



India's First Full-Stack Quantum Computer 'Indus'

[Source: PIB](#)

On **World Quantum Day (14th April)**, Bengaluru-based QpiAI launched **India's first full-stack quantum computer, QpiAI-Indus**, a major milestone in the country's [National Quantum Mission \(NQM\)](#).

QpiAI-Indus

- **About:** It is the **first complete** quantum computing system built entirely in India.
 - It includes **both hardware and software**, covering everything from the **quantum processor** to **AI-driven application tools** to efficiently run quantum applications.
- **Performance:** The system boasts **25 qubits**, crucial for high-performance quantum computing;
 - It enables faster complex calculations with enhanced stability and minimal error rates compared to traditional computers.
- **Applications:** It has potential uses in **life sciences** (drug discovery, genomics), **materials science** (designing new materials), **mobility and logistics** (route and supply chain optimization).

World Quantum Day

- It was launched in **2021**, to commemorate [Planck's constant \(4.14\)](#), a fundamental quantity in **quantum physics**, and to promote **awareness of quantum science and its technological impact**.
- The date was chosen because **14th April ("4.14")** represents the **first three digits of Planck's constant (4.14×10^{-15} eVs)** when rounded up.
- The [UN](#) has designated the year **2025** as the '**International Year of Quantum Science and Technology**'.

NATIONAL QUANTUM MISSION

Aims to put India among the top six leading nations involved in the R&D in quantum technologies

■ Presently, R&D works in quantum technologies are underway in the US, Canada, France, Finland, China and Austria ■

■ **Duration:** 2023-24 to 2030-31

■ **Nodal Ministry:** Ministry of Science & Technology

■ **Highlights of the Mission:**

- Four Thematic Hubs (T-Hubs) in different domains across the country
- Wide-scale applications ranging from healthcare and diagnostics, defence, energy and data security

- Strengthening of indigenously building quantum -based computer
- Help develop magnetometers with high sensitivity in atomic systems and atomic clocks
- Support design and synthesis of quantum materials

A huge boost to National priorities like digital India, Make in India, Skill India, Stand-up India, Start-up India, Self-reliant India and SDGs

Quantum Technology

■ Works by using the principles of quantum mechanics (the physics of sub-atomic particles), including quantum entanglement and quantum superposition ■

Quantum Superposition

The ability of a quantum system to be in multiple states simultaneously

While digital computers store data as bits (the ones and zeros of binary), quantum computers use qubits that exist as one, zero or both at the same time

This superposition state creates a practically infinite range of possibilities, allowing for fast simultaneous and parallel calculations

Quantum Entanglement

It means the two members of a pair (Qubits) exist in a single quantum state

If you change the properties of one of them, the other changes instantly

This can be used to create a secure encryption key in quantum cryptography

If an eavesdropper tries to intercept the transmission, the entangled state of the particles will be disturbed, making the attempt detectable



Read More: [National Quantum Mission](#), [Quantum-Enabled Science & Technology \(QuEST\)](#)

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