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Q-Newsletter

HIGHLIGHT

Quantum Computing: The Scalability Debate

A minority view in the quantum community argues that large-scale quantum computers may never fully work in practice.

The idea is that while small prototype quantum processors already exist, scaling them to useful sizes requires extremely large amounts of qubits to maintain coherence and entanglement. But, as more qubits are added, tiny disturbances from the environment and imperfect control accumulate and scramble the delicate phase relationships that quantum interference depends on.

The standard solution is quantum error correction: encode one reliable "logical" qubit across many noisy physical qubits so errors can be detected and fixed. This works if errors stay below a threshold and behave roughly independently, but sceptics argue that real-world noise may become more correlated and persistent as systems grow, making correction far less effective, preventing a true quantum advantage.

A smaller, more speculative group argues the limit could be fundamental physics: quantum mechanics might not remain exact at large scales. This implies an upper limit on how many stable logical qubits (and therefore how much quantum advantage) we can ever achieve.

Despite the scepticism, progress in the field is real. Experiments are improving reliability and demonstrating advantage in increasingly realistic tasks. For a recent example, see *Issue 10 Highlight*.

RESEARCH

New Ion-Clock

On 28 January 2026, researchers from the Physikalisch-Technische Bundesanstalt (PTB) in Germany and the National Institute of Metrology (NIMT) in Thailand reported the characterization of a special atomic transition in ytterbium-173 ions that could serve as the basis for ultra-precise multi-ion optical clocks.

Optical clocks keep time by probing extremely narrow transitions between atomic energy levels with lasers. The newly studied transition in Yb-173 is enhanced by the unusually deformed shape of its nucleus, which makes the otherwise forbidden transition easier to drive with lower laser intensity. This reduces perturbations such as the AC Stark shift, a key limitation when trying to use multiple trapped ions together for a clock.

By using three trapped ions in a Coulomb crystal, the team demonstrated that this transition can be excited uniformly at relatively low laser power, suggesting that many ions could be used simultaneously. That could combine the precision of single-ion clocks with the stability of multi-ion systems, potentially supporting a new generation of time standards and even a future redefinition of the second.

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MARKET

IONQ Completes Skyloom Acquisition

Quantum computing leader IonQ has completed its acquisition of Skyloom Global Corp., expanding its capabilities in quantum networking and secure communications. The transaction, previously announced in late 2025, brings Skyloom's lightwave-optics expertise into IonQ's portfolio, strengthening the company's roadmap for distributed quantum entanglement and high-performance secure data transmission. Skyloom's technologies are expected to accelerate IonQ's work in quantum key distribution and other advanced communications infrastructure that could be critical for defense, aerospace, and enterprise customers.

Skyloom's team, including CEO Marc Eisenberg and other key leaders, will remain in place and align with IonQ's technical strategy, ensuring continuity for existing customers and projects. IonQ's CEO Niccolo de Masi emphasized that completing the Skyloom acquisition is a significant step toward building a foundation for scalable quantum networking, which many experts see as a necessary complement to standalone quantum computers for future distributed systems. This positions IonQ not just as a quantum processing hardware provider but also as a broader quantum infrastructure company.

By integrating Skyloom's optical communications and secure networking capabilities, IonQ aims to deliver more comprehensive end-to-end solutions that span computing, networking, and secure communications, areas of growing demand as governments and large enterprises look toward quantum solutions for secure data transmission and next-generation systems. The acquisition reinforces IonQ's strategy of building a more complete quantum technology stack and highlights the industry trend of consolidating specialized technologies into unified platforms capable of addressing real-world applications.

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