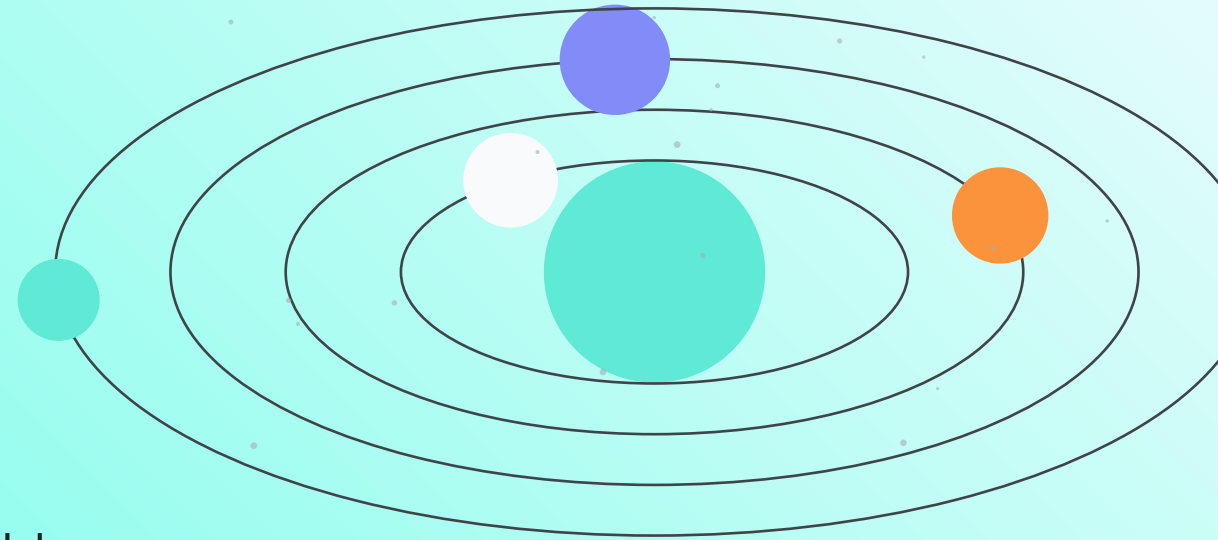


TECHNICAL SEMINAR

Quantum Computing

A beginner-friendly look at qubits and what they could change

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Agenda

- 01 Overview
- 02 Core concepts
- 03 Applications
- 04 Challenges
- 05 Future



Image

Introduction

- ▶ Classical computers use bits that are either 0 or 1
- ▶ Quantum computers use qubits that can be in superposition
- ▶ Some problems may become dramatically faster to solve
- ▶ Today's machines are still small and error-prone



Image

Key concepts

01

Superposition

A qubit can represent 0 and 1 at the same time.

02

Entanglement

Qubits linked so one's state depends on another.

03

Interference

Amplifying right answers and cancelling wrong ones.

How it works

1 Initialise

Qubits prepared in a known state

2 Gates

Quantum gates create superposition

3 Entangle

Qubits linked into a circuit

4 Measure

Result read out as classical bits

Applications



Image 1

Drug discovery

Simulating molecules more accurately



Image 2

Optimisation

Logistics and scheduling problems

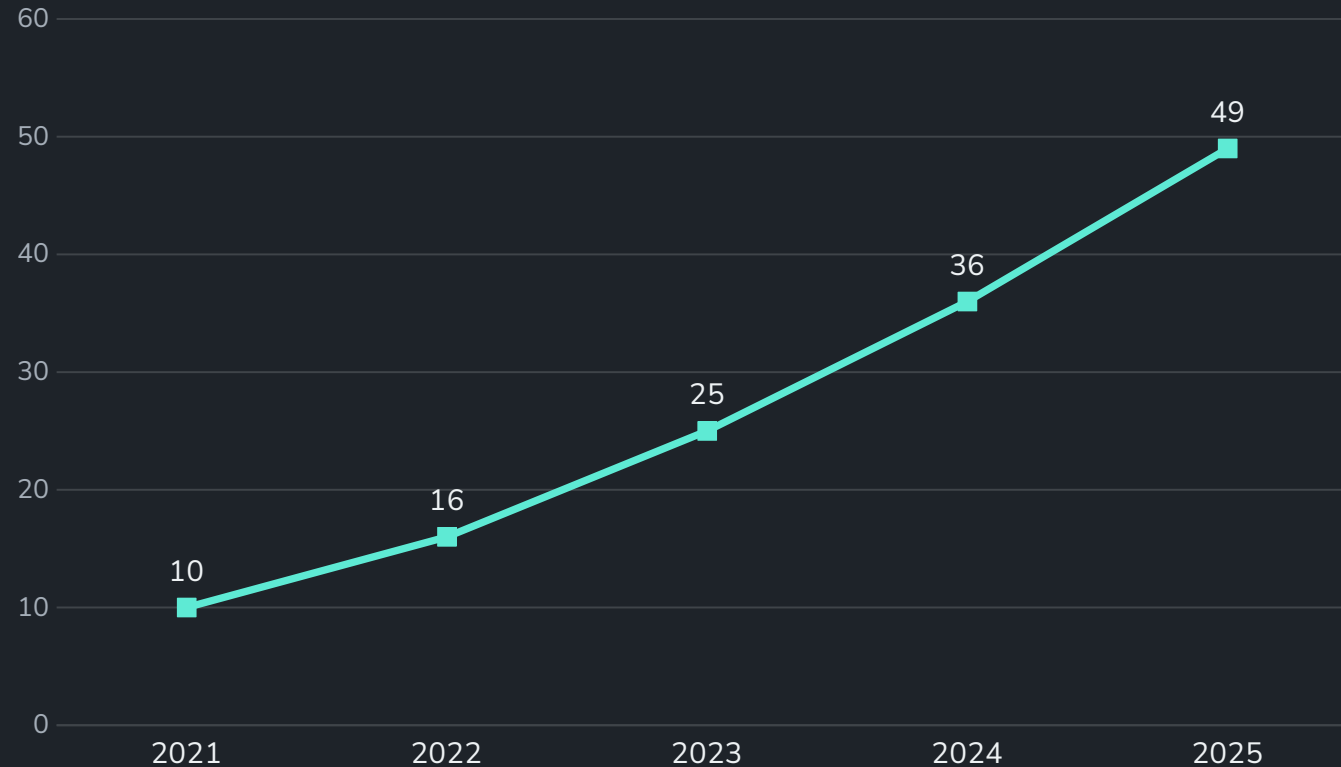


Image 3

Cryptography

New, quantum-safe security methods

Adoption trend



Sample data for illustration — replace with your own figures.

Research activity keeps rising, though practical advantage is still limited to narrow tasks.

Advantages and limitations

Advantages

- Potential speed-ups for some problems
- Natural fit for simulating chemistry
- Drives new cryptography

vs

Limitations

- Qubits are fragile and noisy
- Needs extreme cooling
- Few useful algorithms so far

Open challenges

01

Error correction

Many physical qubits per reliable qubit.

02

Scaling

From hundreds to millions of qubits.

03

Software

Tools and skills are still scarce.



Quantum computers will not
replace laptops — they will solve
problems laptops cannot.

Looking ahead

Conclusion

- ▶ Qubits use superposition and entanglement
- ▶ Real advantage is narrow but growing
- ▶ Error correction is the key milestone to watch



Image

References

- ▶ [1] Survey paper on the topic, IEEE Access, 2024.
- ▶ [2] Textbook chapter covering fundamentals, 2023.
- ▶ [3] Recent conference paper on applications, 2025.
- ▶ [4] Industry white paper (generic reference).



Image

Questions?

Thank you for listening.

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