QUANTINUUM

Quantum Computing. It is real. It is here.

An introduction to this exciting technology.

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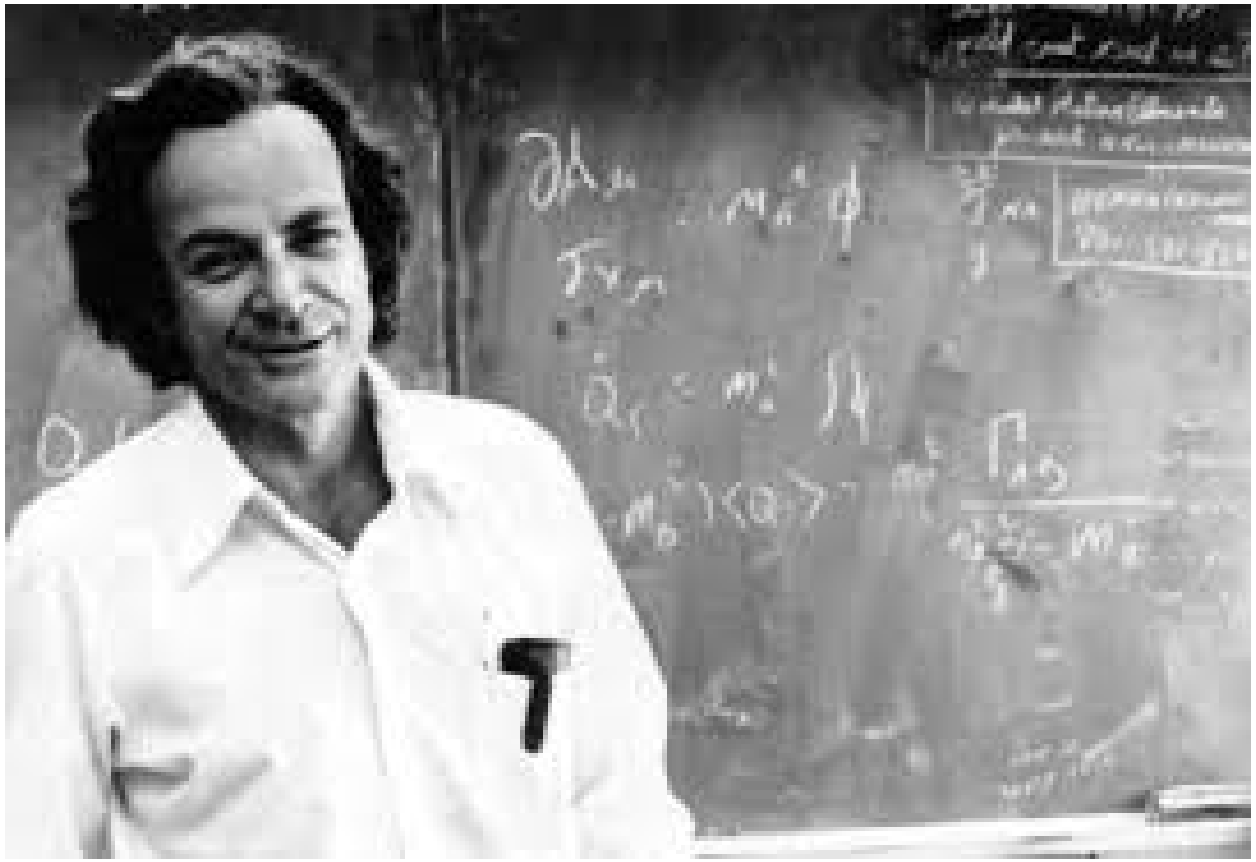
Director of Ecosystem Development

October 16, 2024

Quantum Mechanics

“I think I can safely say that nobody understands quantum mechanics.”

“Nature isn't classical, dammit, and if you want to make a simulation of nature, you'd better make it quantum mechanical.”



Richard Feynman

AMERICAN THEORETICAL PHYSICIST

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Global Investment in Quantum Computing

$35.5 billion

Global **public and private** investment in quantum technologies in 2022.

$1.8 billion

public investment by U.S. National Quantum Initiative.

$1.1 billion in public investment by European Quantum Flagship.

$15 billion in public investment by China.

2022 World Economic Forum report "State of Quantum Computing"

By **2040**, quantum computing is expected to create up to **$850 billion** in annual value for various industries.

2021 Boston Consulting Group report, "When will quantum computers create value – and when?"

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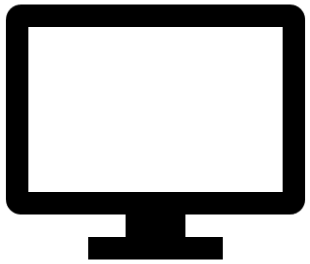
What are Quantum Technologies?

Quantum technologies harness unique properties of quantum physics – specifically **superposition** and **entanglement** - to perform calculations or measurements or transmit data.

Quantum Computing



Quantum Communications

Quantum Sensing

Key Quantum Principles

Superposition

Entanglement

Interference

Classical vs. Quantum: What's the difference?

- Bits exist as either "0" (off) or "1" (on)
- Operate based on law of classical physics
- Deterministic (same input=same output)
- Processes data serially

- Qubits exist in multiple states
- Operate based on laws of quantum physics
- Probabilistic (incorporates randomness)
- Examines different solutions simultaneously

More than one way to build a quantum computer

Type of Qubit

Trapped Ion

- **Quantinuum**
- IonQ
- Oxford Ionics

Superconducting

- IBM
- Google
- Rigetti

Neutral Atom

- Atom Computing
- Infleqtion
- QuEra

Photonic

- PsiQuantum
- Xanadu
- Orca Computing

Other

- Microsoft (Topological)
- Intel (Quantum Dots)

Why Quantum Computing?

Because quantum computers are expected to solve problems considered intractable for today's computers.

"Killer" Applications

Chemistry & Materials

- Catalysis & molecule design
- Fertilizer production
- Drug & materials discovery
- Sustainability, renewables, process design
- Nuclear physics

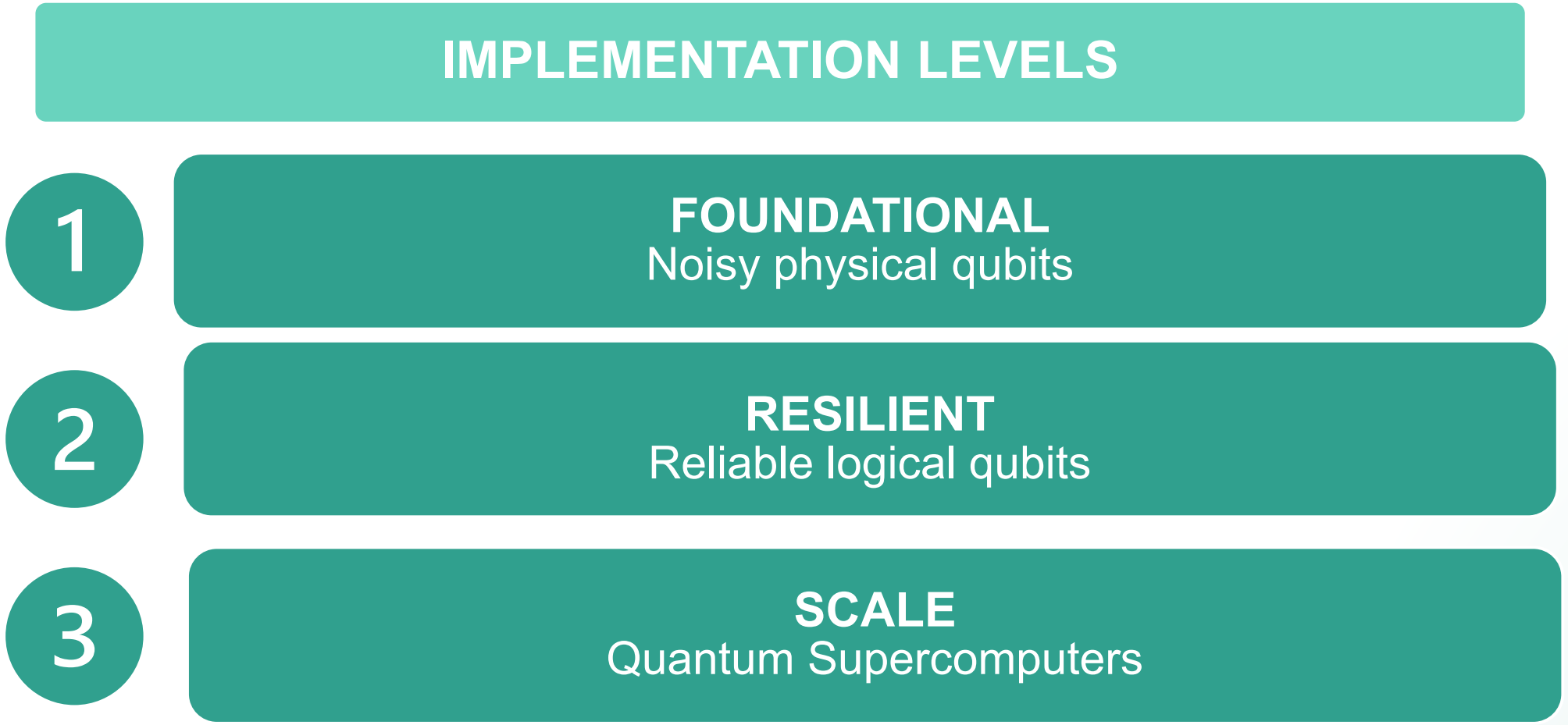
Optimization

- Logistics: demand planning, routing, distribution
- Traffic routing
- Multiphysics simulation for aircraft design
- Finance: portfolio optimization

Information Technology

- Cybersecurity & cryptography
- Database search
- Machine learning

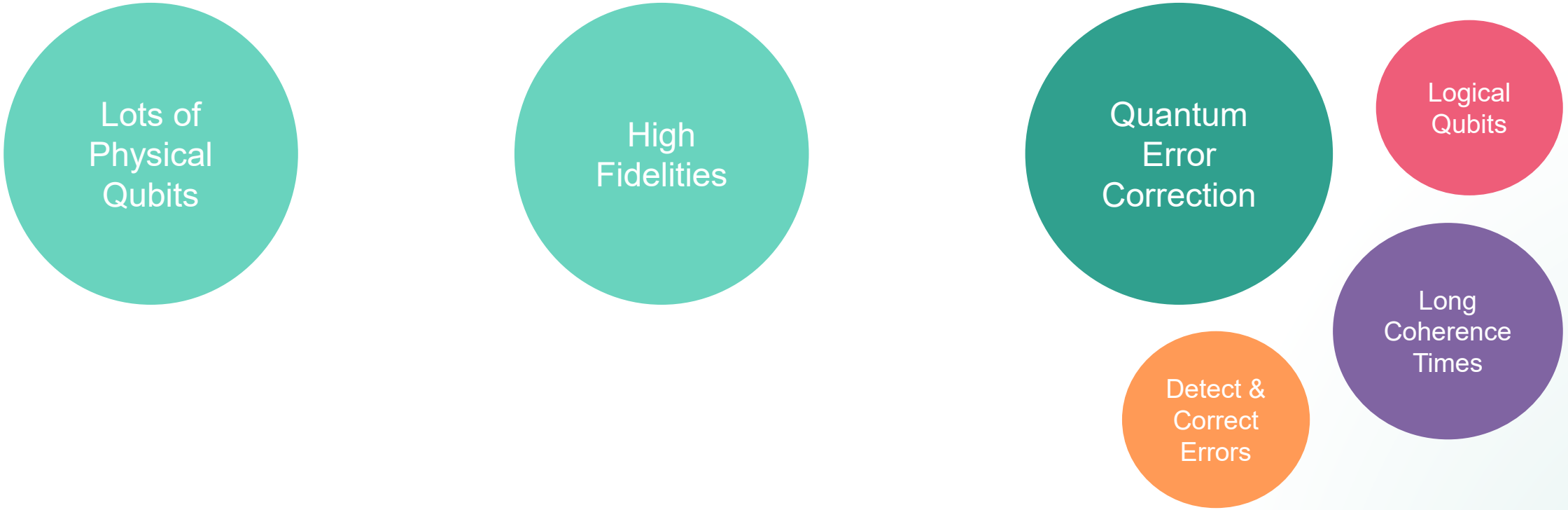
Name of the Game: Scaling

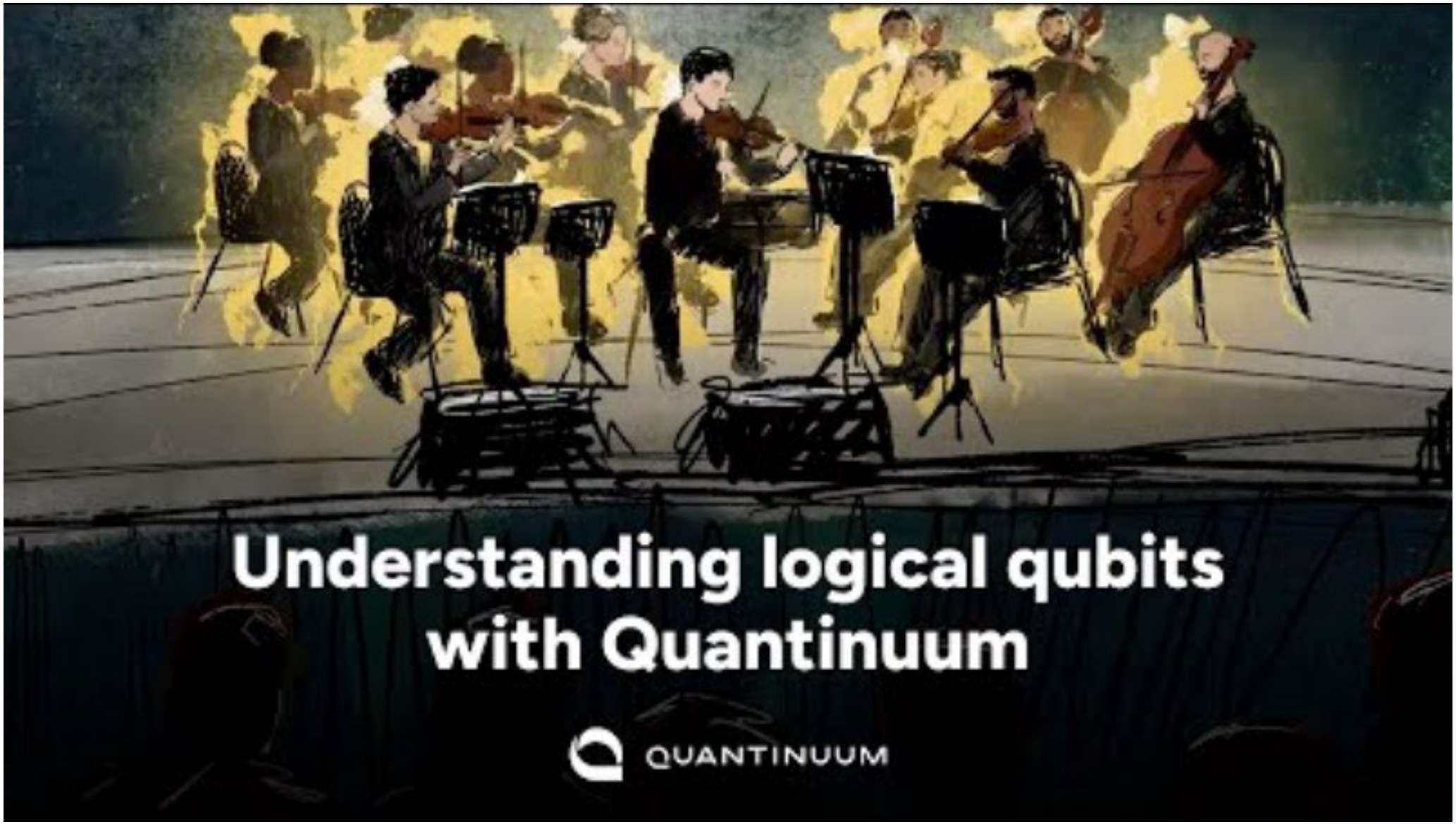


Microsoft Azure Quantum

The Goal? Fault Tolerance

Fault-tolerant quantum computers can overcome errors that occur during computation and deliver accurate result.





Introducing….Quantinuum

QUANTINUUM

GLOBAL PRESENCE

- Nearly 500 employees
- USA, UK, Germany, Japan
- Honeywell-affiliate

QUANTINUUM

SCIENCE LED.
ENTERPRISE DRIVEN.

- **375+** scientists and engineers
- **15+** quantum hardware performance world-records
- **80+** patents
- **155+** publications (as of early 2024)
- **100+** proprietary algorithms and methods

An integrated approach

Applied Algorithms

Monte Carlo, PDEs, Optimization, QML, QNLP, Condensed Matter Physics, etc.

Chemistry

Quantum Computational Chemistry: Transforming the discovery of new materials and novel processes

Cybersecurity

Quantum Origin: Enterprise-grade quantum-computing-hardened cryptographic solution

Third party platforms

Enables other partners to leverage the power of quantum via open-source access

QUANTINUUM NEXUS

The integrated platform for ***users*** of quantum computers

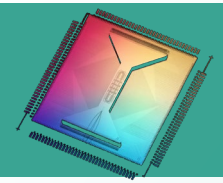
TKET

High-performance quantum software development kit | Open-source | > 1 M downloads

Ecosystem back-ends

H – Series Quantum Computers

Powered by Honeywell



Quantinuum at-a-glance

WHAT WE OFFER

Quantinuum Systems

World-class ion trap hardware with industry-leading fidelity and scalability

Full-stack

InQuanto™ Quantum chemistry software.
TKET™ open-source developer tool kit.
LAMBEQ™ natural language processing

Collaborations and partnerships with commercial and academic organization

USER COMMUNITY

>80

Scientific publications using H-Series hardware

> 400

Global users of H-Series hardware

>1,500,000

Downloads of TKET™ open-source tool kit

CUSTOMERS & PARTNERS

Premier financial institutions:
JPMC | HSBC

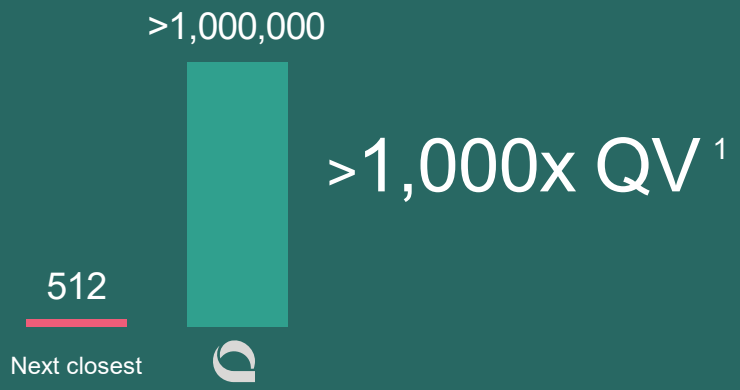
Top industrials:
Honeywell | BMW | Airbus | JSR

US Department of Energy Labs, RIKEN

Cloud service partner:
Microsoft Azure Quantum

Quantinuum H-Series Hardware

Highest performing



>1,000x QV [1]

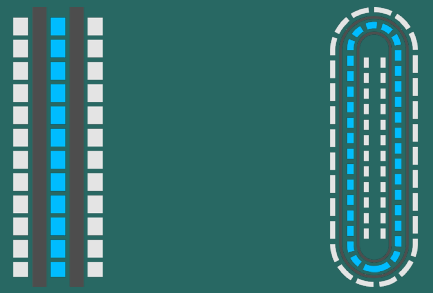
Quantinuum Average TQ gate fidelity

99.9% [2]

Most Benchmarked

H1 POWERED BY HONEYWELL

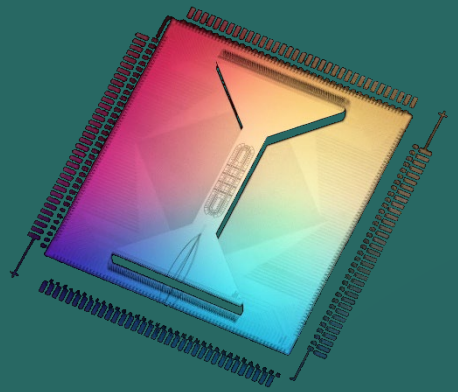
H2 POWERED BY HONEYWELL



18 benchmarks tested

All documented on GitHub

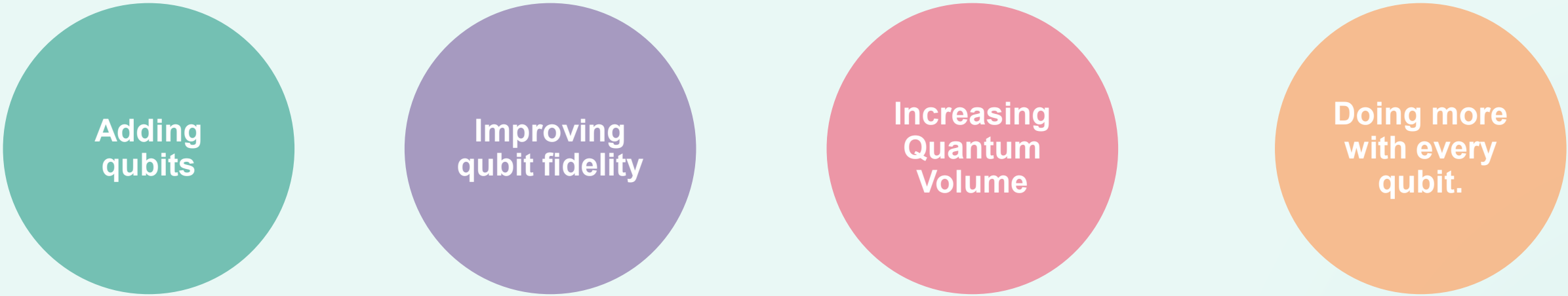
Enabling what no other hardware can do



- Conditional logic
- All-to-all connectivity
- Long coherence times
- Qubit reuse
- Low cross-talk mid-circuit measurement

Scaling: Quantinuum Approach

Continuous upgrading of hardware during its lifetime.



Quantinuum Development Roadmap

*analysis based on recent literature in new, novel error correcting codes predict that error could be as low as 1E-10 in Apollo (ref: arXiv:2403.16054, arXiv:2308.07915)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