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India's Leading

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Training Program

01st
Quantum
Computer



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qualitythought.in | ihubtalent.com

SEP 23, 2025 7:08 PM IST

Why the World's Most Valuable Company Is Buying Into Quantum Computing

TECH AI

by Nikita Ostrovskiy



The Nvidia logo outside the company's offices in Shanghai, China, on Monday, Sept. 22, 2025. (AP Wire—Bloomberg/Getty Images)

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What's really inside a black hole? Quantum computing sheds new light

TOI Science Desk / TIMESOFINDIA.COM / Feb 15, 2025, 08:00 IST

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TOP

Satya Nadella explains why Microsoft's quantum 'breakthrough' is so important

By Katherine Tangolis-Lippert

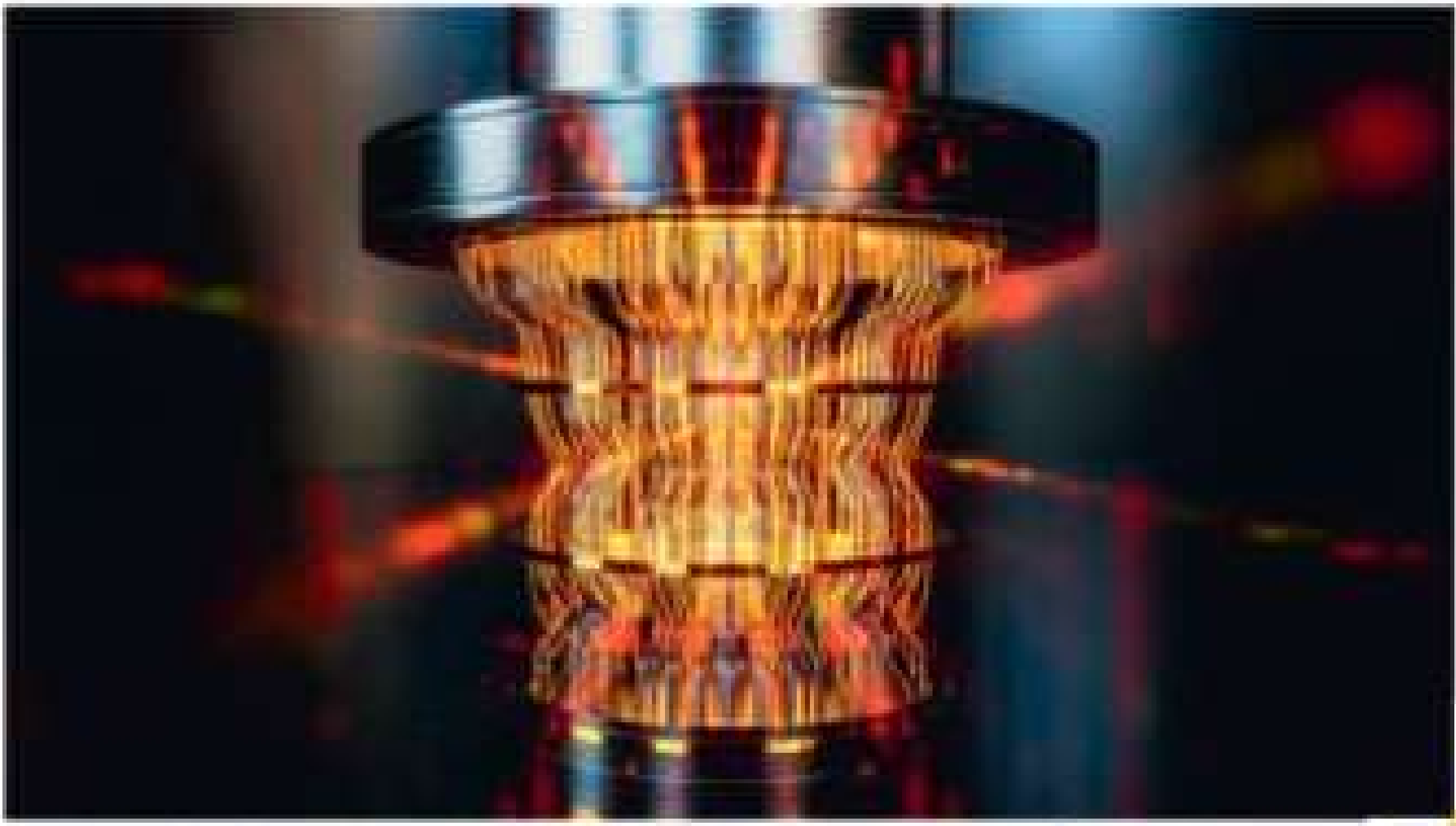


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TECHNOLOGY

Inside The Quantum Computing Crash Triggered By Nvidia CEO – And What His Upcoming 'Quantum Day' May Bring



An AI-generated image illustrates the typical "sandwich" design of a quantum computer. (SuperScience/Shutterstock)

F Forbes

Massive Quantum Computing Breakthrough: Long-Lived Qubits



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HSBC

HSBC demonstrates world's first-known quantum-enabled algorithmic trading with IBM



2 days ago

Job Vacancies in Different Job Portals

01



Naukri.com

<https://www.naukri.com> > ... > Quantum jobs

22586 Quantum Job Vacancies In Hyderabad Secunderabad

02

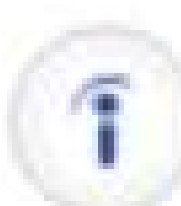


LinkedIn

<https://www.linkedin.com> > jobs > quantum-jobs-worldw...

10000+ Quantum Jobs in Worldwide (451 new)

03



Indeed

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Quantum Computing Jobs, Employment

1059 Quantum Computing jobs available on Indeed.com. Apply to Senior Scientist, Software Engineer, Research Scientist and more!

04



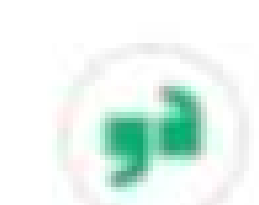
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Browse **325** available quantum computing research - software engineer iii jobs on Dice.com.
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05



Glassdoor

<https://www.glassdoor.com> > Job > quantum-computing...

567 Quantum computing jobs in United States

Search Quantum computing jobs. Get the right Quantum computing job with company ratings & salaries. 567 open jobs for Quantum computing.

▶ Minimum Recommended Specs

- ▶ Processor (CPU): Intel i5 / Ryzen 5 (quad-core or higher)
- ▶ RAM: 16 GB (8 GB works but simulators for 20+ qubits eat memory fast)
- ▶ Storage: 512 GB SSD (for faster I/O, Jupyter notebooks, libraries, datasets)
- ▶ GPU: Not mandatory (unless you're doing ML + quantum hybrid work) then NVIDIA CUDA GPU helps!
- ▶ OS: Linux (Ubuntu), macOS, or Windows (for better Python/conda environment management)
- ▶ If you're serious and want future-proofing: i7/Ryzen 7 + 32 GB RAM is ideal.

Chapter 1

▶ Foundations of Classical Computing

- ▶ Mathematical Foundations
- ▶ Classical Computing Foundations
- ▶ Physics Foundations for Quantum Computing
- ▶ Quantum Physics Fundamentals
- ▶ Quantum Information Science
- ▶ Introduction to Quantum Computing
- ▶ Quantum Storage and Memory Systems
- ▶ Quantum Computing Benefits and Challenges
- ▶ Evolution and Future of Quantum Computing
- ▶ Advanced Quantum Principles
- ▶ Quantum Hardware and Architecture
- ▶ Types of Qubits and Quantum Devices
- ▶ Quantum Technologies and Applications

Chapter 2

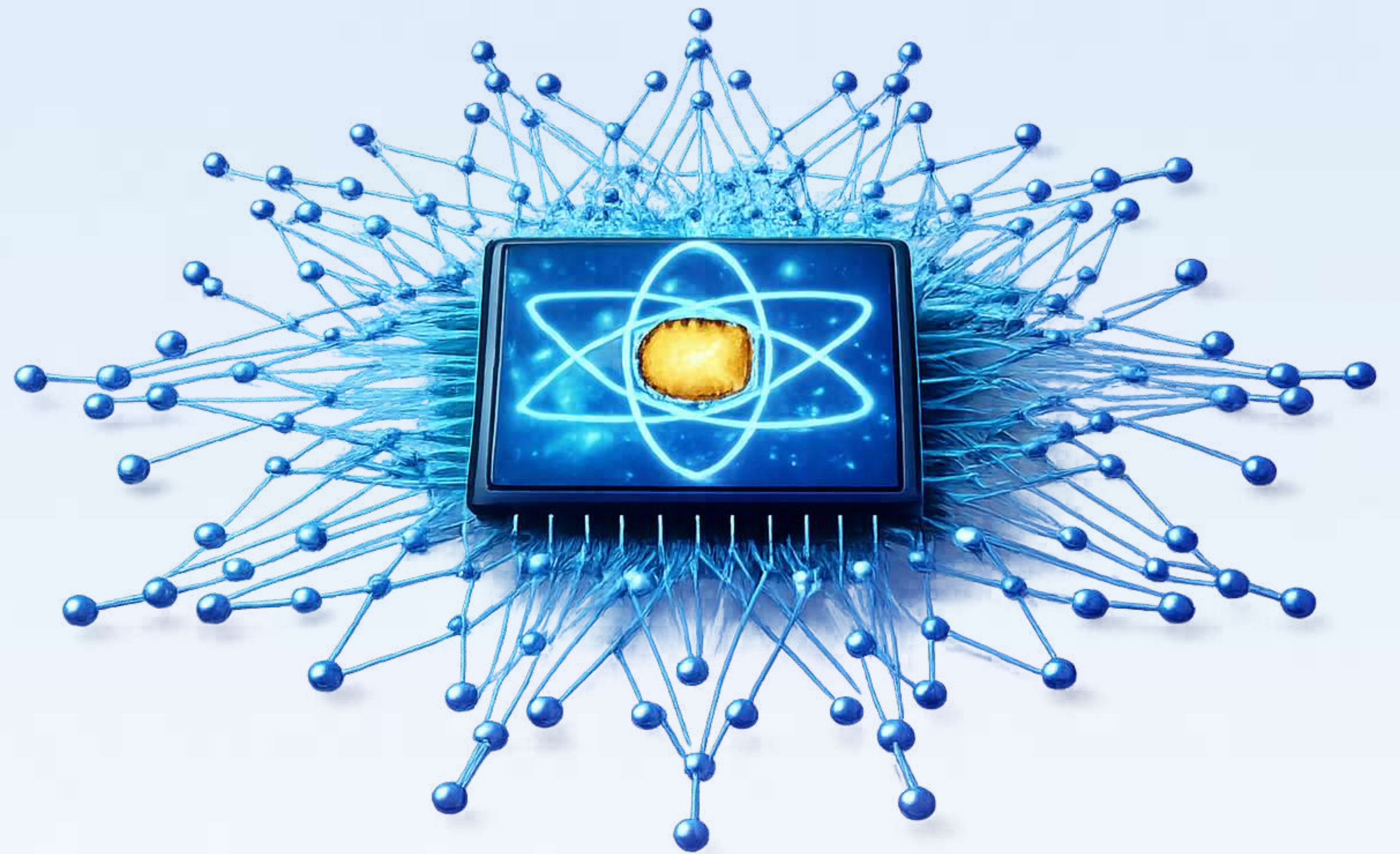
▶ Mathematical Foundations: Linear Algebra



Chapter 3

▶ IBM Qiskit programming

- ▶ Python & Qiskit coding fundamentals
- ▶ Environment Setup & Qiskit Architecture
- ▶ Qiskit Foundations & Circuit Building
- ▶ Measurement & Classical Control
- ▶ Simulation & Visualization
- ▶ Qiskit Primitives & IBM Runtime
- ▶ Qiskit Primitives & IBM Runtime
- ▶ Noise, Error Mitigation & Error Correction
- ▶ Real Hardware Execution & Benchmarking
- ▶ Software Engineering for Quantum



Chapter 4

▶ Quantum Mechanics Primer

- ▶ Wave-Particle Duality
- ▶ Qubits & Quantum states
 - a. $|0\rangle, |1\rangle$, Superposition
- ▶ Probability Amplitudes & Measurement
 - a. Born rule, normalization
- ▶ Phase & Bloch Sphere
- ▶ Multi-Qubit Systems & Entanglement

Chapter 5

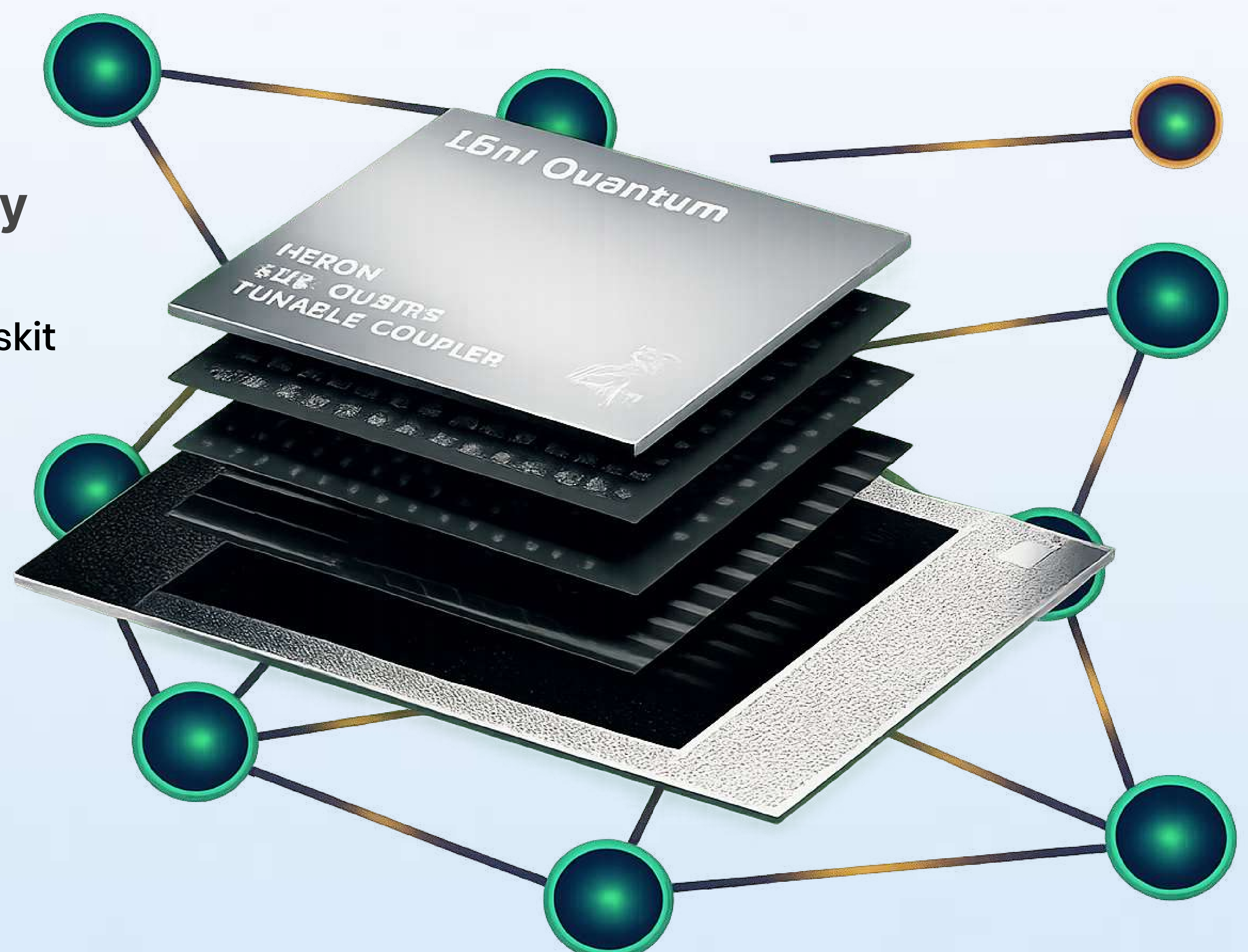
▶ Single & Multi-Qubit Gates

- ▶ Pauli Gates (X, Y, Z)
- ▶ Special Gates (H, S, T, R)
- ▶ Controlled Gates (CNOT, Toffoli)
- ▶ Superposition & Phase Control
- ▶ Entanglement Generation (Bell States)
- ▶ Qiskit Implementation &
- ▶ Bloch Sphere Visualization

Chapter 6

▶ Quantum Randomness & Probability

- ▶ Pseudorandom vs. True Random Numbers
- ▶ Quantum Random Number Generator in Qiskit
- ▶ Quantum Coin Flip Experiments





Chapter 7

▶ Advanced Quantum Algorithms

- ▶ Quantum Fourier Transform (QFT) — theory, matrix form, circuit
- ▶ Phase Estimation & Applications
- ▶ Shor's Algorithm — factoring & modular exponentiation
- ▶ Variational Algorithms (VQE, QAOA) — hybrid approaches
- ▶ Hands-on: QFT, VQE, QAOA in Qiskit

Chapter 8

▶ Quantum Computing: Past, Present & Future

- ▶ History of Quantum Mechanics
- ▶ Evolution of Quantum Computing
- ▶ Current Technologies (IBM Q, Google, D-Wave)
- ▶ Future Research & Career Paths

Chapter 9

▶ Quantum Error Correction & Fault Tolerance

- ▶ Quantum noise & decoherence sources
- ▶ Error models: bit-flip, phase-flip, depolarizing
- ▶ Simple codes: 3-qubit repetition, Shor code
- ▶ Logical qubits & fault-tolerance threshold

Chapter 10

▶ Quantum Cryptography & Communication

- ▶ BB84 protocol & no-cloning theorem
- ▶ E91 entanglement-based QKD
- ▶ Quantum teleportation & superdense coding
- ▶ Quantum secure direct communication
- ▶ Qiskit implementation of BB84 & teleportation

Chapter 11

▶ Quantum Machine Learning (QML)

- ▶ Introduction & motivation for QML
- ▶ Data encoding strategies
- ▶ Quantum feature maps & kernels
- ▶ Quantum classifiers (QSVM, VQC)
- ▶ Hands-on: Qiskit Machine Learning library
- ▶ Classical vs quantum ML model comparison

Chapter 12

▶ Tools to Practise Quantum Computing (Free & Paid)

Free Tools (cloud + local simulators):

- ▶ Qiskit (IBM, Python library) → free, with access to IBM Quantum devices in the cloud.
- ▶ Cirq(Google) → free, simulates Google's quantum processors.
- ▶ Q# and Azure Quantum (Microsoft) → free tier for experimentation.
- ▶ PennyLane (Xanadu) → free for quantum machine learning.
- ▶ ProjectQ, QuTip → open-source frameworks for simulation.
- ▶ Jupyter Notebooks → free, great for practicing.

Paid Tools / Platform:

- ▶ AWS Braket (Amazon) → pay-per-use to run circuits on real hardware
- ▶ D-Wave Leap → limited free credits, then paid.
- ▶ Premium edX/Coursera/MIT xPro tools → bundled with their courses.



Chapter 13

▶ Final Beginner Projects & Presentations

- ▶ Mini-Projects:
 - a. Quantum Communication
 - b. Quantum Cryptography
 - c. Quantum Cryptography
 - d. Quantum Machine Learning
 - e. Algorithms & Optimization
- ▶ Presentation & Peer Review

Chapter 14

▶ Professional Capstone Project

Choose an advanced project

- a. QML model implementation
 - b. QEC code simulation
 - c. Quantum chemistry simulation
 - d. Quantum cryptographic protocol
- ▶ Development Platform - IBM Qiskit, Qiskit Runtime, Aer simulator
 - ▶ IDE - Visual Studio Code - Jupyter Notebook, Rainbow CSV

Project Development Platform - Azure DevOps - Boards, Repos, Pipelines, Testplans, Artifacts, GitHub, Docker, GitHub Actions

Quantum Computing Market

Size, by Region, 2018 - 2030



Source: Grand View Research

Chapter 15

► Certifications in Quantum Computing

There is no single mandatory certification to enter the field, but many platforms and universities offer programs. Many are paid, but some have free options:

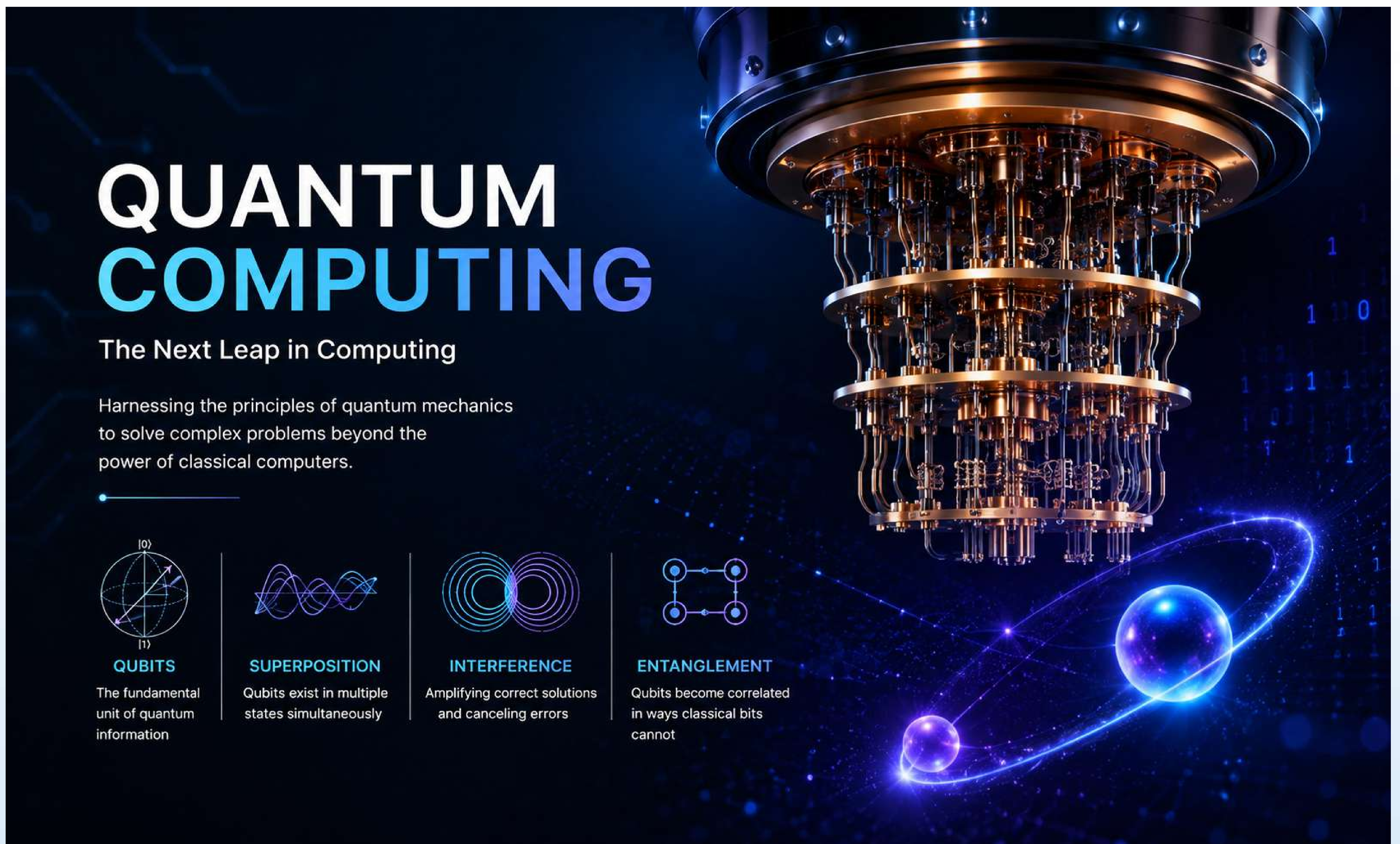
► Popular certifications & Courses

- IBM Quantum Developer Certification (paid, ~\$200, but prep material is free via IBM Quantum Learning)
- Qiskit Global summer School (free, but competitive to get in)
- Microsoft Azure Quantum learning paths (free, via Microsoft Learn)
- edX / Coursera quantum computing courses (mostly paid, but financial aid often available)
- MIT xPRO / Caltech / Harvard quantum courses (paid, premium programs)
- So - certification is not required, but it helps showcase credibility.

► Summary

Free Tools (cloud + local simulators):

- Any decent modern laptop (16 GB RAM preferred/8 GB is also ok) is fine.
- Certifications exist (IBM, Microsoft, Coursera) → mostly paid, but optional.
- Tools: Mostly free (Qiskit, Cirq, PennyLane, Azure Quantum). Paid tools come in when you want advanced access.



Career Opportunities



Quantum Hardware Engineer
(Physics, EE) Designs &
builds qubits.

Quantum Applications Scientist
(Chemistry, Finance, Biology)
Finds real-world uses.

Quantum Algorithm Developer
(CS, Math) Designs &
codes quantum algorithms.

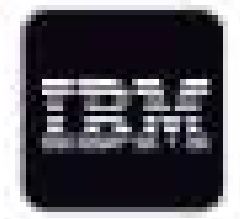
**Quantum Error
Correction Scientist**
(Math, CS) Fights decoherence.

Quantum Software Engineer
(CS) Builds SDKs and
software tools.

Quantum Product Manager
(Business, Tech)
Guides strategy.

Google

Quantum Computing Job Postings



IBM USA
Yorktown Heights, NY, United States • via Prosple
🕒 1 day ago 💰\$99,840–\$1,83,040 a year 🏢 Internship



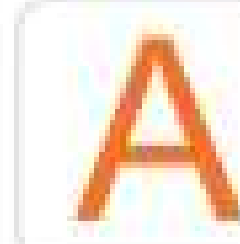
IBM USA
San Jose, CA, United States • via Prosple
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IBM
California, United States (+2 others) • via Job Board
🕒 3 days ago 🏢 Internship



Quantum Computing Inc.
Hoboken, AL, United States • via Recruit.net
🕒 12 hours ago 🏢 Full-time



Argonne National Laboratory
Illinois, United States • via Postdoc Jobs.com



Visa
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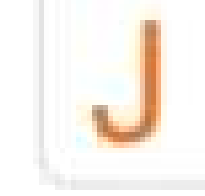
Google India Pvt Ltd
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UCF
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PsiQuantum
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💰\$2.6L a year 🏢 Full-time



JRG Partners LLC
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QuEra Computing, Inc.
Boston, MA, United States • via Greenhouse
🏢 Full-time



Google
Goleta, CA, United States • via Karkidi
💰\$1.57L–\$2.35L a year 🏢 Full-time



QuEra Computing, Inc.
Boston, MA, United States • via Greenhouse
🏢 Full-time



Leidos
Arlington, VA, United States • via Karkidi
💰\$85,150–\$1,53,925 a year 🏢 Full-time



IBM
San Jose, CA, United States • via JobzMall
💰\$95K–\$1.6L a year 🏢 Full-time



Amazon
Seattle, WA, United States • via Dr. Job
💰\$1.04L–\$1.85L a year 🏢 Full-time



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