

# Union Cabinet gives nod for ₹6,003 crore Quantum Mission

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JACOB KOSHY



Union Minister of State for Science and Technology and Earth Sciences (I/C) Jitendra Singh. | Photo Credit: ANI

The Union Cabinet on Wednesday, April 19, 2023, approved the ₹6,003 crore National Quantum Mission (NQM) that will fund research and development of quantum computing technology and associated applications. Quantum computers are a work-in-progress globally and exploit properties of the atom, which are only explainable by the principles of quantum mechanics. The promise is a reliable class of computers that work several times faster than the speediest machines of today and also facilitate exponentially secure communication networks, with wide applications. The mission was budgeted for ₹8,000 crore in the Union Budget of 2023.

The plan involves developing “intermediate scale” quantum computers with 20-50 physical ‘qubits’ in three years, 50-100 physical qubits in five years and 50-1,000 physical qubits in eight years. Just like bits (1 and 0) are the basic units by which computers process information, ‘qubits’ or ‘quantum bits’ are the units of process by quantum computers.

Other ambitions include developing “...satellite based secure quantum communications between ground stations over a range of 2,000 kilometres within India, long distance secure quantum communications with other countries, inter-city quantum key distribution over 2000 km as well as multi-node quantum network with quantum memories are also some of the deliverables of the mission,” a press statement by the Science and Technology Ministry, which has administrative charge of the project, said.

The mission will help develop magnetometers with high sensitivity in atomic systems, atomic clocks for precision timing, communications and navigation. Fabrication of quantum materials such as superconductors, novel semiconductor structures, and topological materials for fabrication of quantum devices.

Truly a Quantum jump for India, made possible by the vision of PM Sh @narendramodi. #Cabinet approves "National Quantum Mission" to accelerate Quantum Technology led economic growth and leverage #India into a leading nation in this latest ecosystem.#DST#CabinetDecisionpic.twitter.com/0jab2QW2HL

— Dr Jitendra Singh (@DrJitendraSingh) April 19, 2023

"Four Thematic Hubs (T-Hubs) would be set up in top academic and National R&D institutes on the domains of 'Quantum Computing', 'Quantum Communication', 'Quantum Sensing & Metrology' and 'Quantum Materials & Devices'. The hubs, which will focus on the generation of new knowledge through basic and applied research as well as promote R&D in areas that are mandated to them," Science Minister Jitendra Singh said on Wednesday, explaining the policy, "Only six countries so far have some capability in this domain. This mission will bring India to the forefront along with them, and India can be a world leader," he added.

For over a decade, research groups and technology companies have announced the development of prototype quantum computers though none that are actually useful in real world problems. Problems that require immense computation work and beyond the scope of today's super computers would be solved in a trice, proponents of quantum technology aver, and while there is cutting-edge research demonstrating novel algorithms that employ quantum technology principles, no one — including IBM, D-Wave of Canada or China's Zuchongzhi 2.1 — all of whom have prototype systems, have built a practical computer that can actually work and solve meaningful problems.

Current prototype systems require extremely cold (close to -273 C) conditions to work, along with developing the materials capable of such computations.

"The qubit systems we have today are a tremendous scientific achievement, but they take us no closer to having a quantum computer that can solve a problem that anybody cares about. It is akin to trying to make today's best smartphones using vacuum tubes from the early 1900s," Sankar Das Sarma, of the Condensed Matter Theory Centre, University of Maryland, wrote in an article for *MIT Tech Review* in March.

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