



## 100 years of S N Bose's Colossal Work

Distinguished scientists and scientific administrators recently gathered at the **S.N. Bose National Centre for Basic Sciences (SNBNCBS) in Kolkata** to celebrate the 100th anniversary of **Satyendra Nath Bose's** last of the **four revolutionary publications** that led to new **quantum mechanics** (the others being those of **Planck in 1900**, **Einstein in 1905**, and **Niels Bohr in 1913**), traced the evolution of quantum mechanics through the years.

- SNBNCBS, an Autonomous Research Institute established under the **Department of Science and Technology (DST)**, in 1986 to honour the life and work of **S. N. Bose**.
  - S N Bose's pioneering work on **quantum statistics** has paved the way for the development of **modern quantum technologies** including **Bose-Einstein condensation**, **quantum superconductivity**, and **quantum information theory**.
  - Half the fundamental particles in the **Universe are named after him - BOSON**.
- The conference highlighted that **23 countries have set up National Quantum Missions** and India has a substantial contribution to make at an international level, especially in the field of quantum algorithms.

# 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

### QUANTUM TECHNOLOGY

- Quantum Key Distribution
- Quantum Networks
- Quantum Simulators
- Post-Quantum Cryptography
- Quantum Sensors Particle Generators Atomic Clocks
- Quantum Cloud Computing
- Quantum Memories Quantum Repeaters Quantum Chips
- Quantum Software
- Quantum Computing Quantum Annealers
- Quantum Materials

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**Read more:** [National Quantum Mission](#)

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