Sep 8, 2026 – Sep 9 • Daily Brief

Europe's Largest Superconducting Quantum Computer Set for 2027 Deployment in Finland

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CURRENTSOTA

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

Quantum hardware SOTA table →

01 Other

Today's Three Things

1 **Finland locks in a 300-qubit superconducting machine, delivered in two stages** IQM and VTT will operate a 300-qubit IQM Radiance system in Finland in 2027, with the first 150-qubit stage arriving by end-2026 and the full machine integrated into the national supercomputing infrastructure. The two parties say it will be the largest superconducting quantum computer ever built in Europe [15] — for now that is a first only by scale; no capability figures have been released.

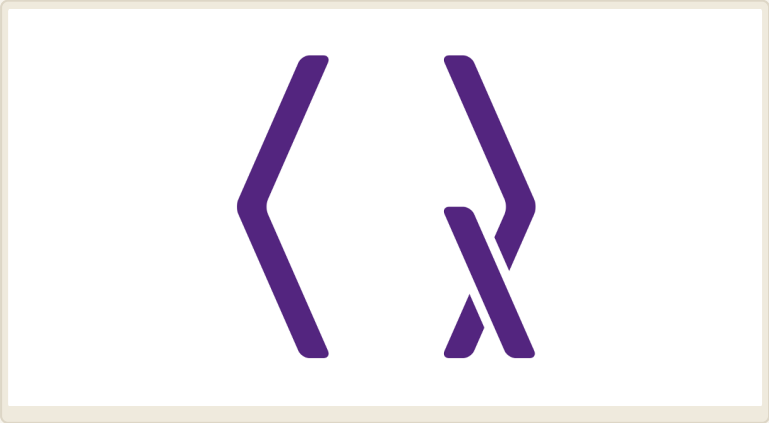
1 **Keyfactor crosses $200 million in annual recurring revenue** Keyfactor announced that annual recurring revenue (ARR, subscription revenue on an annualized basis) surpassed $200 million at the start of Q3 2026, attributing the milestone to rising demand for machine identity security [13] — a rare piece of revenue-side evidence within

the quantum-security narrative, though the company did not attribute the growth to post-quantum cryptography migration.

1 **Quantum navigation flies on an attritable drone for the first time** SandboxAQ's AQNav magnetic navigation completed flight testing on Northrop Grumman's Lumberjack attritable unmanned aerial system — the first publicly reported test of magnetic navigation on such a platform, and the first time it has been paired with visual navigation for a one-way attack platform [20]. Positioning that does not depend on satellite signals is entering the defense procurement field of view.

02 Hardware

Hardware Frontier



Superconducting

IQM + VTT: 300 qubits, 2027, Finland

IQM and VTT confirmed that a 300-qubit IQM Radiance system will be deployed and operated in Finland in 2027, with an initial 150-qubit stage delivered by end-2026 and the full machine folded into Finland's national supercomputing infrastructure; the parties say it will be the largest superconducting quantum computer built in Europe[15].

Technical implication: going 150 to 300 in two steps is an engineering cadence that cuts the risk in half rather than a single leap. Public information gives no two-qubit gate fidelity (the fraction of operations performed correctly when two qubits are operated together), coherence time, or full-chip median data, so this "largest" is for now a claim about scale alone.

Against current public benchmarks: the error-correction yardstick on the superconducting path remains Google Willow's 105 physical qubits with a surface-code error-suppression factor $\Lambda \approx 2.1$ (each step up in code distance drops the logical error rate to roughly 1/2.1), while IBM Nighthawk pairs 120 physical qubits with 218 tunable couplers. On qubit count alone, 300 clears both — but qubit count has never been a metric that earns credit on its own: IBM Condor's 1,121 qubits dropped out of the main line long ago because its fidelity was not competitive. What is still missing: until

full-chip median fidelity and TLS fluctuation data (material defects that let coherence times drift across a 2–3× range) are published, there is no way to judge how deep a circuit this machine can run.

Landscape impact: European high-performance computing buyers gain a domestic alternative, putting direct pressure on IBM's and Rigetti's machine-time sales in Europe. The first verifiable numbers will have to wait for the 150-qubit stage at the end of 2026.

Photonics

ASML puts its name into quantum hardware: a lithography partnership with Xanadu

Xanadu and ASML announced a collaboration to develop advanced lithography processes for Xanadu's photonic quantum hardware, aiming to reduce optical loss in quantum chips and to explore better patterning control through lithography[19].

Technical implication: every fidelity figure on the photonic path is a conditional value given "photon detected"; the real hard constraint is the end-to-end loss budget. Moving the loss problem from bench-top tuning into lithography process parameters is the only scalable fix this path has. Against current

public benchmarks, PsiQuantum's Omega — 99.22%±0.12% two-qubit fusion fidelity and 99.72% chip-to-chip interconnect fidelity (over 42 meters of fiber) on GlobalFoundries' 300mm line — remains the best published result on the photonic path; this collaboration has yet to produce any device data. What is still missing: an itemized loss budget — without one, no fusion fidelity number can be compared across systems.

Landscape impact: manufacturing dependence on the photonic path extends from foundries to lithography equipment makers, further concentrating supply-chain leverage. From process exploration to tape-out validation, the timescale is measured in years.

Repeaters and Quantum Networks

Diamond repeater node: roughly 10× photon collection efficiency, 78% teleportation fidelity

Following recent related coverage, the increment here is a complete single-node operation running end to end: a system integrating diamond color centers (atomic defects in the diamond lattice) used a "repeat-until-success" emission protocol to raise photon collection efficiency to roughly 10× that of prior single-shot excitation methods,

and completed a full set of single-node operations including heralded transfer and quantum teleportation at 78% fidelity. The source says this validates the approach's potential for future quantum networks[10].

Technical implication: long-distance entanglement has been bottlenecked on photon collection efficiency, with single-shot excitation success rates low enough to make the payoff predictably poor. Only with an order-of-magnitude efficiency gain does stringing nodes into a link become a real conversation. But 78% is still far from link quality usable directly for error correction, and it is not the same measurement as the photonic path's 99.72% chip-to-chip interconnect over 42 meters of fiber — the two cannot be compared directly.

Landscape impact: roadmaps for metro-scale entanglement distribution and quantum repeater vendors remain at the prototype stage; from single node to two-node link, the timescale is measured in years.

Spin Quantum Dots

NVision selected for the EuroHPC Quantum Grand Challenge NVision was selected for the EuroHPC Quantum Grand Challenge program with its spin-qubit approach[33]. Against

current public benchmarks: the spin path already matches the best fidelity results (99.99% for donor qubits, and devices randomly sampled from 300mm production wafers exceeding 99%), but device scale remains around 12 qubits, and the number of operations executable per unit coherence time is the lowest tier among the five mainstream paths. What is still missing: uniformity when scaling from a dozen qubits to hundreds, plus the cryogenic wiring density to match.

Quobly and Absolut System sign an industrial partnership declaration The two signed an industrial partnership declaration to support the development and production scale-up of Quobly's spin-qubit quantum computer, with cryogenic infrastructure as the focal point[34]. Business implication: the spin qubit's biggest selling point is that it can use off-the-shelf silicon production lines, but refrigeration and wiring remain external dependencies — whoever standardizes that piece first will be the first to bend their system cost curve down. Declarations of this kind are statements of intent; execution pace depends on what follows.

Materials and Devices

Substrates: strontium titanate layer thickness reaches 100× prior levels La Luce

Cristallina's QP-STOI wafers, evaluated by the U.S. National Institute of Standards and Technology (NIST), carry a strontium titanate (STO) layer 100× thicker than prior levels, targeting quantum and cryogenic devices[16]. Technical implication: substrate availability directly determines device yield and iteration speed. The original text gives no dielectric or loss figures, so this is supply-side progress rather than a performance record. Landscape impact: midstream suppliers to cryogenic electronics and quantum devices gain one more procurable specification.

03 Algorithms

Algorithms and Software

Google Quantum team: nonequilibrium dynamics in 2D spin systems, without storing the full wavefunction

The Google Quantum team simulated nonequilibrium dynamics in two-dimensional

quantum spin systems using a method that sidesteps storing the full wavefunction[11].

Technical implication: memory requirements for the full wavefunction grow exponentially with qubit count; bypassing it means simulable scale is no longer memory-bound. This is an outward push of the classically simulable boundary.

Landscape impact: every team claiming quantum advantage on two-dimensional spin systems must recalibrate its comparison baseline. Advances in classical methods of this kind often erase an "advantage" claim faster than hardware can establish one.

Quantum LDPC codes: breaking the orthogonality barrier

A paper published in Quantum, volume 10, article 2205, proposes a route past the orthogonality constraint in quantum low-density parity-check (LDPC, a class of sparse error-correcting codes) codes; in classical LDPC, increasing girth improves performance, while the quantum version has long been limited by this constraint[9].

Technical implication: quantum LDPC is the main hope for pushing the physical-to-logical encoding ratio down. Sources this issue give no verifiable encoding-ratio figures across

technology paths, so cross-path comparison must wait for public data.

Landscape impact: every notch the encoding ratio drops proportionally reduces the physical qubits needed for the same logical qubit count, directly rewriting the cost tables in every vendor roadmap — though between code construction and hardware implementation stand two more walls: connectivity and decoding speed.

Qedma and HQC2: quantum chemistry accuracy improved 30–50× over prior results

The two companies improved the accuracy of quantum chemistry calculations by 30–50× over prior results on IBM's Aachen processor[14].

Technical implication: the gain comes from the error suppression and mitigation layer, not from an improvement in hardware fidelity itself — the distinction matters. Error mitigation trades additional sampling for accuracy, and the overhead grows with circuit depth.

Landscape impact: the "usable threshold" for chemistry use cases arrives earlier, but the bill lands on machine time and sample counts — a direct positive for cloud quantum services billed by machine time.

a16z Crypto rewrites the Jolt proving system to be post-quantum secure

a16z Crypto released a lattice-based version of the Jolt proving system, which the company says both resists attack by future quantum computers and generates proofs 2 to 3 times faster than the technology it replaces[28].

Technical implication: swapping the security foundation of a zero-knowledge proof system from elliptic curves to lattice-based assumptions removes the "broken by a quantum computer someday" risk at the protocol layer. Raising proof speed while changing the foundation is an uncommon outcome for this kind of rework.

Landscape impact: on-chain verification, rollups, and any scenario requiring long-lived validity proofs benefit first. Once infrastructure of this kind is settled, the replacement cycle runs in years.

Can quantum protocols make electronic voting more trustworthy Research has surveyed possible routes for using quantum protocols to improve the security and anonymity of electronic voting, noting that the trustworthiness of existing networked voting devices and voting machines remains widely questioned[6]. Technical implication: the voting scenario demands the naturally contradictory

pair of properties "verifiable + anonymous"; quantum protocols can in theory deliver both, but the equipment conditions required far exceed current deployment levels.

04 Industry

Industry and Ecosystem

U.S. Treasury establishes a quantum readiness working group, giving the financial sector's migration a lead agency

Pursuant to Executive Order 14412, the U.S. Department of the Treasury established a quantum readiness working group to coordinate the financial sector's transition to post-quantum cryptography (PQC, new encryption resistant to quantum attack)[12].

Business implication: the compliance clock is upgraded from "industry recommendation" to an administrative arrangement with a lead department and a coordination mechanism —

budget lines and accountable owners land at the same time, and that is the signal that starts IT procurement.

Technical implication: what gets migrated is signatures and key exchange; the real cost item is not algorithm replacement but certificate-chain inventory and legacy system rework.

Landscape impact: security budgets at U.S. banks, clearing institutions, and brokerages get reshuffled on a quarterly cadence; vendors in certificate management and cryptographic asset inventory are the first-order beneficiaries.

Not just data — software itself needs quantum hardening Technology officials are urging agencies to start now, extending the protection scope from stored data to applications themselves[2]. Separately, a guest article by the chief marketing officer of quantum security vendor QNu Labs argues that post-quantum migration should begin immediately rather than wait — a stakeholder viewpoint[31]. Technical implication: hardcoded crypto library calls inside application code are the layer most easily missed — data encryption can be replaced centrally, while call sites scattered through business code have to be fixed one at a time.

Keyfactor passes $200 million in annual recurring revenue The company says ARR crossed $200 million at the start of Q3 2026, driven by rising strategic demand for machine identity security[13]. Business implication: this is rare revenue-side evidence within the "quantum security" narrative. The metric is annual recurring revenue rather than recognized revenue, but the subscription model means customers have moved cryptographic migration into standing budgets rather than treating it as a one-off project.

Manchester leads a £12.6 million UK program The source writes "Manchester-led" without specifying whether the entity is the University of Manchester or a consortium of local institutions; this £12.6 million UK program advances photonic and quantum technologies, including ultra-sensitive quantum sensors and secure communications[18]. Landscape impact: the UK continues to concentrate funding on sensing and communications — the two directions that can ship sooner — rather than general-purpose computing.

Quandela and CMC Microsystems sign a memorandum of understanding The first step is bringing Quandela into CMC's access channel, opening photonic quantum computing to Canadian users[8]. Business

implication: a memorandum of understanding is a statement of intent and carries no legal obligation; for the photonic path, joining a national academic access platform is the cheapest way to acquire customers.

Industry roundup: Washington is no longer just writing research checks A September 8 industry roundup notes that equity stakes, foundry capacity, and 2027 delivery dates now sit on the same page as helium-related concept sketches (the original reads "helium sketches"), while also citing a paper attack estimate of 25.7 days against 256-bit curves[35]. Business implication: the government's role shifts from research funder to capacity and equity investor, and valuation logic shifts with it — from "papers and patents" toward "production lines and delivery schedules."

Quantum chemistry and quantum life sciences enter the industrialization phase Related analysis argues that industrialization means turning fragile laboratory apparatus into reliable, mass-producible, affordable commercial systems[3]. Business implication: revenue on this path will not come from the machines themselves but from packaging measurement and simulation capability as a service sold to chemical and pharmaceutical customers.

People: two companies fill roles on the same day Former IBM executive Joerg Behrend becomes VP of hardware at Q.ANT[29]; former Google executive Gina Fratarcangeli joins Qtonic Quantum as senior advisor (AI transformation and global alliances)[30]. Business implication: hiring a hardware lead and an enterprise-grade advisor away from large incumbents typically happens right after a funding round or just before volume production.

Other A guest article discusses what CERN can bring to quantum technologies[32]; separately, one argument holds that universities should judge quantum computing investments by what students learn, and that students need to run experiments on real quantum systems[7].

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05 Other

Academic Frontier

Unconventional quantum materials could rewrite dark matter detection sensitivity

An international team has identified a new class of quantum materials that could substantially improve search sensitivity for the lightest and hardest-to-catch category of dark matter. Dark matter is thought to make up roughly 85% of all matter in the universe, with

gravitational effects that shaped galaxies and large-scale cosmic structure, yet it has never been directly detected (the original gives no specific factor for the sensitivity improvement) [4].

Technical implication: the bottleneck in dark matter detection is detector background and response bandwidth, so changing the material means changing the detection window — a shift from "build a bigger detector" to "build a better-matched detector."

Landscape impact: the research market for quantum sensing gains another high-value scenario; from material identification to a completed experimental apparatus, the timescale is measured in years.

Layer count as a design variable: Tohoku University gives topological magnets a systematic design route

Researchers at Tohoku University demonstrated that varying the number of crystal layers allows topological magnets to be designed systematically, with results published in the Journal of the American Chemical Society [5].

Technical implication: topological quantum materials combine unusual electronic states with magnetism and superconductivity, and

until now have relied largely on compositional trial and error. Making layer count a tunable knob turns a matter of luck into a predictable design process.

Landscape impact: materials screening cycles for future electronics and quantum devices shorten; the beneficiaries are upstream materials laboratories rather than today's system vendors.

A 12,635-atom protein simulation reaches the Gordon Bell finals

Cleveland Clinic, RIKEN, and IBM reached the finals for the 2026 ACM Gordon Bell Prize with a 12,635-atom protein simulation[17].

Technical implication: the upper bound on plugging quantum methods into large-scale scientific computing workflows has been written down as an explicit number rather than left as a method demonstration — atom count is the most straightforward comparable metric for simulations of this kind.

Landscape impact: computational buyers in pharma and life sciences can, for the first time, take a concrete system size and compare it against their own requirements; results will be announced within this year's supercomputing conference cycle.

06 Impact

Today's Impact

1 **Europe's quantum machine-time supply now has a firm schedule** The IQM–VTT 300-qubit system comes online in 2027, with the 150-qubit stage in place by end-2026 and integration into national supercomputing infrastructure [15] — European research users no longer have to queue for U.S. cloud platforms. Worth watching next: whether full-chip median two-qubit fidelity is published at the first-stage delivery in late 2026. Only that number can show where it beats existing 100-qubit-class machines.

1 **Cryptographic migration at financial institutions enters the execution phase** The U.S. Treasury's quantum readiness working group is in place [12], officials are stressing that application software itself must be hardened [2], and Keyfactor's ARR crossing $200 million gives a demand-side price signal [13]. Worth watching next: whether the working group issues phased deadlines — with dates, procurement moves from pilot to full rollout.

1 **The error-handling layer is becoming a standalone value segment** Qedma and

HQC2 improved chemistry calculation accuracy 30–50× on an IBM processor through error suppression rather than new hardware[14]; at the same time, the orthogonality barrier in quantum LDPC codes has been theoretically pried open[9]. Worth watching next: whether gains of this kind still hold on deeper circuits, and the growth curve of the sampling overhead.

1. **Navigation and sensing monetize ahead of computing** SandboxAQ completed magnetic navigation flight testing on an attritable drone[20], and the UK is putting £12.6 million behind photonics and quantum sensors[18]. Worth watching next: the timeline for magnetic navigation to move from flight test to volume fielding, and whether a second supplier emerges capable of comparable flight validation.

1. **Classical simulation is still catching up to quantum hardware** The Google Quantum team simulated nonequilibrium dynamics in two-dimensional spin systems without storing the full wavefunction[11]; on the other side, a 12,635-atom protein simulation reached the Gordon Bell finals, which the source calls a leap for quantum-enhanced computing[17]. Worth watching next: how much margin existing quantum advantage claims have left under the new baseline.

07 Other

Editor's Note

In today's batch, the most notable thing is not any single record but that numbers have been replaced by dates. Finland's machine now has a year and a staged scale; Europe's sensing program has a figure; the U.S. financial sector's cryptographic migration has a lead agency and an executive basis. For the past two years this industry has spoken in terms of capability limits — how many qubits, how many nines. It is now starting to speak in delivery schedules. For researchers, that means reproducible comparison samples will cluster at fixed points in time; for funders, it means diligence questions move forward from "does the technology hold up" to "can it be delivered on schedule, and at what fidelity." Worth remembering: the leader by scale and the leader by capability have never been the same machine. Historically, the chip with the most qubits is often the one that cannot run the deepest circuit. When you see the word "largest," first ask what the full-chip median fidelity is.

A second undercurrent is that the division of labor is hardening. Hardware makers increasingly do not solve manufacturing

problems themselves — lithography goes to the equipment giants, refrigeration to cryogenic engineering firms, substrates to materials suppliers, error handling to third parties specializing in the software layer. This supply chain is starting to look like semiconductors in their early phase: system vendors own architecture and integration, while value disperses upstream along the process steps. The implication for investment judgment is direct — betting on system vendors means betting on which path wins, while betting on refrigeration, substrates, lithography, and error mitigation gives exposure across multiple paths. And on the error-correction side, what actually determines cost is still the exchange rate between physical and logical qubits. As long as that ratio sits in the double or even triple digits, every claim about scale has to be divided by it before you can talk about what it can actually compute.

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[3] Emerging Industrialization for Quantum Chemicals and Quantum Life Science

[4] Unconventional quantum materials could dramatically boost the search for dark matter

[5] Layer-based design offers new route to topological magnets

[6] Could quantum protocols make electronic voting more secure?

[7] Universities should judge quantum-computing investments by what students learn

[8] Quandela and CMC Microsystems initiate a partnership to expand photonic quantum computing access in Canada

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[20] Cleveland Clinic, RIKEN, IBM named Gordon Bell finalists

[21] Quantum codes sidestep a key limit on error correction

[22] Manchester to lead £12.6M push for quantum sensors and secure comms

[23] ASML explores photonics with Xanadu quantum collaboration

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[25] SandboxAQ tests quantum navigation on Northrop Grumman drone

[26] Diamond spin quantum computing takes a step toward optical scaling

[27] New maps reveal hidden landscapes inside a prehistoric supercontinent

[28] Astronomers reveal a new type of celestial object that has been hiding in plain sight for decades

[29] Scientists unlock new clues to what Denisovans, a mysterious ancient human ancestor, looked like

[30] Gray whales are washing up dead on the West Coast. The reason is alarming

[31]

Fog may be hiding secret ecosystems

[32] SpaceXAI' s Colossus data center is fueling a massive backlash

[33] The science of friendship and loneliness

[34] a16z Crypto Rebuilds Jolt Proof System With Post-Quantum Security And Faster Performance

[35] Former IBM Executive Joerg Behrend Joins Q.ANT as VP Hardware

[36] Former Google Executive Gina Fratarcangeli Joins Qtonic Quantum

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