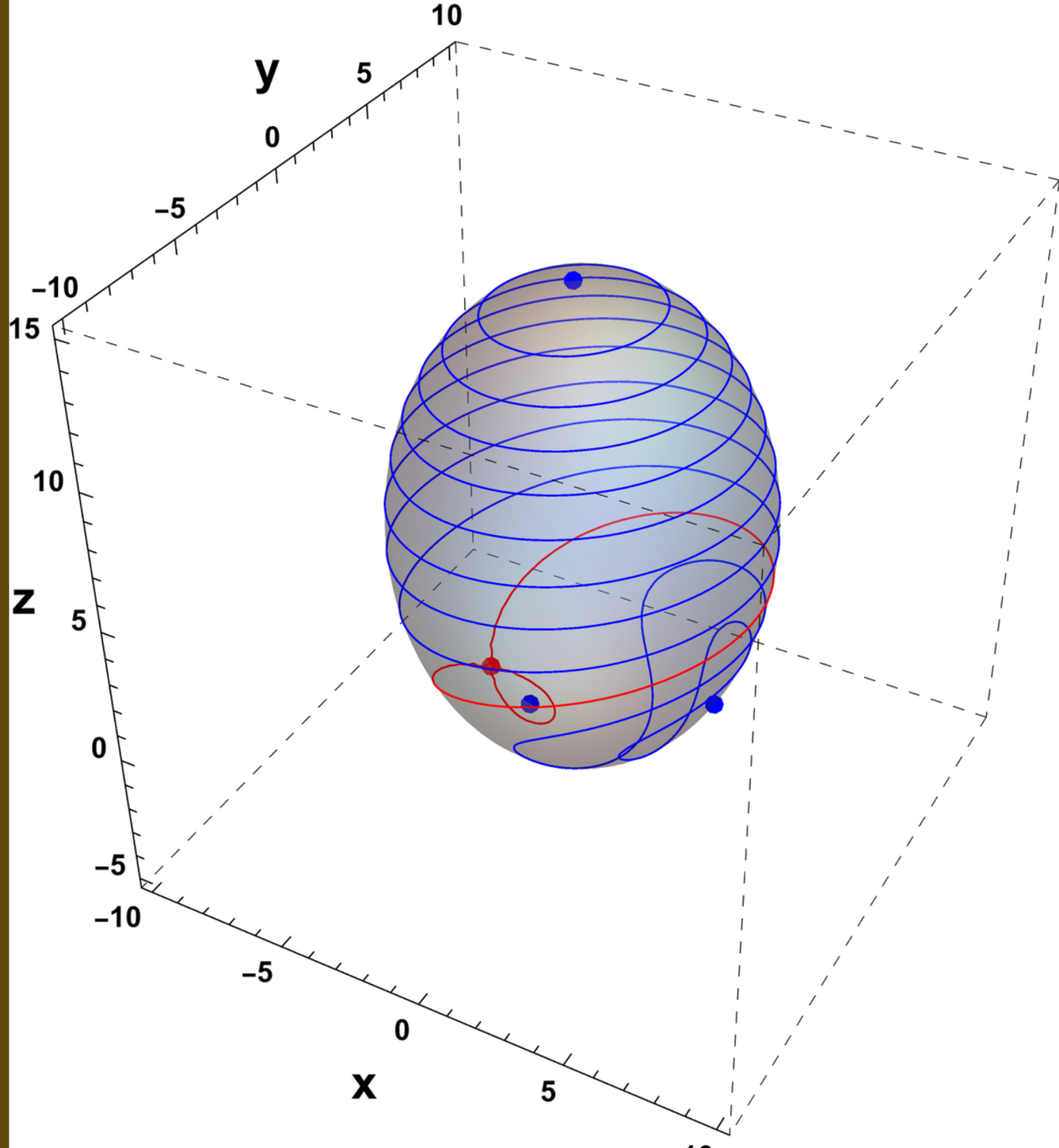
EMPRESAS



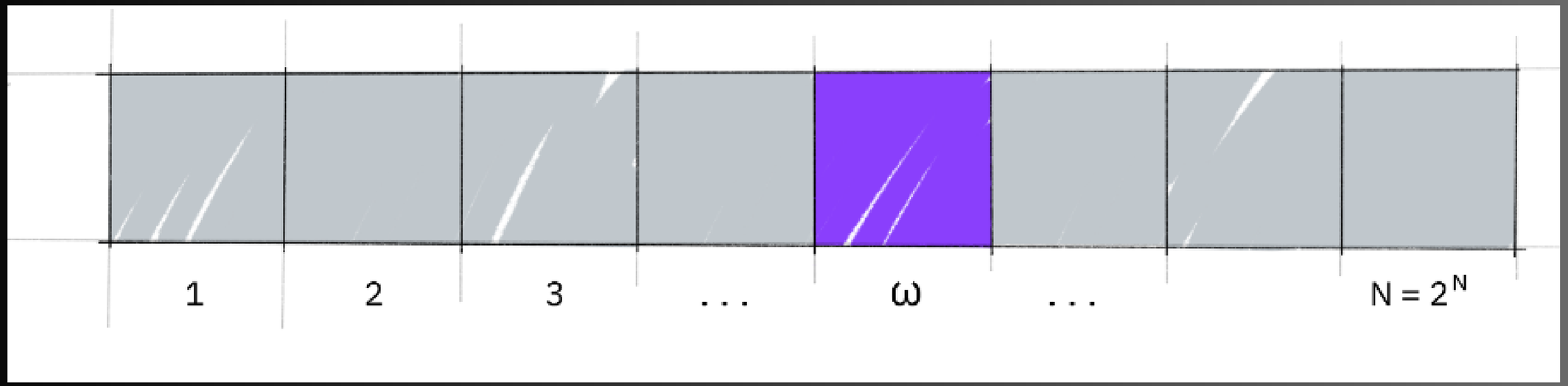
- IBM Composer
- Qiskit textbook
- Qiskit Global Summer School
- Xanadu Quantum Codebook
- Pennylane
- Summer Internships
- ....

DÍMERO POLARITÓNICO

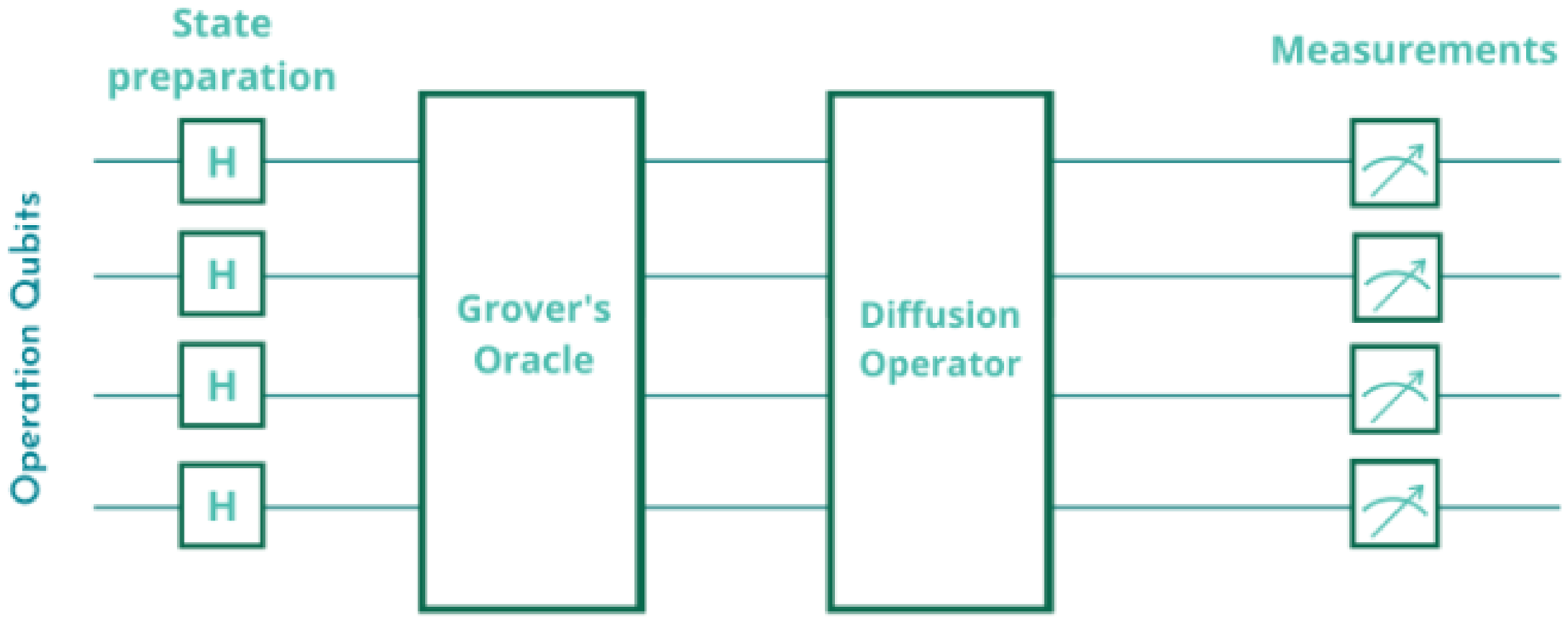
Dr. Yura Rubo
Ing. Jesán Velázquez Reséndiz



ALGORITMO DE GROVER



https://learn.qiskit.org/course/ch-algorithms/grovers-algorithm



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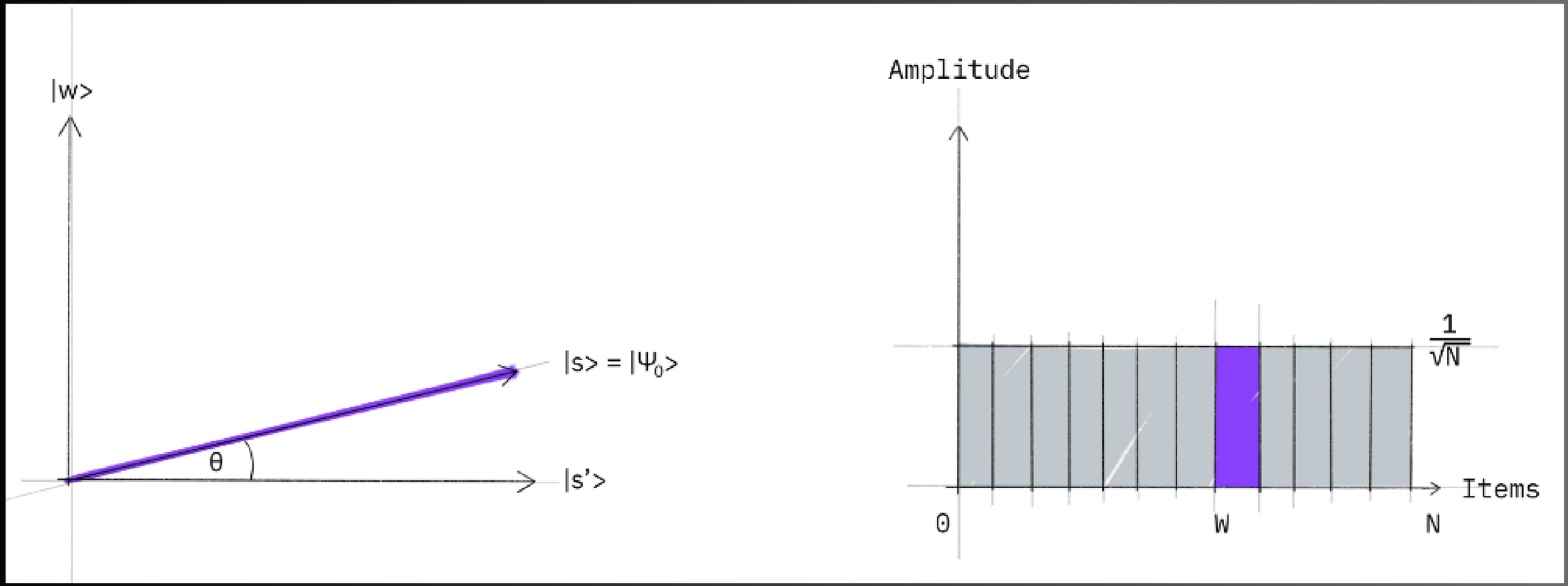
PASO 1



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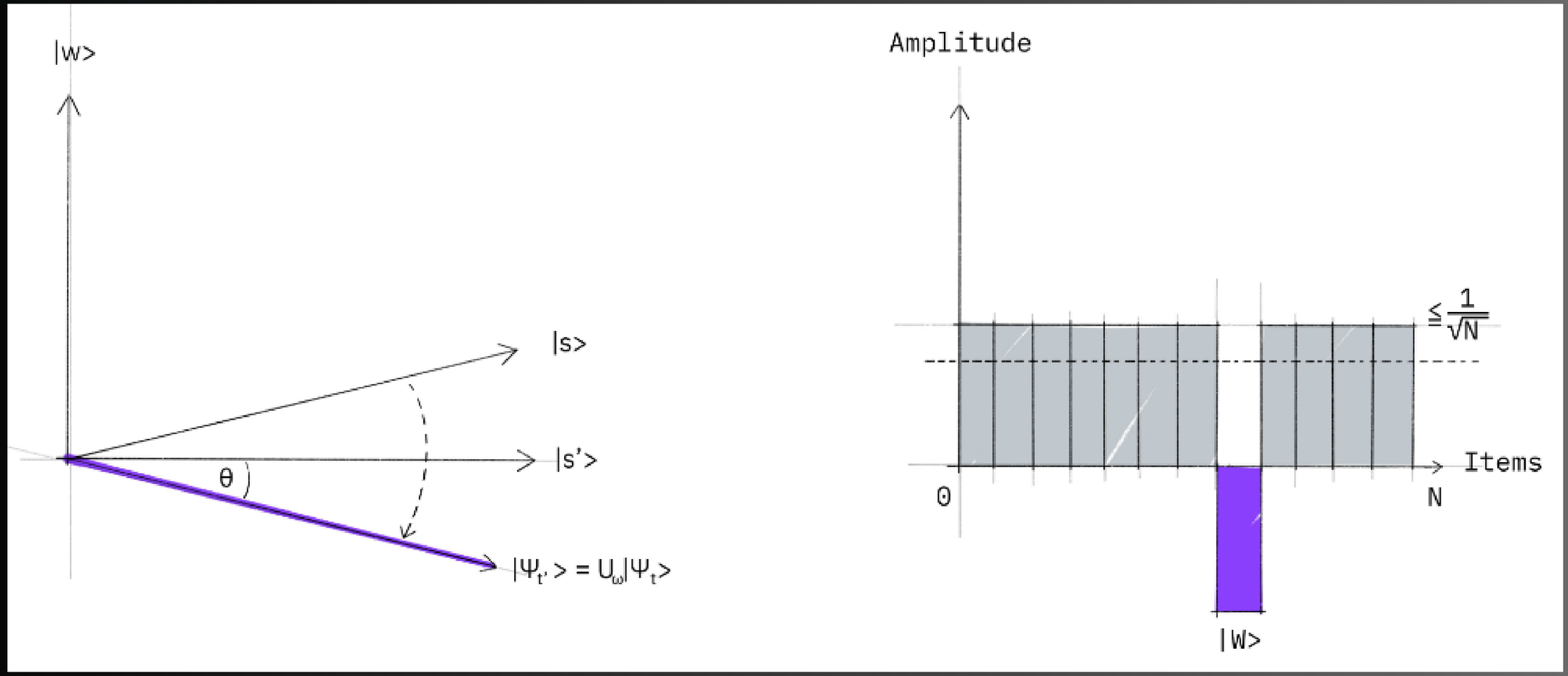
PASO 2



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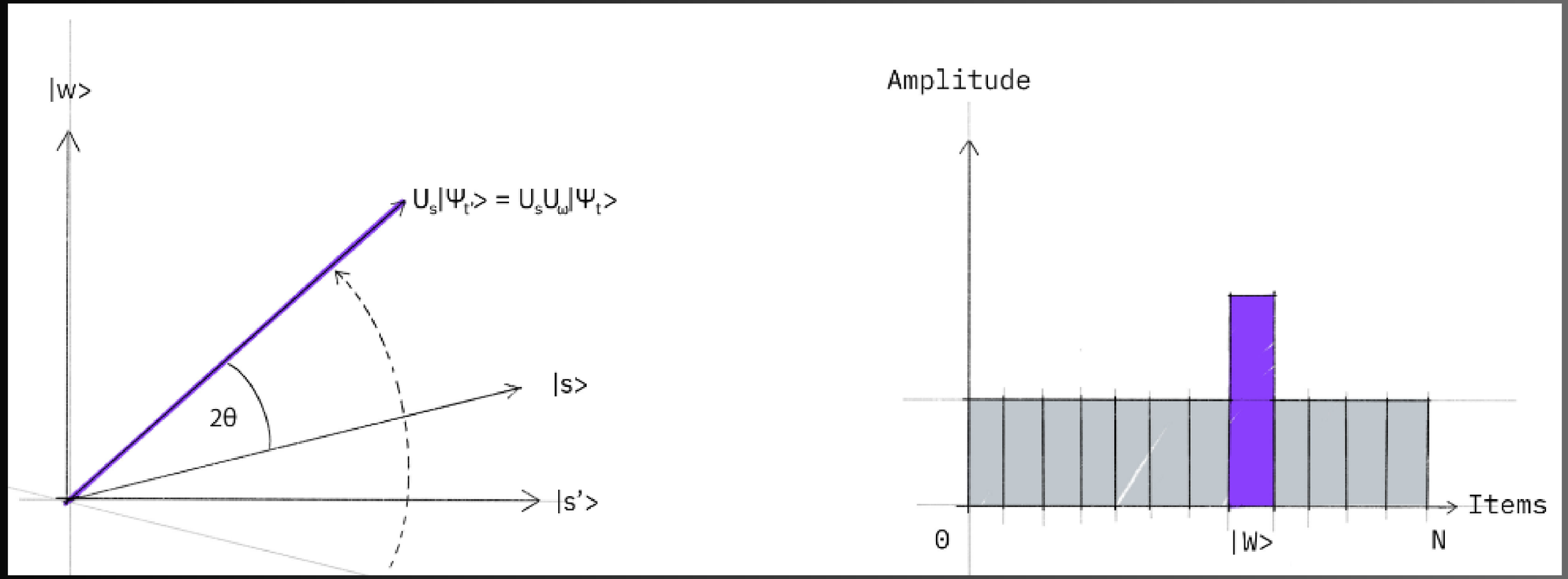
PASO 3



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