

Quantum + AI

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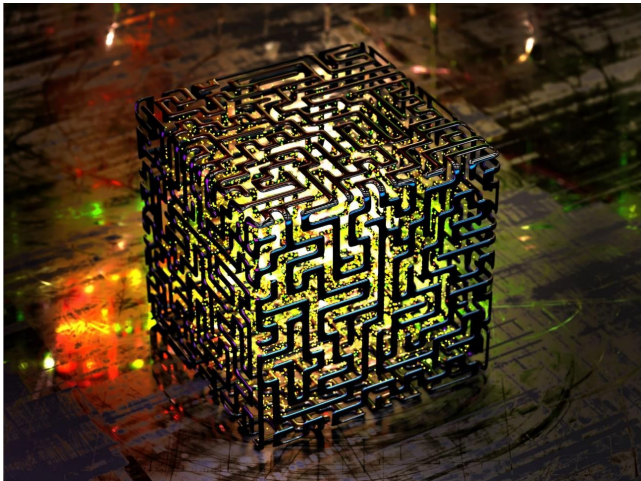
عضو في مؤسسة قطر
Member of Qatar Foundation

Quantum Computing

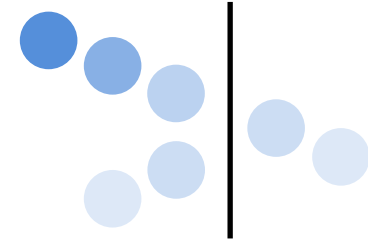
Superposition



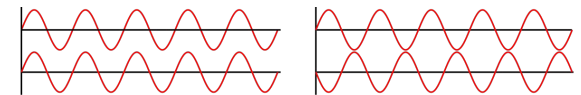
Entanglement



Tunneling

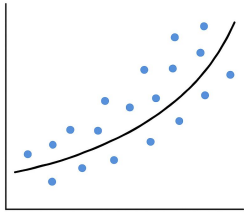


Interference

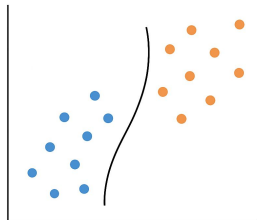


Machine Learning

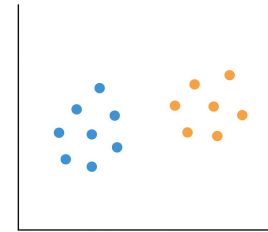
Regression



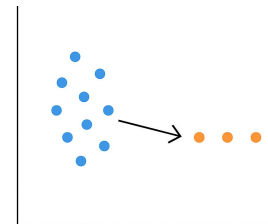
Classification



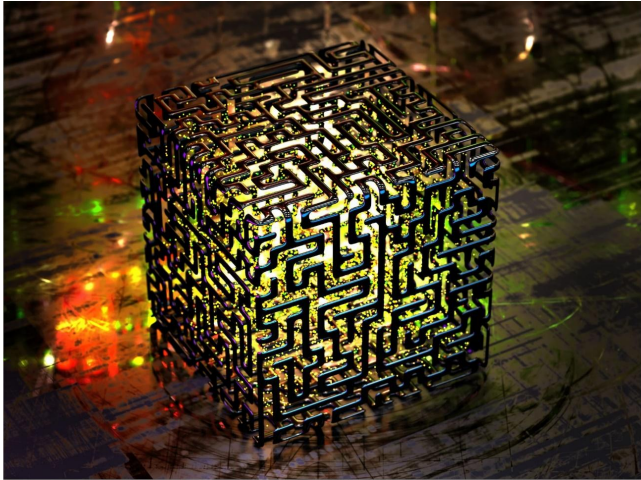
Clustering



Dimensionality Reduction



Quantum Machine Learning



+

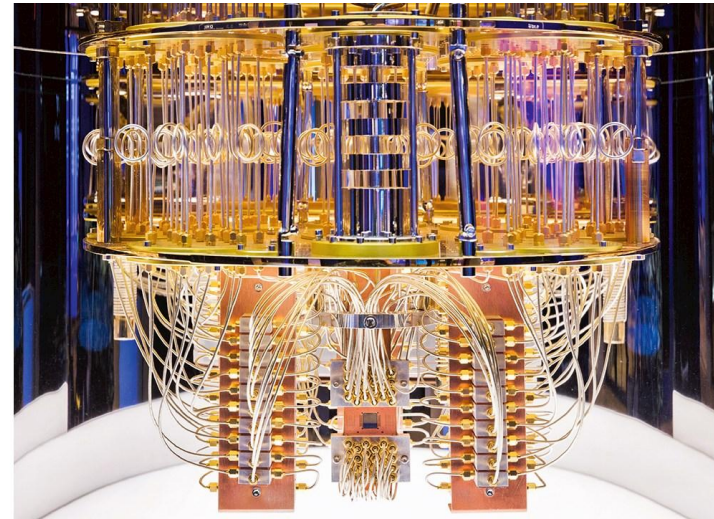


Quantum Machine Learning

First Wave (2013 – 2018)

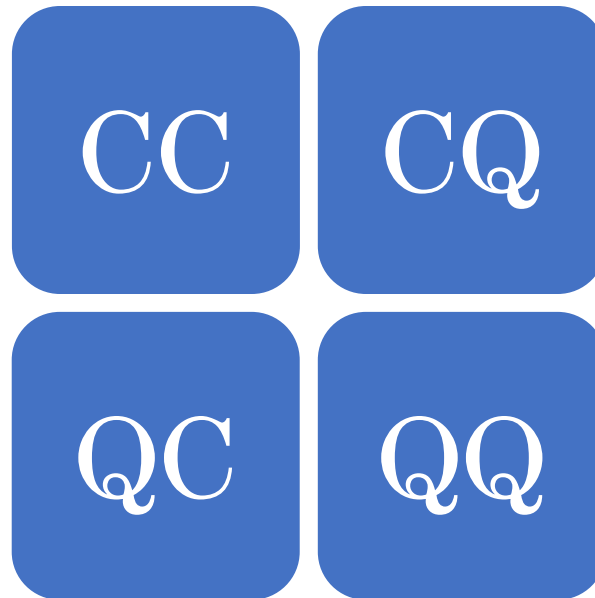


Second Wave (2018 – present)

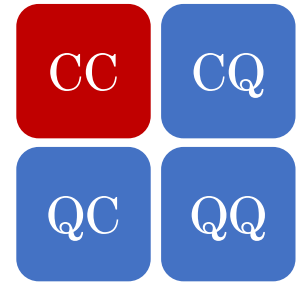


Quantum Machine Learning

Different combinations



Quantum Machine Learning

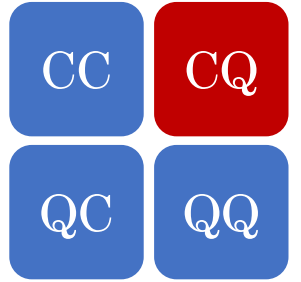


Classical computer processes classical data

```
010100101011010101010101001
010100101001010100101010010
101111001010100101010010100
101010010101010010101001010
100101011010100101001110001
110010010000101001111001101
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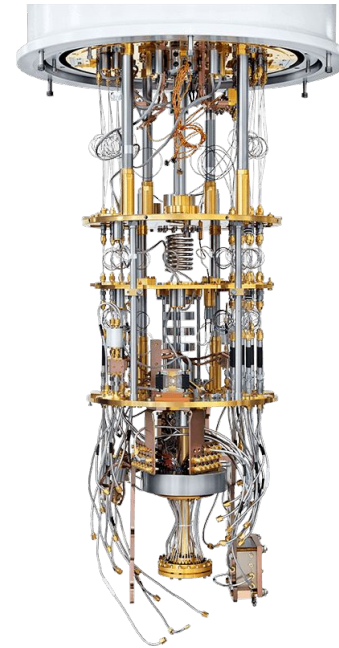


Quantum Machine Learning



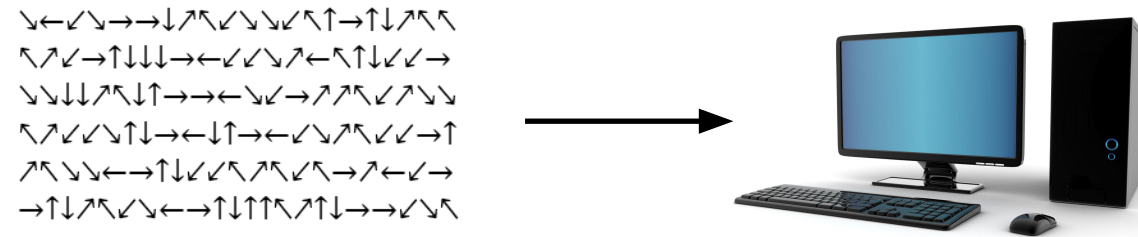
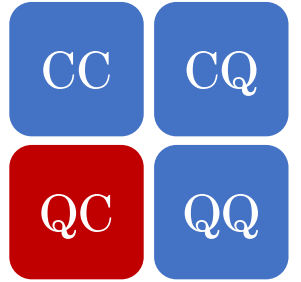
Quantum computer processes classical data

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010100101011010101010101001  
010100101001010100101010010  
101111001010100101010010100  
101010010101010010101001010  
100101011010100101001110001  
110010010000101001111001101
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Quantum Machine Learning

Classical computer processes quantum data



The Quantum Journey



Operations on single physical qubit



Algorithms on multiple physical qubits



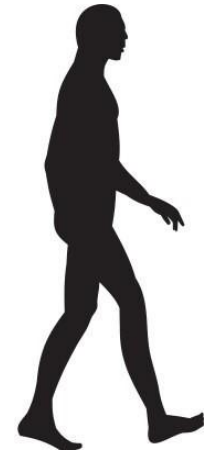
Development of Error Correction codes



Operations on single logical qubit



Algorithms on multiple logical qubits



Fault-Tolerant Quantum Computation

Design and improve quantum hardware

Manage the complexity of controlling and optimizing the quantum device

Can AI power Quantum?

Improve error correction

Improve the efficiency of quantum algorithms

The Quantum Journey *powered by AI*



Operations on single physical qubit



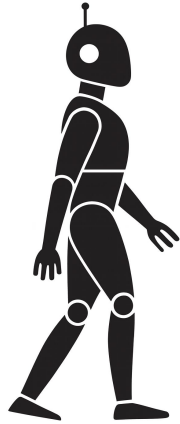
Algorithms on multiple physical qubits



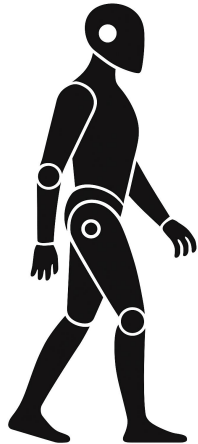
Development of Error Correction codes



Operations on single logical qubit



Algorithms on multiple logical qubits



Fault-Tolerant Quantum Computation