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CURRENT SOTA

Physical qubits	1,180
2Q fidelity	99.99%
Logical qubits	96 LQ

Quantum hardware SOTA table →

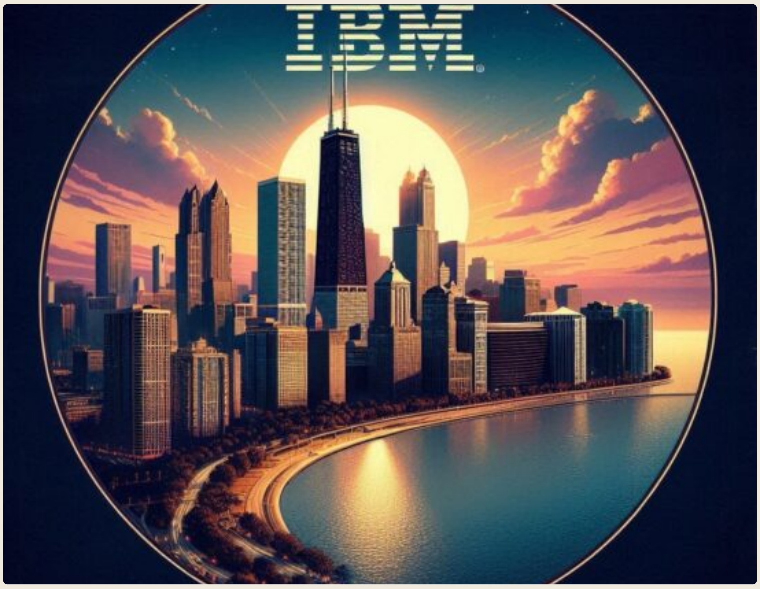
Aug 2, 2026 – Aug 3 · Daily Brief

IBM 验证 70 逻辑量子比特结果挑战经典模拟霸权

7 items · 3 sources | PDF | This issue's roundup is free

01 Highlights

Highlights



IBM, together with multiple partner institutions, implemented an encoded circuit containing 70 logical qubits on a Heron processor and obtained verification results that classical methods could not reproduce, demonstrating a clear advantage over classical supercomputers at the logical-qubit level for the first time[4]. This achievement advances quantum computing from physical-qubit demonstrations to the practical verification stage of logical qubits, potentially marking the eve of commercial fault-tolerant quantum computing[4].

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02 Hardware

Hardware Frontiers

Superconducting Qubits

IBM, in collaboration with the University of Chicago, Qedma, and Algorithmiq, demonstrated three types of verifiable quantum results on a Heron processor: an encoded circuit reaching 70 logical qubits, a 74-qubit Floquet dynamics simulation (with QESEM error mitigation), and a heterogeneous material simulation; classical methods gave divergent or uncertain results at these scales[4]. This progress surpasses the capability boundary of classical simulation at the logical-qubit level for the first time. Although the logical qubits used may be at the error-detection level rather than full error-correction level, it approaches a new height in practical verification for the superconducting route — compared to Google Willow's earlier 105-physical-qubit surface-code demonstration ($\Lambda \approx 2.1$), IBM significantly leads in logical-qubit count this time; however, key metrics such as whether the logical error rate is lower than the physical error rate and the post-selection rate still need confirmation[4].

Quantum Interconnects and Infrastructure

QTREX's additively manufactured coaxial quantum-interconnect platform achieved continuous broadband transmission from 10 MHz to 20 GHz, with isolation of at least 68 dB and an average channel-to-channel skew of only 4.4 picoseconds, demonstrating high manufacturing consistency[5]. This performance surpasses the RF benchmarks set by partners, providing a key enabling technology for high-density, low-noise interconnects between quantum processors and classical control electronics. Especially in the scaling of superconducting and silicon-spin qubits, low-skew interconnects are a necessary condition for maintaining synchronisation in large-scale systems[5].

Algorithms and Software

Quantum Advantage Demonstration

BlueQubit, Qedma, IBM, and RIKEN jointly demonstrated the prediction of complex material behaviour on an error-mitigated quantum processor, while classical simulations on state-of-the-art supercomputers failed, claiming that quantum advantage has arrived[1]. If independently verified, this statement would be the first clear evidence of quantum computing surpassing classical methods in materials science, but it should be noted that error-mitigation techniques may introduce specific assumptions, and whether the results truly reflect the coherence of the quantum system still awaits peer review[1].

Quantum Topological Data Analysis

SoftBank and Quantinuum released a white paper positioning telecom fraud detection (specifically International Revenue Share Fraud) as a commercial quantum topological data analysis opportunity that may arrive earlier than quantum chemistry[2]. The study, based on experiments with the BUPT dataset on quantum hardware, indicates that quantum machine learning may find industry pain-point applications more quickly on near-term noisy quantum devices, providing the telecom industry with a clear expectation of return on investment for quantum computing[2].

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04 Industry

Industry and Ecosystem

SEALSQ announced the initiation of early commercialisation of Miraex SA's quantum photonics platform, following a 100% acquisition completed in June 2026, funded by its reported $200 million quantum fund [3]. Miraex develops a photonic integrated circuit platform based on thin-film lithium niobate, aiming to achieve microwave-to-optical quantum transduction. This acquisition marks an acceleration of quantum photonics from the lab to the market, but the lithium niobate platform still faces challenges in loss and manufacturability; its commercialisation timeline depends on public verification of the end-to-end loss budget [3].

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05 Other

Academic Frontiers

No significant academic papers or preprints this week.

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06 Impact

This Week's Impact

1. The race between quantum computing and classical simulation enters a new phase: IBM's 70-logical-qubit demonstration directly challenges the classical high-performance computing community, and future supercomputing centres may need to reassess

the feasibility of classical simulation for specific materials-science problems[4].

2. The telecom industry gains an early entry point for quantum applications: SoftBank and Quantinuum's fraud-detection research provides global telecom operators with a quantifiable quantum-advantage use case, potentially accelerating the adoption of quantum technology in this sector[2].
3. Quantum-interconnect standardisation accelerates: The performance benchmarks of QTREX's interconnect platform may become a de facto standard for quantum computing system interconnects, driving the development of multi-chip modules and distributed quantum computing architectures[5].
4. Quantum photonics commercialisation heats up: SEALSQ's acquisition of Miraex and the launch of commercialisation may trigger more investment and consolidation targeting quantum photonics startups, especially in the critical microwave-to-optical transduction interface[3].

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07 Other

Editor's Note

This week's quantum computing newsletter reveals a clear trend: claims of quantum advantage are migrating from the physical-qubit level to the logical-qubit level and are beginning to address concrete industry problems. IBM’s 70-logical-qubit demonstration, although lacking complete error-correction cycle data, validates the irreplaceability of quantum computing on specific tasks through direct comparison with classical methods — a significant upgrade to the "quantum advantage" narrative. Meanwhile, SoftBank’s targeting of topological data analysis at telecom fraud detection indicates that the exploration of quantum algorithm applications is shifting from generic chemistry simulations toward scenarios closer to business operations, which may win broader industrial support for quantum computing. However, concerns remain on the hardware side: the coherence-time limitations of superconducting qubits and the effectiveness of error-mitigation techniques are still key obstacles on the path to practical fault-tolerant computing, while the commercialisation of photonics platforms urgently needs transparent end-to-end loss data. Overall, the quantum computing ecosystem is moving from single-point breakthroughs to the intersection of system verification and commercial deployment, but the coexistence of hype and substance still requires the industry to maintain a critical perspective.

References

[1] BlueQubit, IBM, and RIKEN Demonstrate Quantum R&D Potential

[2] SoftBank and Quantinuum White Paper Flags Telecom Fraud Detection as Early Quantum TDA Opportunity

[3] SEALSQ Initiates Early Commercialization of Miraex Quantum Photonics Platform Following Strategic Acquisition

[4] IBM Demonstrates Verified Quantum Results That Challenge Classical Methods

[5] QTREX Reports Interconnect Platform Exceeds Partner RF Benchmarks

[6] Quantum Computing Weekly Round-Up: Week Ending August 1, 2026

[7] Pilotless planes for the hardest-to-reach places