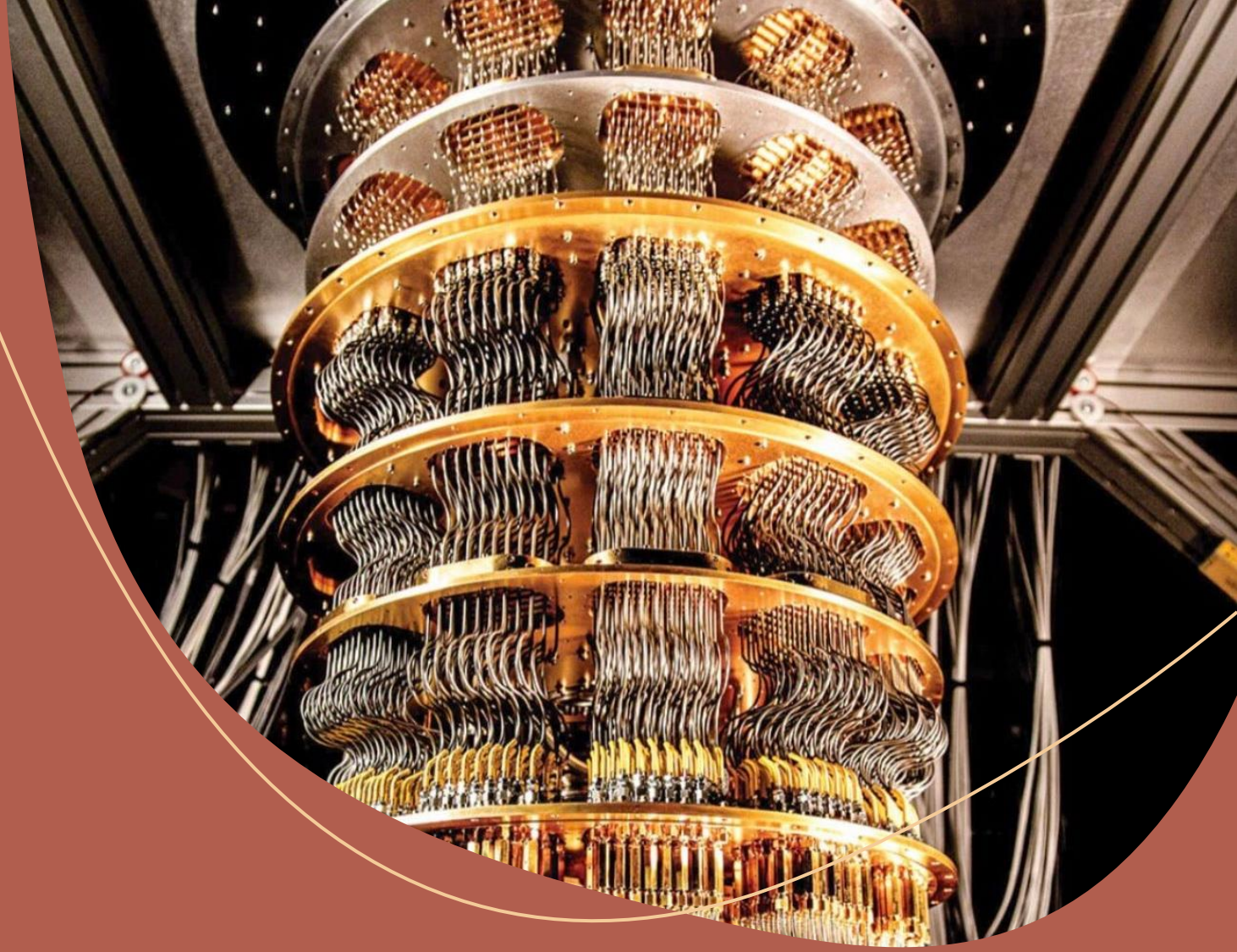
Computación cuántica: retos y oportunidades



Elías F. Combarro

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Universidad de Oviedo

Universidad de Oviedo


Chinese Scientists Achieve
Quantum Computational Advantage


QUANTUM COMPUTERS
AND THE END OF SECURITY


The international journal of science / 24 October 2019
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Classical supercomputer
outperformed by quantum
chip for the first time
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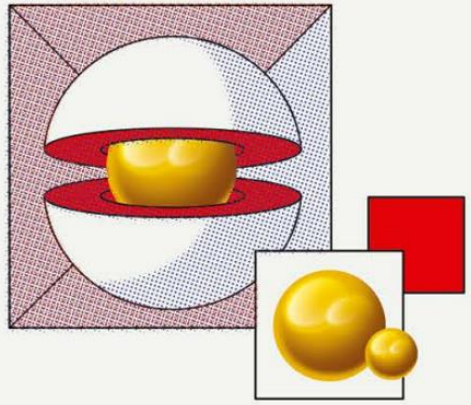
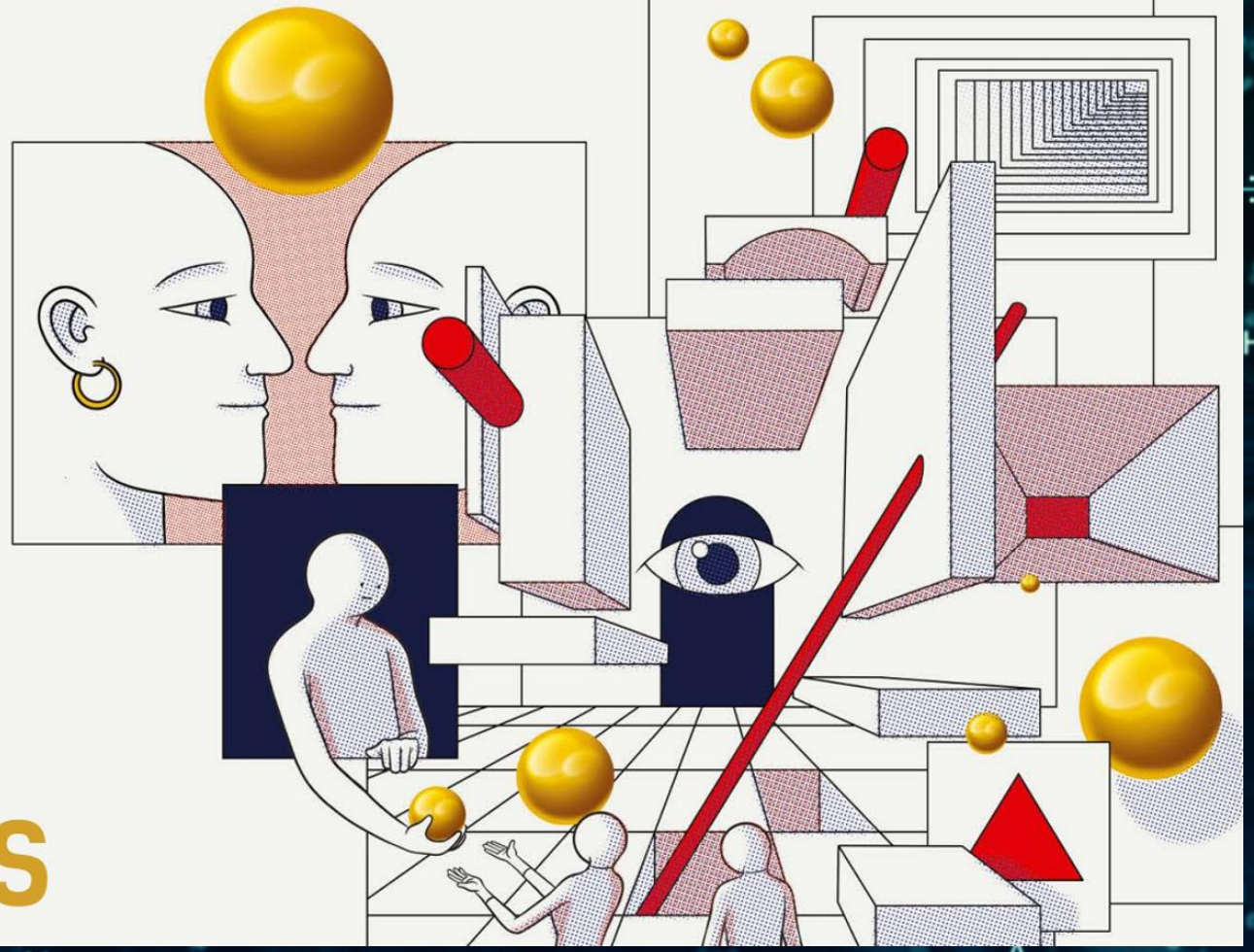


Palabras clave: computación cuántica, supremacía cuántica, criptografía, inteligencia artificial, simulación.

Las verdaderas capacidades de los ordenadores cuánticos

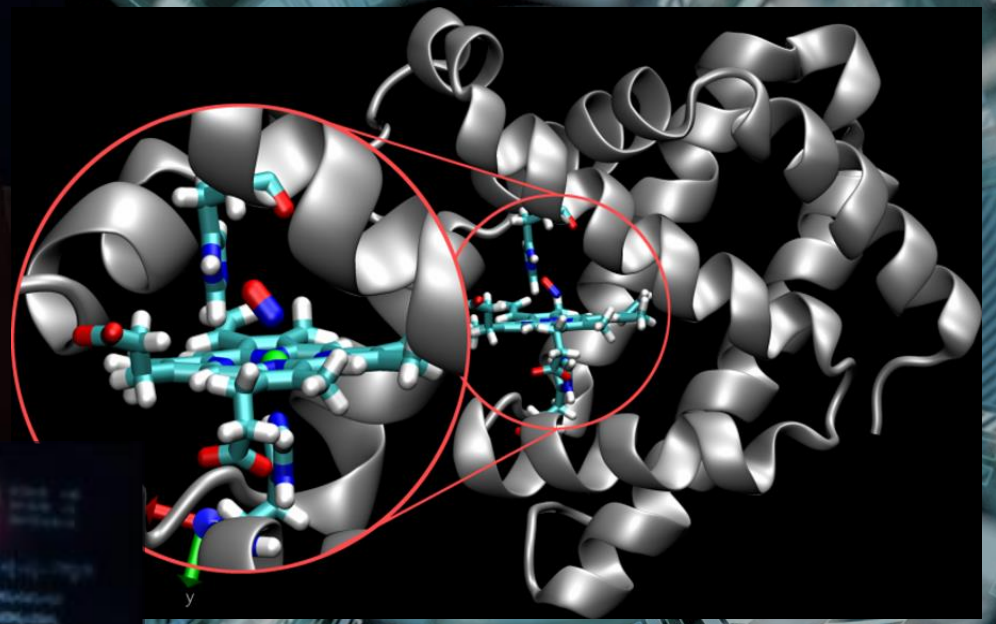
ELÍAS F. COMBARRO



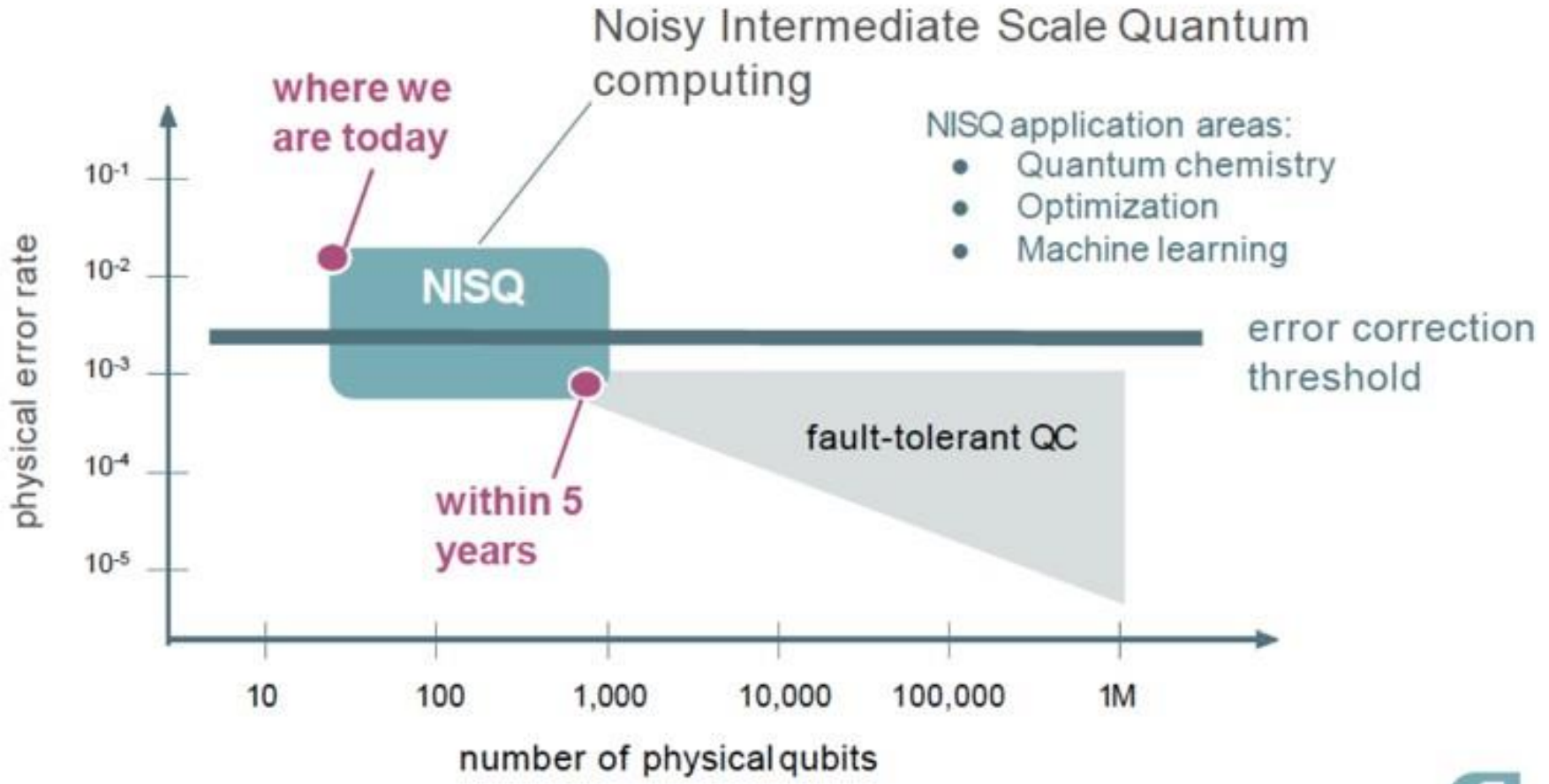
COMPUTACIÓN CUÁNTICA:

MITOS Y REALIDADES

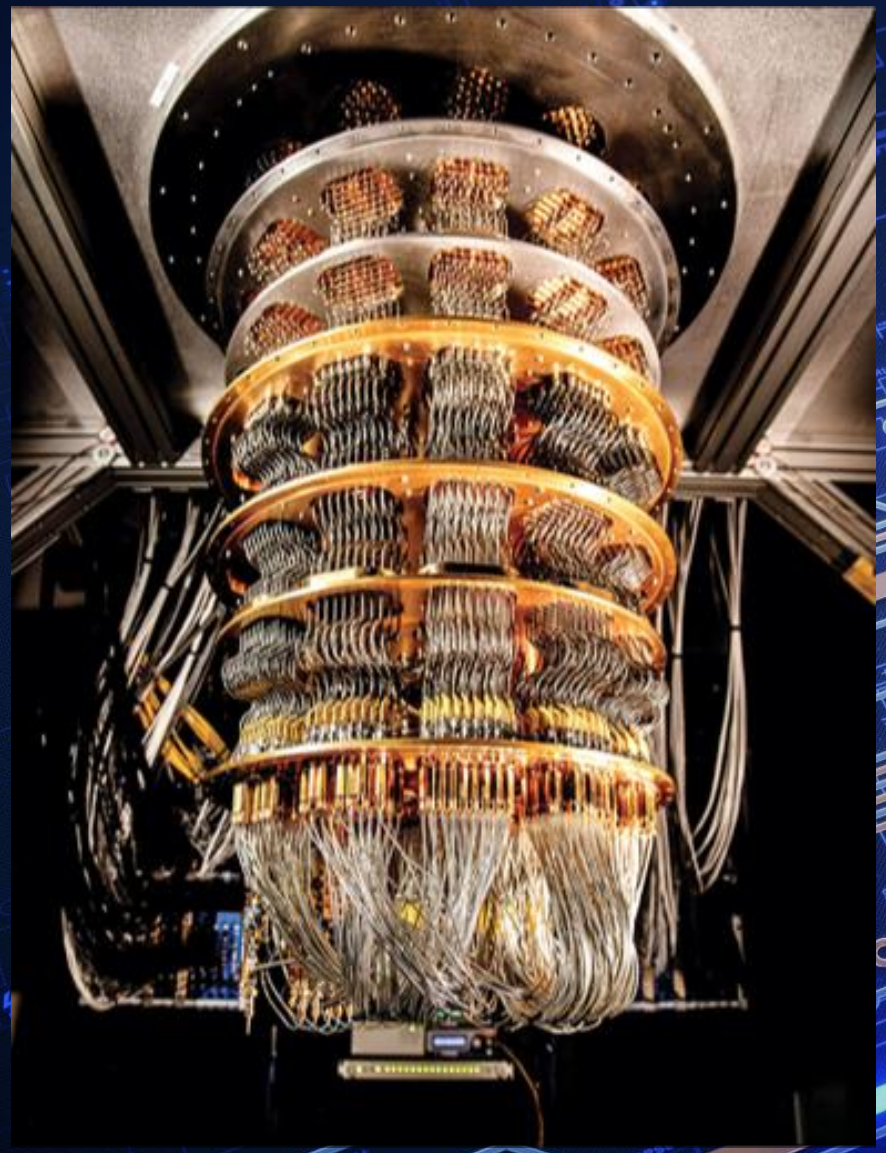

CYBER SECURITY

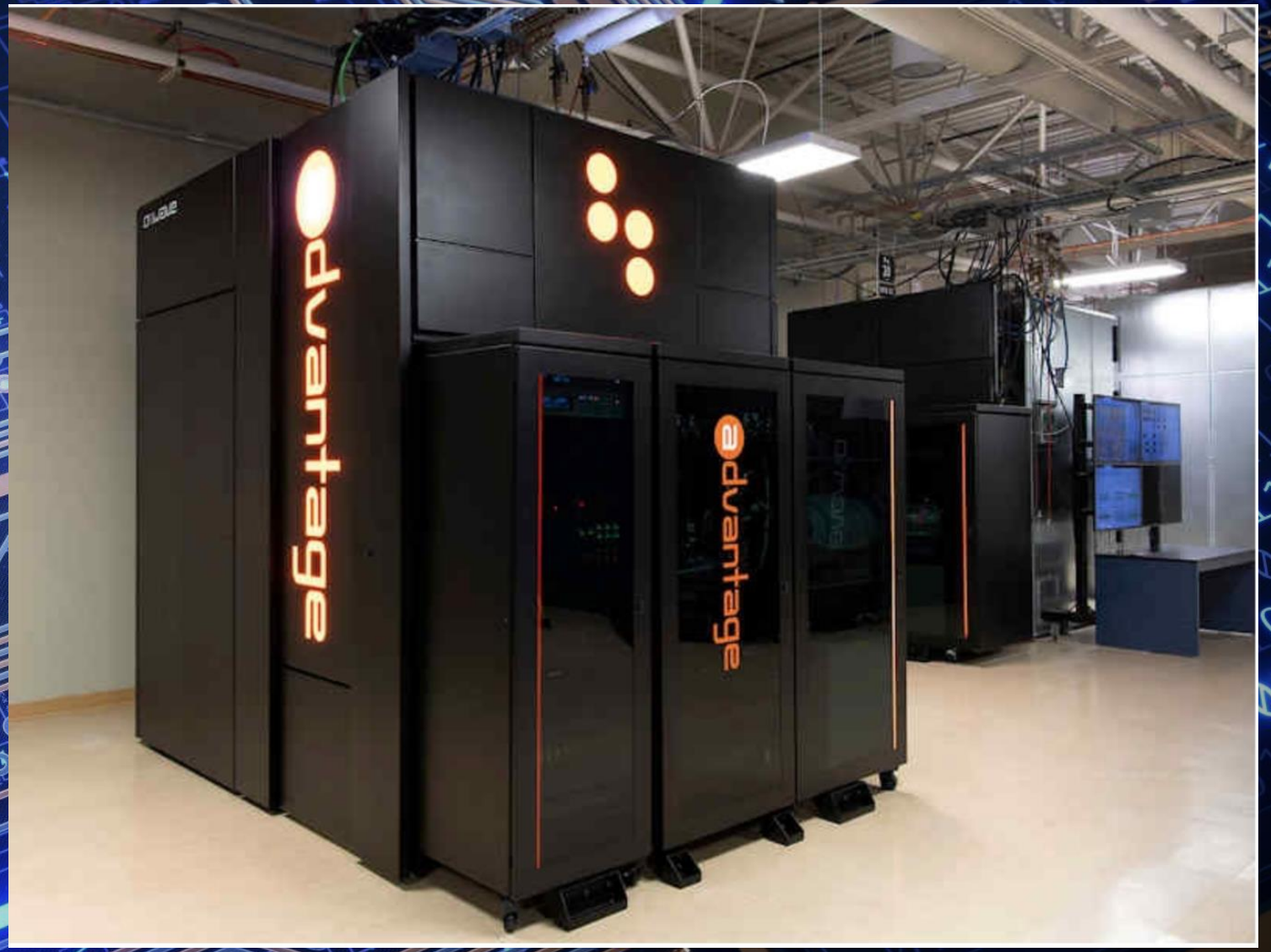



OPTIMIZATION



"Quantum computing in the NISQ era and beyond" Preskill, 2018 https://arxiv.org/abs/1801.00862

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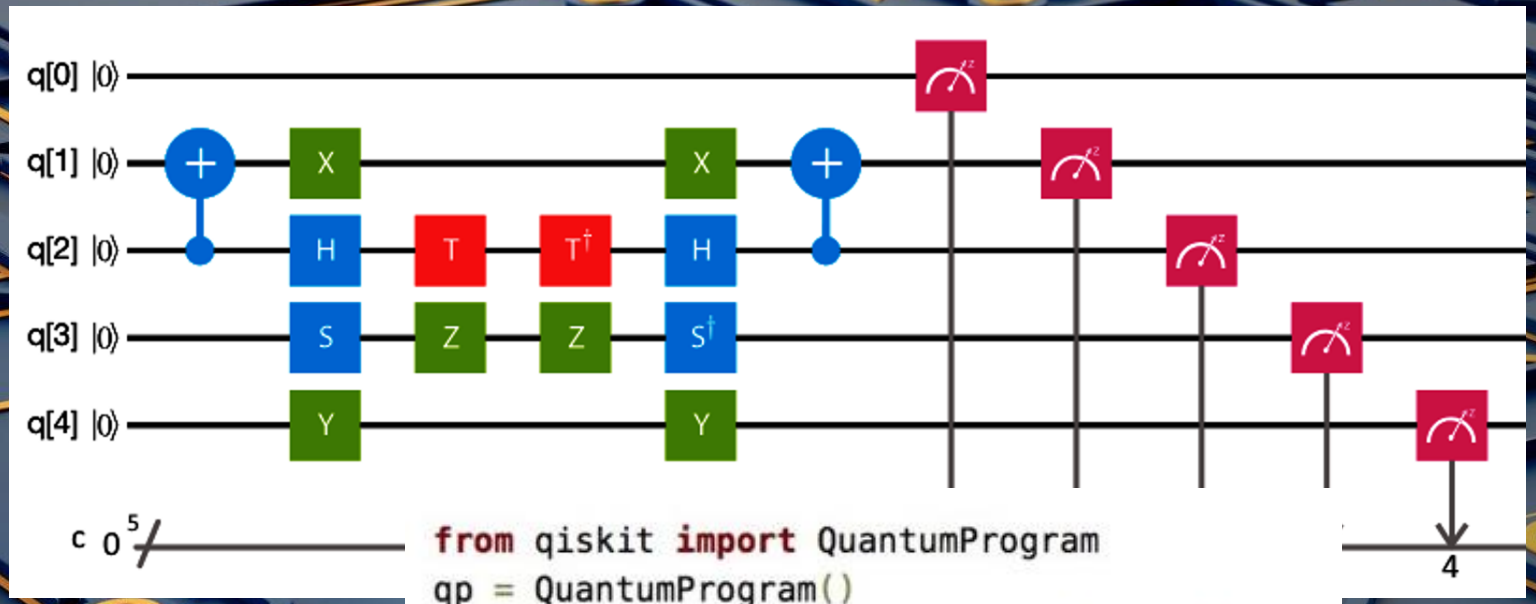
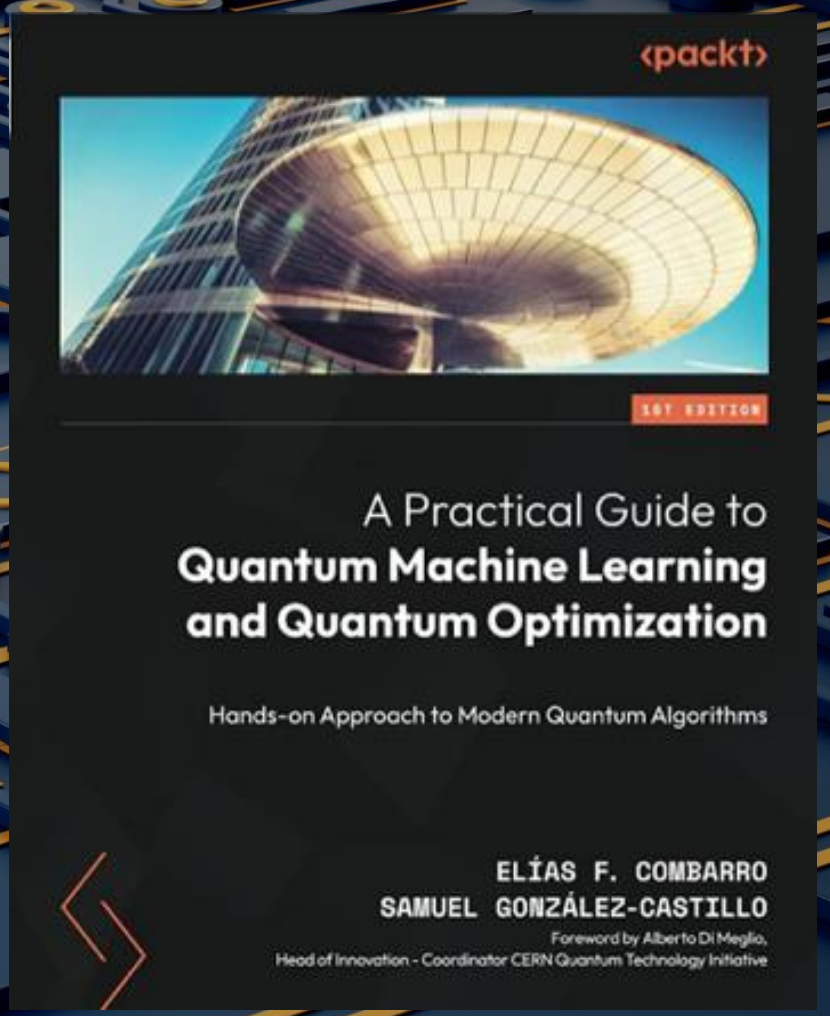
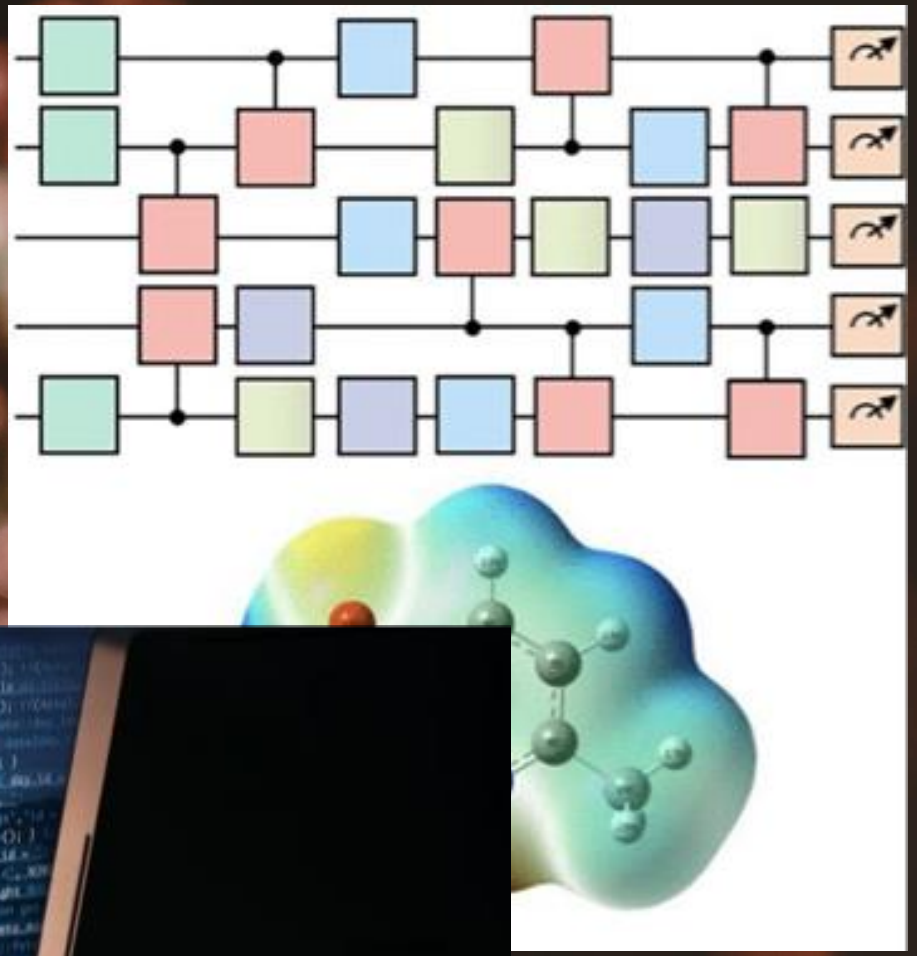
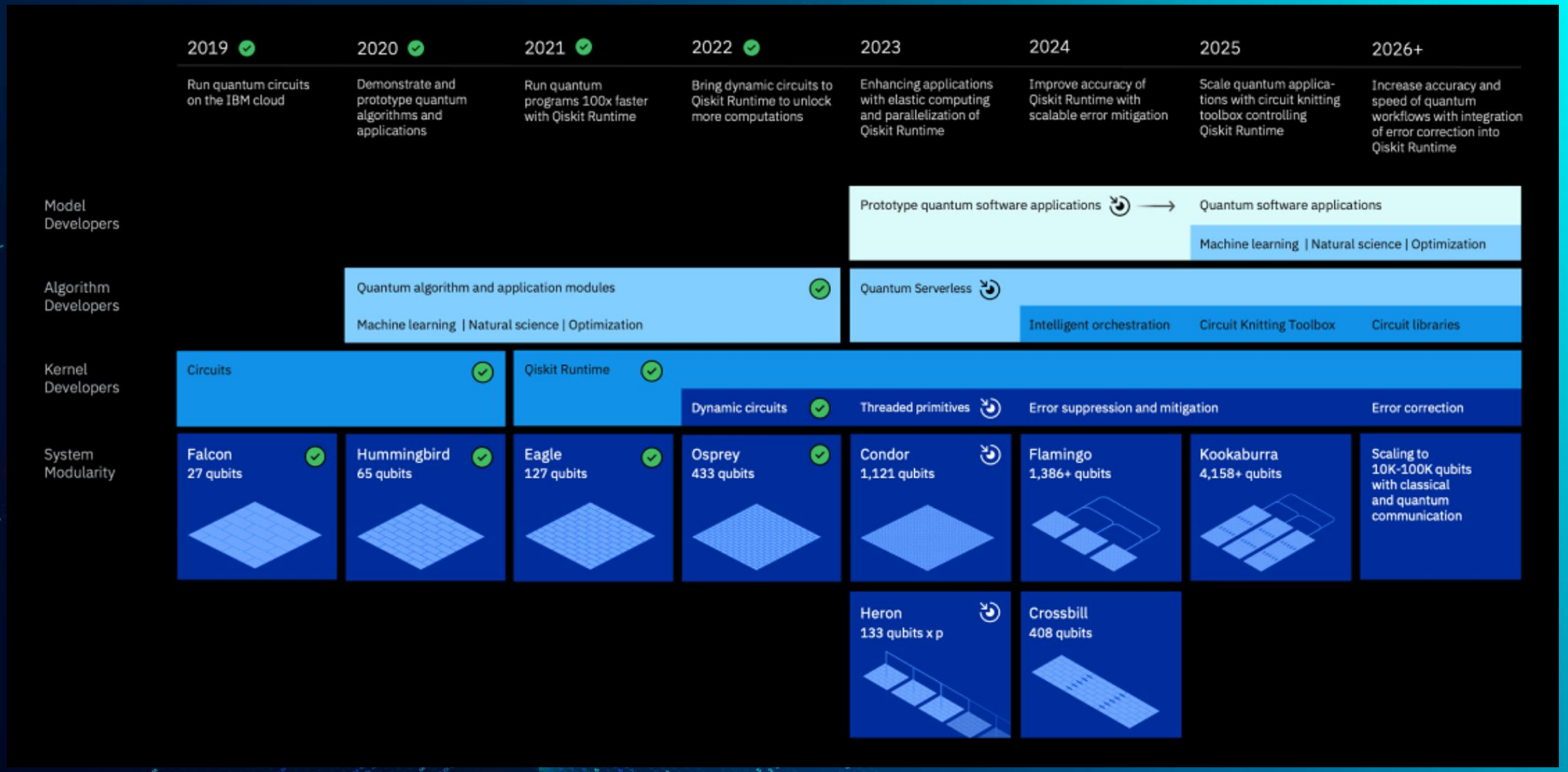



```
from qiskit import QuantumProgram
qp = QuantumProgram()
qr = qp.create_quantum_register('qr', 2)
cr = qp.create_classical_register('cr', 2)
qc = qp.create_circuit('Bell', [qr], [cr])
qc.h(qr[0])
qc.cx(qr[0], qr[1])
qc.measure(qr[0], cr[0])
qc.measure(qr[1], cr[1])
result = qp.execute('Bell')
print(result.get_counts('Bell'))
```



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2020
Demonstrate and prototype quantum algorithms and applications
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Run quantum programs 100x faster with Qiskit Runtime
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Bring dynamic circuits to Qiskit Runtime to unlock more computations
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Improve accuracy of Qiskit Runtime with scalable error mitigation
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Increase accuracy and speed of quantum workflows with integration of error correction into Qiskit Runtime
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Prototype quantum software applications
Quantum software applications
Machine learning | Natural science | Optimization
Algorithm Developers
Quantum algorithm and application modules
Machine learning | Natural science | Optimization
Quantum Serverless
Intelligent orchestration
Circuit Knitting Toolbox
Circuit libraries
Kernel Developers
Circuits
Qiskit Runtime
Dynamic circuits
Threaded primitives
Error suppression and mitigation
Error correction
System Modularity
Falcon
27 qubits
Hummingbird
65 qubits
Eagle
127 qubits
Osprey
433 qubits
Condor
1,121 qubits
Flamingo
1,386+ qubits
Kookaburra
4,158+ qubits
Scaling to 10K-100K qubits with classical and quantum communication
Heron
133 qubits x p
Crossbill
408 qubits