FRONTIER COMPUTING BRIEFING

The State of Quantum Computing

Vol. 1 · July 2026

BY **DANIEL SHANKLIN**

danielshanklin.com/stateof/quantum

SECTION 01

Executive Summary

Error correction moved from papers to products in the same nine months the money went vertical and then rolled over. Vol. 1 opens this ledger in the gap between announced and delivered — and the house discipline for every claim in this issue is **vendor-announced ≠ peer-reviewed ≠ delivered ≠ benchmarked.**

1. Error correction went commercial. Quantinuum's Helios shipped Nov 5, 2025 with **48 fully error-corrected logical qubits at a 2:1 encoding rate** — vendor-announced, claimed better-than-physical — and the underlying 98-qubit machine[1] was peer-reviewed in Nature on Jun 17, 2026 (machine Nov 2025, paper Jun 2026 — the three-date problem this series will police). IBM's Loon demonstrated **real-time qLDPC decoding in <480 ns**, claimed a year ahead of schedule (IBM Newsroom[2], Nov 12, 2025), and Google published reinforcement-learning control of error correction in Nature on Jul 8, 2026 — the freshest peer-reviewed QEC result on record.

2. The money went vertical, then rolled over. Quantinuum's Jun 4 IPO raised **$1.68B, the largest quantum IPO ever**, 20x oversubscribed — and broke below its offer price within two days (Reuters / Barron's, Jun 4–5, 2026). IonQ grew Q1 2026 revenue +755% YoY to $64.7M[3] — and fell 26.1% in June, entering its Aug 5 earnings down ~36% (Motley Fool, Jul 3; TradingView, Jul 14, 2026).

3. The valuation gap is the sector's defining number: six public names carry **~$41B of combined market cap against ~$1B of total industry-wide annual revenue** (McKinsey QTM 2026, via secondary summaries) — roughly 40x everything the entire industry bills in a year. The five US-listed pure-plays alone: ~$25.8B of cap on ~$200M combined TTM revenue and >$1.1B of combined FY2025 net losses, with every 52-week high 2–4x above the Jul 20 close (stockanalysis.com[3], Jul 20, 2026).

4. Uncle Sam bought in — literally. The Commerce Department signed **$2B of letters of intent with 9 quantum companies** under CHIPS Act authority, taking non-controlling federal equity stakes (NIST[4] / WSJ / NYT, May 21, 2026); IBM's $1B is the largest single award, per follow-up coverage. Trump's late-June quantum executive orders set a policy target of a "commercially relevant quantum computer by 2028" (Yahoo Finance, Jun 22, 2026). The NQI Reauthorization Act is through committee in both chambers — and not yet law as of Jul 20.

5. The year's loudest roadmap acceleration rests on science its own field publicly disputes. Microsoft's Majorana 2 (Jun 2, 2026) switched aluminum for lead, claimed a 1,000x reliability improvement, and pulled the company's scalable-machine timeline in from ~2035 to **2029** — while Nature news ("researchers are still sceptical," Jun 3), Science, Science News, and Hackaday all report the underlying topological science remains contested. Largest claim-vs-consensus gap in the field; both sides at full volume in Section 04.

6. The advantage clocks are running. Google's Quantum Echoes (~13,000x, Oct 22, 2025, Nature same day) has not been dequantized — but the only detailed defense is Google-affiliated[5]; no independent adjudication exists. D-Wave and Flatiron Institute are five orders of magnitude apart on the same experiment ("a million years on Frontier" vs "a laptop"). And IBM's self-imposed **advantage-by-end-of-2026 deadline** — reiterated by CEO Krishna Apr 30, 2026 — has ~5 months on the clock with nothing published that qualifies, per IBM's own collaborators.

7. The real near-term economy is post-quantum cryptography. A June 2026 executive order set a federal PQC migration deadline — reported as 2030 by some outlets and 2031 by others, same EO, same day — on top of NIST's final FIPS 203/204/205 standards and a 2027 migration pilot. PQC spend is real, current, and mandated; quantum *compute* revenue is none of those three. The forecasts section is where this issue's tensions become falsifiable.

SOURCES

[1] www.quantinuum.com

[2] newsroom.ibm.com

[3] stockanalysis.com/stocks/ionq

[4] www.nist.gov

[5] arxiv.org/abs/2604.15427

SECTION 02

By the Numbers

Eight numbers that define quantum computing as of July 2026. This is the board the series will mark to, month over month.

~$41B

Combined market cap of six public quantum names[1] — vs ~$1B total industry-wide annual revenue (McKinsey): the sector trades near 40x ALL of its industry's revenue

STOCKANALYSIS.COM QUOTE PAGES · JUL 20, 2026 CLOSE

$64.7M

IonQ Q1 2026 revenue[1] — +755% YoY; FY2025's $130.0M was the first $100M+ GAAP year for any public quantum firm; FY26 guide raised to $270M

THE QUANTUM INSIDER / INVESTING.COM · MAY 6, 2026

$1.68B

Quantinuum IPO raise[2] — largest quantum IPO ever, Jun 4, 2026, 20x oversubscribed; broke below offer within two days; now ~875x TTM sales

REUTERS / BARRON'S · JUN 4–5, 2026

48

Quantinuum Helios fully error-corrected logical qubits[3] — at 2:1 encoding, vendor-claimed better-than-physical; launched Nov 5, 2025; the 98-qubit machine peer-reviewed in Nature Jun 17, 2026

QUANTINUUM RELEASE NOV 5, 2025 · NATURE JUN 17, 2026

120q / 5,000

IBM Nighthawk: 120 qubits, circuits to 5,000 two-qubit gates[4] — delivered end-2025, on platform Jan 2026; no published gate-fidelity figure; IBM's advantage deadline: end of 2026

IBM NEWSROOM · NOV 12, 2025

$2B

DOC CHIPS-authority quantum awards[5] — letters of intent with 9 companies, non-controlling federal equity stakes; IBM's $1B the largest single award (reported)

NIST / WSJ / NYT · MAY 21, 2026

>$1.1B

Combined FY2025 net losses, five US-listed pure-plays[6] — on roughly ~$200M combined TTM revenue; every 52-week high sits 2–4x above the Jul 20 price

STOCKANALYSIS.COM QUOTE PAGES · JUL 20, 2026

$12.6B

Capital invested in quantum in 2025, per McKinsey QTM 2026 — which titled the year “a commercial tipping point”; industry revenue crossed $1B for the first time [figures via secondary summaries]

MCKINSEY QTM 2026 · APR 28, 2026 · HEDGED

SOURCES

[1] stockanalysis.com/stocks/ionq

[2] stockanalysis.com/stocks/qnt

[3] www.quantinuum.com

[4] newsroom.ibm.com

[5] www.nist.gov

[6] stockanalysis.com/stocks/rgti

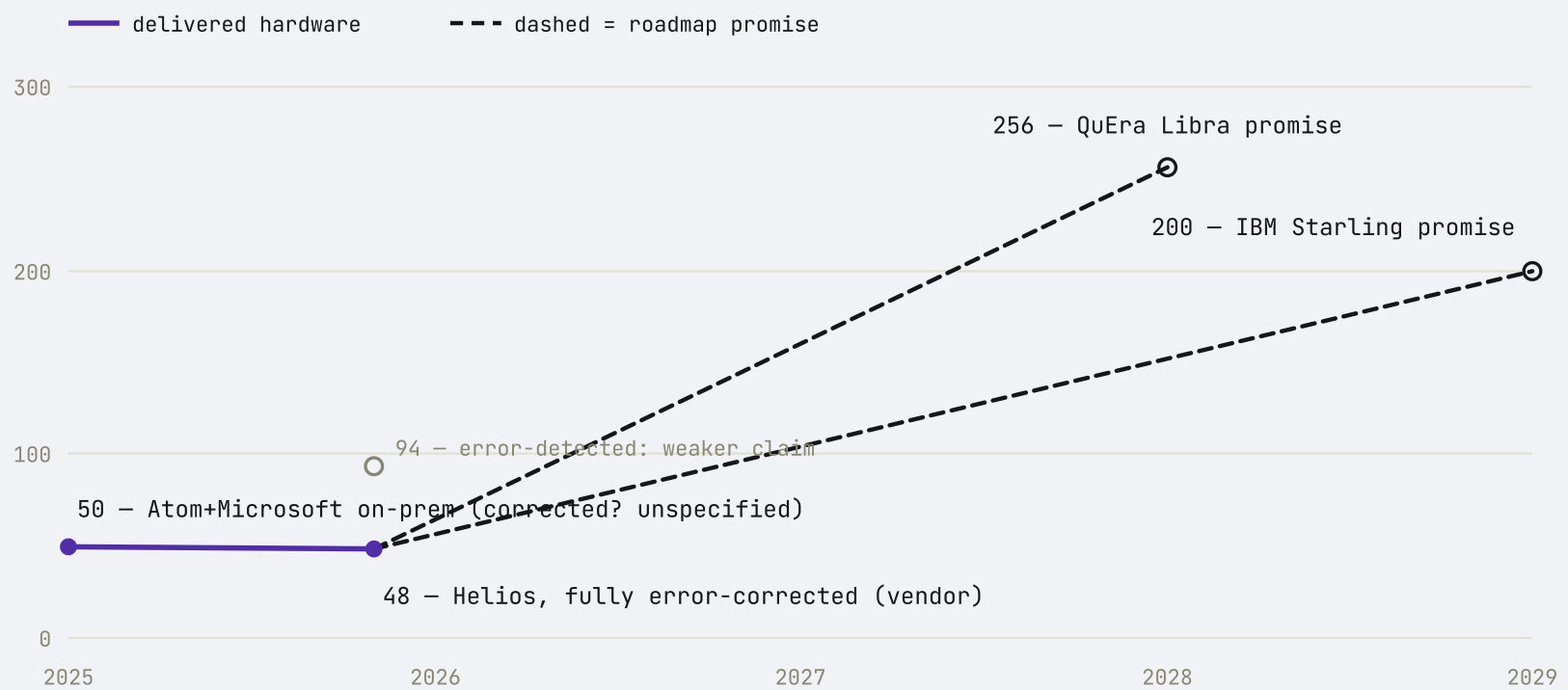
SECTION 03 · ERROR CORRECTION

Error Correction Goes Commercial

The technical centerpiece of the coverage window: fully error-corrected logical qubits are now a product you can buy, real-time qLDPC decoding runs on hardware, and a Nature-published machine learns from its own errors. Every claim below carries its evidentiary grade.

The Logical-Qubit Ladder — delivered vs promised

Solid: logical-qubit counts on shipped hardware. Dashed: vendor roadmap promises. Caveat, verbatim from the field: “logical qubit” has **no standardized definition** — error-detected, error-corrected, and code distance are not comparable across vendors (Alice & Bob, “Not All Logical Qubits Are Created Equal,” Jun 9, 2026; Forbes, Apr 6, 2026). That non-comparability is the point of this chart.



Points: Atom Computing + Microsoft on-prem system, “50 logical qubits,” error-detected vs error-corrected unspecified (HPCwire, Jan 20, 2025); Quantinuum Helios 48 fully error-corrected at 2:1, vendor-announced Nov 5, 2025, system peer-reviewed Jun 2026; QuEra Libra 256 logical qubits on Amazon Braket, promised 2028 (The Quantum Insider, Jun 15, 2026); IBM Starling 200 logical qubits / 100 million gates, promised 2029 (IBM Newsroom, Nov 12, 2025). Helios’s 94 is error-detected — a weaker claim — and is deliberately not on the line.

Quantinuum Helios: the product

Helios launched commercially Nov 5, 2025: **98 all-to-all-connected physical qubits**, and — all vendor-announced — three logical configurations: 94 logical error-detected globally entangled, 50 logical error-detected in a magnetism simulation, and **48 logical fully error-corrected at a 2:1 encoding rate with 99.99% SPAM**, all claimed "better than physical performance" (Quantinuum press release[1], Nov 5, 2025). Only the 48-LQ figure is full QEC; vendors mix "error-detected" and "error-corrected" and this ledger will not. Launch customers: Amgen, BMW, JPMorganChase, SoftBank (same release). Peer review caught up Jun 17, 2026, when "A 98-qubit trapped-ion quantum computer with all-to-all connectivity" ran in Nature — describing the Nov 2025 machine. High-rate Iceberg codes were implemented on Helios (Quantum Computing Report, Mar 17, 2026). One discount applies to all of it: Quantinuum's hardware claims now sit inside an IPO narrative — weight accordingly.

IBM Loon: fault tolerance's component set, a year early

Loon, IBM's experimental chip, demonstrated the parts list for fault tolerance — multi-layer low-loss routing with long-range "c-couplers," qubit reset, and **real-time qLDPC decoding in under 480 ns** with ~10x decoder speedup, which IBM says landed one year ahead of its internal schedule (IBM Newsroom[2], Nov 12, 2025 — announced; vendor-graded on the schedule claim). IBM's roadmap claims qLDPC cuts physical-qubit overhead by up to 90% vs surface codes (Quantum Computing Report, May 14, 2026, restating IBM). Qubit fabrication moved to 300mm wafers at Albany NanoTech, with a claimed ≥2x R&D iteration speedup.

Google: the machine that learns from its own errors

The freshest peer-reviewed result in this issue: **"Reinforcement learning control of quantum error correction"** (Nature, Jul 8, 2026) — press framing: the machine "learns from its own errors while it computes" (The Quantum Insider, Jul 10, 2026). It extends the Willow lineage: distance-7 surface code below threshold (Nature, Dec 2024), dynamic surface codes (Nature, Oct 17, 2025). Notably, Google announced **no new chip in 2026** — Willow, 105 qubits, remains the flagship, and July 2026 press recycling the "10 septillion years" line is reprinting the Dec 2024 benchmark as if it were news.

The unproven column

Atom Computing announced the "industry's first full demonstration of QEC using a toric code" on neutral atoms, with error rates falling as qubit count scales — and disclosed **zero numbers**: no qubit counts, no distances, no error rates; a paper is promised "later this year" (The Quantum Insider, Jun 3, 2026 — announced, unpublished). Carried here as unproven until the preprint lands; SOQC-2607-05 instruments it. **QuEra/Harvard/MIT's** ~2:1 qLDPC codes (arXiv 2604.16209[3], Apr 21, 2026) — 1,152 physical → 580 logical, 2,304 → 1,156, simulated logical error rates of 2.9×10^{-11} down to ~1.3×10^{-13} per qubit per round at 0.1% physical error — is a **simulation-only preprint**. Press headlines saying the 2:1 ratio was "achieved" are wrong; no hardware demo exists.

Meanwhile the field is attacking the magic-state cost problem from both directions, in peer review: fault-tolerant computation *without* distillation on a 2D device (Nature, Nov 28, 2025); measurement-free universal logical computation (Nature, Jan 26, 2026); very-low-cost "unfolded distillation" for biased-noise qubits (Nature, Feb 20, 2026); magic-state injection above the distillation threshold on IBM processors (Scientific Reports, Feb 26, 2026).

The standards gap

"Logical qubit" has no agreed definition. Error-detected vs error-corrected vs code distance are routinely conflated in vendor claims — flagged by Alice & Bob ("Not All Logical Qubits Are Created Equal," Jun 9, 2026) and Forbes (Apr 6, 2026). Every cross-vendor logical-qubit number in this issue — Quantinuum's 48/94, QuEra's 256, IBM's 200, Atom's "50" — carries this caveat. **Until there is a standard unit, the ladder chart above compares apples to announcements.**

SOURCES

[1] www.quantinuum.com

[2] newsroom.ibm.com

[3] arxiv.org/abs/2604.16209

SECTION 04 · MODALITIES

The Hardware Board

The modality scoreboard as of Jul 20, 2026, with the announced / delivered / peer-reviewed discipline applied row by row. Where a number does not exist, the absence is printed.

MODALITY	VENDOR · SYSTEM	GRADE	THE SIGNAL
SUPERCONDUCTING	IBM · Nighthawk	Delivered	120 qubits, 218 tunable couplers, circuits to 5,000 two-qubit gates; on platform Jan 13, 2026. **No published two-qubit fidelity figure exists** — "maintaining low error rates" is marketing, not a number (IBM Newsroom[1], Nov 12, 2025; The Quantum Insider, Jan 13, 2026). Scaling schedule: 7,500 gates end-2026, 15,000 by 2028 with 1,000+ connected qubits (roadmap, not hardware).
SUPERCONDUCTING	Google · Willow	Delivered · peer-reviewed	105 qubits, still the flagship — no new Google chip announced in 2026. Below-threshold surface code peer-reviewed Dec 2024; 2026 output is error-correction results on Willow-class hardware. July 2026 press recycling Dec 2024 benchmarks as news is the three-date problem in action (ScienceBlog, Jul 15, 2026).

MODALITY	VENDOR · SYSTEM	GRADE	THE SIGNAL
TRAPPED ION	Quantinuum · Helios	Delivered · system peer-reviewed	98 all-to-all qubits; vendor-announced 2Q fidelity 99.921%, 1Q 99.9975%; 48 fully error-corrected logical qubits at 2:1 (Quantinuum[2], Nov 5, 2025; Nature, Jun 17, 2026). Fidelity and logical-qubit figures are vendor claims now inside an IPO narrative — discount accordingly.
TRAPPED ION	IonQ · Tempo / 256q	Sold ≠ delivered	AQ 64 milestone Sep 2025 — **"AQ" is an IonQ-defined vendor metric**, not an industry standard. Tempo (~100-qubit class) KISTI delivery deal Jan 2026. First 256-qubit system reported sold with Q1 earnings (buyer Horizon Quantum per Quantum Zeitgeist, Apr 9, 2026) **— sold ≠ delivered ≠ benchmarked; delivery unverified.** "Walking Cat" FT blueprint to 10,000+ physical qubits (Apr 22, 2026).
NEUTRAL ATOM	QuEra	Roadmap	"Libra" — 256 logical qubits, fault-tolerant, launching 2028 on Amazon Braket under an expanded AWS collaboration (The Quantum Insider, Jun 15, 2026). The ~2:1 qLDPC result behind the headlines is a simulation-only preprint[3].

MODALITY	VENDOR · SYSTEM	GRADE	THE SIGNAL
NEUTRAL ATOM	Pasqal	Delivered	Delivered Italy's first neutral-atom QPU — 140 qubits, to CINECA (HPCwire, Feb 17, 2026), its third system in Europe; leads a €50M European neutral-atom manufacturing pilot line (Tech Times, Jul 13, 2026); SPAC path toward Nasdaq announced May 26, 2026.
NEUTRAL ATOM	Atom Computing	Announced, unpublished	Toric-code QEC claim with zero disclosed numbers; paper promised late 2026 (The Quantum Insider, Jun 3, 2026). Funding reported as a $300M Series C with conflicting accounts of its structure ($100M closed + commitments is the likelier read).
PHOTONIC	Xanadu	Public co.	First pure-play photonic QC company to go public (The Quantum Insider, Mar 27, 2026); manufacturing deals with Tower Semiconductor, EV Group, Thorlabs; negotiating up to CAD$390M in Canadian government support. No new flagship system metrics in the window.

MODALITY	VENDOR · SYSTEM	GRADE	THE SIGNAL
PHOTONIC	PsiQuantum	No published metrics	**Zero published system-level metrics** — no qubit counts, no fidelities. Brisbane (A$940M public funding) ~12 months behind its end-2027 operational target, consultation unstarted, no public funds drawn as of Dec 2025 (Startup Daily, Dec 9, 2025, citing Senate Estimates); CEO transition Feb 2026. Chicago site, broke ground Sep 2025, is ahead of Brisbane.
SILICON SPIN	Intel	Near-silent	Quietest modality: no successor to 12-qubit Tunnel Falls (2023) surfaced; latest concrete item is an Argonne–Intel collaboration (anl.gov, Jan 6, 2026). Academic milestone: universal logical operations in a silicon processor (Nature, Mar 23, 2026 — peer-reviewed).
TOPOLOGICAL	Microsoft · Majorana 2	Announced · contested	Announced Jun 2, 2026: aluminum → lead; claimed 1,000x reliability over Majorana 1, ~20 s mean qubit lifetime, ~1 µs operations (all vendor claims); scalable machine “by 2029.” Qubit count not specified. See the featured conflict below.

Featured conflict: Microsoft’s 2029 vs the field’s doubts

Both sides, full volume. **Microsoft’s claim:** Majorana 2’s lead-based qubits are 1,000x more reliable than Majorana 1’s, with mean lifetimes of 20 seconds (up to ~1 minute), and the path to a scalable quantum computer now lands in **2029** — “cutting its original timeline in half” from the ~2035 framing that accompanied Majorana 1 in Feb 2025 (Microsoft Source, Jun 2, 2026). **The field’s**

response, in print, same week: “Microsoft upgrades controversial quantum chip — researchers are still sceptical” (Nature news, Jun 3, 2026); “Critics are still skeptical” (Science News, Jun 2, 2026); “Doubling down on controversial claims” (Science/AAAS, Jun 2, 2026); “Topological Quantum Computing Claims Once Again In Question” (Hackaday, Jun 30, 2026) — on top of the unresolved Feb–Mar 2025 disputes over whether Majorana 1 demonstrated topological qubits at all. A 6-year roadmap acceleration announced simultaneously with contested underlying science is the **largest claim-vs-consensus gap in the field**. The scorecard notes Microsoft superseded its own 2035 forecast after 16 months; the ledger now tracks both.

SOURCES

[1] newsroom.ibm.com

[2] www.quantinuum.com

[3] arxiv.org/abs/2604.16209

SECTION 05 · ADVANTAGE

Advantage Claims & Their Shadows

Every advantage claim in quantum computing lives under a moving threat: the classical-simulability frontier keeps advancing. Three claims define the current board — one undefeated but unaudited, one disputed by five orders of magnitude, one racing its own deadline.

Google Quantum Echoes: undefeated, unaudited

Announced Oct 22, 2025 with a Nature paper the same day: out-of-time-order correlator (OTOC) measurement on 105-qubit Willow, claimed **~13,000x faster than the best classical method** on a leading supercomputer — billed as the first "verifiable quantum advantage" (blog.google / research.google, Oct 22, 2025). Skepticism arrived the same day: "Google claims 'quantum advantage' again — but researchers are sceptical" (Nature news, Oct 22, 2025). As of July 2026 the claim has **not** been dequantized — but the only detailed defense, arguing tensor-network + belief-propagation methods cannot feasibly simulate the experiment, is arXiv 2604.15427[1] (Apr 16, 2026), whose authors overlap with Google Quantum AI. **A self-defense is not independent adjudication.** Where are the independent replication or spoofing attempts? Genuinely open — SOQC-2607-02 instruments it.

D-Wave vs Flatiron: five orders of magnitude apart

D-Wave's Mar 2025 Science magnetic-materials "supremacy" claim was challenged within days (Science News, Mar 12, 2025). The dispute renewed in May 2026: a Flatiron Institute tensor-network algorithm was framed in press as "a laptop challenges its quantum supremacy" (CoinCentral, May 27, 2026), while D-Wave systematically rebutted, arguing the Frontier supercomputer would need ~"a million years" (Quantum Computing Report, May 26, 2026). Same experiment, **five orders of magnitude of disagreement, unresolved** — and QBTS stock fell ~5% on the classical study (MoneyCheck, May 27, 2026). Carried as an open row on the scorecard, not graded.

IBM's clock: ~5 months to its own deadline

IBM declared "quantum advantage by end of 2026" on Nov 12, 2025, and CEO Arvind Krishna reiterated it Apr 30, 2026 — "first real-world quantum advantage in 2026" (The Quantum Insider, Apr 30, 2026). As of mid-July, nothing published qualifies, per IBM's own collaborators: Nighthawk's lattice-gauge-theory QCD run and a 110-node cybersecurity workflow are explicitly framed as "hardware feasibility and architectural benchmarks rather than claims of quantum advantage" (Quantum Computing Report, ~Jun 19–20, 2026). This is the sector's nearest-dated falsifiable claim; SOQC-2607-01 takes a side.

The standing threat under all three: peer-reviewed theory keeps expanding what classical machines can fake — "Operationally classical simulation of quantum states" (Nature, Jan 27, 2026) and "Noise-induced shallow circuits and the absence of barren plateaus" (Nature, Apr 2, 2026). Every NISQ-era advantage claim is provisional until the frontier stops moving.

SOURCES

[1] arxiv.org/abs/2604.15427

SECTION 06 · MARKETS

The Money Went Vertical

The largest quantum IPO ever, the first $100M GAAP revenue year, +755% growth — and a sector trading 50–70% below its highs at ~40x its entire industry's annual revenue. Prices and caps as of the Jul 20, 2026 close.

COMPANY	TICKER	PRICE	MKT CAP	52-WK RANGE	LATEST REVENUE	FY2025 NET LOSS
IONQ	IONQ[1]	$34.24	$12.78B	$25.89–$84.64	Q1'26 $64.7M · FY25 $130.0M	−$510.4M
QUANTINUUM	QNT[2]	$57.35	$14.98B	IPO'd Jun 4, 2026	TTM $17.08M	n/a (newly public)
D-WAVE	QBTS[3]	$16.72	$6.19B	$12.75–$46.75	Q1'26 $2.9M · FY25 $24.6M	−$355.1M
RIGETTI	RGTI[4]	$14.25	$4.74B	$12.53–$58.15	TTM $10.0M · FY25 $7.09M (−34%)	−$216.2M
QUANTUM COMPUTING INC	QUBT[5]	$7.92	$1.79B	$6.18–$25.84	Q1'26 $3.7M · FY25 $682K	−$18.7M
ARQIT	ARQQ[6]	$17.21	$285M	$11.52–$62.00	FY25 $530K · H1'26 "~10x YoY" (co. release)	−$35.3M

Source: stockanalysis.com quote pages, fetched Jul 20, 2026. The five US-listed pure-plays (ex-Quantinuum) carry ~$25.8B of combined cap on ~$200M combined TTM revenue and >$1.1B combined FY2025 net losses. Every 52-week high sits 2–4x above the current price — the whole board is in a deep drawdown from the late-2025/early-2026 peak.

IonQ: the growth story and the drawdown, simultaneously

IonQ became the first public quantum firm past $100M of GAAP revenue — FY2025 came in at **$130.0M, beating its own guidance by 20%** (Stock Titan, Feb 25, 2026). Q1 2026: **$64.7M, +755% YoY**, with FY2026 guidance raised to $270M (The Quantum Insider / Investing.com, May 6, 2026). Against that: a short-seller report and legal probe in February (24/7 Wall St, Feb 15, 2026), −24.9% in March (Motley Fool, Apr 6, 2026), −26.1% in June (Motley Fool, Jul 3, 2026), and a ~36% slide in the month before its Aug 5 earnings (TradingView, Jul 14, 2026). The growth story and the valuation reassessment are the same stock, the same quarter.

Quantinuum: the IPO that made and broke the tape in 48 hours

The Honeywell spin-out's Nasdaq debut on Jun 4, 2026 raised **$1.68B in an upsized, 20x-oversubscribed offering** — the largest quantum IPO ever — and broke below its offer price within two days (Reuters; Barron's, Jun 5, 2026). It now trades at ~$14.98B on $17.08M of TTM revenue — **~875x sales** (stockanalysis.com[2], Jul 20, 2026). Two source conflicts are carried unresolved rather than settled: the IPO price ($48 per Reuters/CNBC vs $60, opening $68, per stockanalysis.com) and the debut valuation ($17.6B per Reuters vs $15.6B per Crypto Briefing — likely basic vs diluted share counts). Its first earnings report as a public company lands before Vol. 3; SOQC-2607-04 takes a position on it.

The confusing middle of the table

D-Wave printed the coverage window's most confusing quarter: Q1 bookings $33.4M, **+1,994% YoY** — and revenue $2.9M, **−81% YoY**, because the year-ago quarter contained one large system sale (TradingView / qz.com, May 12 & Jun 30, 2026). The stock *rose* on the miss. It holds $588M in cash, was named one of only two "Leaders" in IDC's quantum market assessment (Jul 14, 2026), and released a gate-model roadmap Jun 1. **Rigetti's** FY2025 revenue *fell* 34% to $7.09M — the only revenue decline on the board — and it missed DARPA QBI Stage 2 (The Quantum Insider, May 2026), yet won up to $100M in the May 21 DOC awards and carries a $4.74B market cap. **QUBT** holds a $1.4B cash position against $3.7M of Q1 revenue.

The Huang arc: the sector's sentiment metronome

Jan 8, 2025: Jensen Huang says useful quantum computing is "15–30 years away" and craters the sector (Investopedia, Jan 8, 2025). Mar 2025: "I was wrong," at GTC Quantum Day (Motley Fool, Apr 11, 2025). Apr 14–21, 2026: the "Jensen bump," round 2 — Nvidia debuts AI-quantum models, Huang calls AI the "control plane" of quantum machines and says "early commercialization begins this year"; quantum stocks post a massive week (CNBC, Apr 14; Sherwood News, Apr 16, 2026). By ~May 2026: full reversal to quantum bull (NAI500 retrospective). The sector's loudest forecast lasted ten weeks; the scorecard grades the behavior, not the claim.

The tension this issue refuses to resolve

Sell-side consensus is "Strong Buy" across the board, with ~2x price targets on every covered name — IONQ $69.11 (+102%), QBTS $37.56 (+125%), RGTI $30.07 (+111%), QUBT $18.33 (+131%) (stockanalysis.com aggregates, Jul 20, 2026) — and Wedbush called 56% sector upside on Jun 26 (TradingView, Jun 26, 2026), after which the sector fell. Set against: a 50–70% drawdown, ~$1B of industry-wide annual revenue, and $2B of government equity-taking. Both facts are printed; neither is adjudicated. The forecast ledger will do the adjudicating.

SOURCES

[1] stockanalysis.com/stocks/ionq

[2] stockanalysis.com/stocks/qnt

[3] stockanalysis.com/stocks/qbts

[4] stockanalysis.com/stocks/rgti

[5] stockanalysis.com/stocks/qubt

[6] stockanalysis.com/stocks/arqq

SECTION 07 · POLICY

Uncle Sam Buys In

The US government stopped funding quantum computing and started owning it: $2B of CHIPS-authority equity stakes, two executive orders with a 2028 target, and a reauthorization bill one floor vote from law.

The $2B equity play

On May 21, 2026 the Commerce Department announced **letters of intent with 9 quantum companies for $2B under CHIPS Act authority — taking non-controlling federal equity stakes in exchange** (NIST[1] announcement; WSJ; NYT, May 21, 2026). IBM took the largest single award, $1B, per follow-up coverage (reported, not confirmed in the primary release); Infleqtion, Atom Computing, and Rigetti each received up to $100M, and local coverage notes three Colorado-based companies got ~$100M each (Manufacturing Dive, May 22–26, 2026). The full nine-company list is not enumerated here — the research sweep could not confirm it, and this ledger does not fill gaps. Quantum stocks soared on the announcement (CNBC, May 21, 2026). Related: SandboxAQ took a separate $500M CHIPS R&D award for AI-driven materials discovery (Reuters/NIST, Jun 17, 2026) — described by the Cato Institute as part of an "ad hoc equity portfolio" (Jun 23, 2026).

Executive orders and the bill that isn't law yet

Two quantum executive orders landed ~Jun 22–25, 2026 (Inside Privacy, Jun 25; Sidley, Jul 1, 2026): a policy target of a **"commercially relevant quantum computer by 2028"** (Yahoo Finance, Jun 22, 2026), Pentagon quantum-sensor acceleration, a DOE "Quantum Genesis" initiative, and a federal PQC migration deadline (Section 09 — with a date conflict). The **NQI Reauthorization Act of 2026**: introduced Jan 8–9 by Sens. Young & Cantwell, passed Senate Commerce unanimously with 7 amendments in April, House version (H.R. 8462) through committee May 1–2 (Quantum Computing Report / The Quantum Insider). **Status as of Jul 20, 2026: through committee in both chambers, not yet law.** SOQC-2607-07 handicaps the floor votes.

DARPA's filter

DARPA's Quantum Benchmarking Initiative is the closest thing the sector has to an independent referee: ~15 companies at Stage A (Apr 2025), **11 advanced to Stage B** (Nov 2025) — including IonQ, IBM, Quantinuum, Atom Computing, Xanadu, and Nord Quantique, at up to $15M each — while **Rigetti missed Stage 2** (May 2026); Quandela was added to Stage A in June. Microsoft and PsiQuantum sit in the "final phase" via the predecessor US2QC track (per The Quantum Insider / Quantum Computing Report coverage). A government benchmarking program cutting a $4.7B-cap company from its pipeline is a datapoint the market largely shrugged at.

The rest of the world

JURISDICTION	COMMITMENT	NOTES
UK	£2B	National Quantum Strategy scaling-and-procurement push, incl. ~£1B specifically for quantum computing research/trials (Bloomberg / Quantum Computing Report, Mar 2026)
FRANCE	€1.5B	For quantum computing + advanced chips (SCMP, May 2026); GENCI procuring an on-prem Alice & Bob system (Jun 2026)
EU	—	Quantum Act legislative proposal expected in 2026 under the Jul 2025 Quantum Europe Strategy — status unverified as of this issue; carried as expected, not enacted
JAPAN	—	HPC-plus-quantum leadership initiative (National Bureau of Asian Research, Mar 2026); first enterprise on-prem purchase in Japan: IQM 20-qubit Radiance to TOYO Corp (Apr 27, 2026)

JURISDICTION	COMMITMENT	NOTES
CHINA	No official figure	Widely-cited ~$15B state-investment estimates are third-party guesses and are not printed here; The Quantum Insider (Apr 2026) notes “larger funding rounds return” amid US–China rivalry

SOURCES

[1] www.nist.gov

SECTION 08 · TRACTION

Commercial Traction vs Hype

What is actually being bought, at what price, by whom — and the one thing this issue's entire research sweep could not find.

Real purchase orders (the price anchors)

BUYER	SYSTEM	PRICE	REPORTED
Two buyers (Rigetti)	Two systems	~$5.7M total (~$2–3M/system)	The Quantum Insider, Sep 30, 2025 — the sector's most useful public price anchor
C-DAC (India)	Rigetti 108-qubit system	Undisclosed	The Quantum Insider, Jan 20, 2026
TOYO Corp (Japan)	IQM 20-qubit Radiance	Undisclosed	Apr 27, 2026 — first enterprise on-prem purchase in Japan
GENCI (France)	Alice & Bob on-prem system	Undisclosed	Data Center Dynamics, Jun 18, 2026
Undisclosed (Atom Computing + Microsoft)	On-prem system, "50 logical qubits" (definition unspecified)	Undisclosed	HPCwire, Jan 20, 2025

IBM has crossed **$1B in *cumulative* quantum bookings/revenue** — cumulative over the program's life, not annual (CNBC via The Quantum Insider, Feb 5, 2025; AI CERTs, Dec 22, 2025). D-Wave's −81% quarter is the lumpiness exhibit: one system sale can be ~5x a normal quarter's revenue, so single orders whipsaw every small denominator in the sector.

The industry-level claim, hedged

McKinsey's Quantum Technology Monitor 2026 (Apr 28, 2026) says the industry **crossed $1B in total annual revenue in 2025**, counts **$12.6B invested in 2025** and 300+ companies adopting quantum, and titles the year "a commercial tipping point." All three figures reach this issue via secondary summaries — McKinsey's site timed out during research — and are carried hedged. Even taken at face value, much of that $1B is government contracts and system sales, not recurring commercial workloads.

The most telling absence in the issue

Across the entire research sweep — AWS Braket, Azure Quantum, and IBM cloud coverage included — **no named 2026 production cloud case study with revenue attached was found on any of the three major platforms**. Partnerships exist (Pasqal–MegazoneCloud in South Korea, Jul 7, 2026; Crédit Agricole–Pasqal in banking, Jul 1, 2026); disclosed production revenue does not. This is absence of evidence, printed as exactly that — and it is the first thing Vol. 2 will re-check.

SECTION 09 · POST-QUANTUM CRYPTOGRAPHY

PQC: The Real Near-Term Economy

While quantum compute revenue waits on advantage claims, post-quantum cryptography spend is mandated by standards bodies, executive order, and procurement deadlines. Harvest-now-decrypt-later is the stated driver.

The migration ladder

DATE	AUTHORITY	MILESTONE
Aug 2024	NIST	FIPS 203/204/205 (ML-KEM, ML-DSA, SLH-DSA) finalized Aug 13, 2024 (NIST[1])
Mar 2025	NIST	HQC selected as fifth algorithm; draft standard expected 2026, final ~2027
2027	NIST	Migration pilot — “quantum migration enters execution phase” (Tech Times, Jul 8, 2026)
2027	NSA CNSA 2.0	Browsers/cloud services on the quantum-safe ladder (software/firmware signing was 2025; all national-security systems by 2033)
2028	UK NCSC	Discovery complete; high-priority migration by 2031, full by 2035 (Mar 2025 guidance)
2029	Google · Cloudflare	Both committed to full PQC migration by 2029 (Dark Reading, Mar 27, 2026; Tech Times, Jun 25, 2026)

DATE	AUTHORITY	MILESTONE
2030/2031	US federal (Jun 2026 EO)	**Federal PQC migration deadline — reported as 2030** (The Hacker News, Cybersecurity Dive, Jun 23, 2026) **and as 2031** (The Block, same day). Same EO, same day — likely two distinct milestones within the order; carried as a conflict, not resolved. Either way it accelerates the prior OMB 2035 horizon
2030–2035	EU	Member-state roadmap (Jun 2025): begin migration by end-2026, high-risk systems by 2030, full by 2035

Who gets paid

Arqit reported H1 2026 revenue up **~10x YoY — off a $530K FY2025 base** (company release via stockanalysis, May 21, 2026; the base is printed next to the multiple, always), with telecom/defense/financial contracts. **IonQ** entered the space with its Clavis XG Multiplex quantum-security product (~late June 2026, per stockanalysis news feed). The threat-timeline pressure is real enough to have its own headline genre: “Q-Day Just Got Closer: Three Papers in Three Months Are Rewriting the Quantum Threat Timeline” (The Quantum Insider, Mar 31, 2026).

The kicker this section exists for: PQC migration spend is real, current, and mandated — by standards finalized in 2024, an executive order signed in June 2026, and corporate deadlines already committed. Quantum *compute* revenue is, industry-wide, ~$1B a year and mostly lumpy system sales. In 2026, the quantum threat pays better than the quantum computer.

SOURCES

[1] www.nist.gov

SECTION 10 · MILESTONES

Sector Timeline

Vol. 1 begins the running milestone ledger: regime changes, firsts, and records — not a news roundup. Future volumes append; nothing is rewritten.

JAN 2025

Huang: useful QC “15–30 years away” HIGH

CES remark craters quantum stocks sector-wide (Investopedia, Jan 8, 2025).

FEB 2025

Google: commercial quantum apps “within five years” MEDIUM

The ~2030 anchor for Google’s public timeline (per Reuters, Feb 5, 2025).

MAR 2025

Huang walks it back at GTC Quantum Day MEDIUM

“I was wrong” — first leg of the sentiment metronome (Motley Fool, Apr 11, 2025).

SEP 2025

PsiQuantum raises ~$1B with Nvidia participation MEDIUM

Claims useful QC “ready in two years”; raise/valuation reports conflict ($1B at $7B vs $1.5B at $10.5B) (Reuters/WSJ, Sep 10, 2025).

OCT 2025

Google Quantum Echoes: “verifiable quantum advantage” HIGH

~13,000x OTOC claim, Nature paper same day — and same-day skepticism (blog.google / Nature news, Oct 22, 2025).

NOV 2025

Quantinuum Helios ships HIGH

98 qubits, 99.921% 2Q fidelity, 48 fully error-corrected logical qubits — all vendor-announced (Quantinuum, Nov 5, 2025).

NOV 2025

IBM Nighthawk + Loon; the 2026 advantage clock starts HIGH

120q/5,000 gates delivered; real-time qLDPC decode <480 ns; “advantage by end of 2026” (IBM Newsroom, Nov 12, 2025).

FEB 2026

IonQ short-seller report + legal probe MEDIUM

Sector-wide valuation reassessment begins (24/7 Wall St, Feb 15, 2026).

FEB 2026

PsiQuantum CEO transition; Brisbane ~12 months behind MEDIUM

The field’s one clearly documented roadmap slip (The Australian, Feb 11, 2026; Startup Daily, Dec 9, 2025).

MAR 2026

Xanadu becomes first pure-play photonic QC company to go public MEDIUM

Tower/EV Group/Thorlabs manufacturing deals follow (The Quantum Insider, Mar 27, 2026).

APR 2026

The “Jensen bump,” round 2 MEDIUM

Nvidia debuts AI-quantum models; “early commercialization begins this year”; massive sector week (CNBC, Apr 14 / Sherwood News, Apr 16, 2026).

APR 2026

QuEra/Harvard/MIT ~2:1 qLDPC preprint MEDIUM

Simulation-only; press “achieved” headlines overstate it (arXiv 2604.16209[1], Apr 21, 2026).

MAY 2026

DOC takes $2B of equity stakes in 9 quantum firms HIGH

IBM $1B largest (reported); quantum stocks soar; Rigetti misses DARPA QBI Stage 2 the same month (NIST/WSJ/NYT, May 21, 2026).

JUN 2026

Microsoft Majorana 2: timeline pulled to 2029 HIGH

1,000x reliability claimed — while Nature news/Science report the science still contested (Microsoft Source, Jun 2 / Nature news, Jun 3, 2026).

JUN 2026

Quantinuum IPO: $1.68B, largest ever HIGH

20x oversubscribed; breaks offer price within two days; Helios peer-reviewed in Nature Jun 17 (Reuters/Barron’s, Jun 4–5, 2026).

JUN 2026

Trump quantum executive orders HIGH

“Commercially relevant QC by 2028”; federal PQC deadline (2030 or 2031 — conflicting reports) (Yahoo Finance, Jun 22 / Inside Privacy, Jun 25, 2026).

JUL 2026

Risk-off hits the sector; Google’s error-correcting AI lands in Nature HIGH

IonQ −26% June, −36% into Aug 5 earnings; RL-controlled QEC is the freshest peer-reviewed result (24/7 Wall St, Jul 13 / Nature, Jul 8, 2026).

SOURCES

[1] arxiv.org/abs/2604.16209

SECTION 11 · THE CALIBRATION INSTRUMENT

Forecasts & Scorecard

The purpose of this series: a time capsule that shows how the sector changes and whether forecasts — ours and others' — were right. Our own Vol. 1 forecasts get graded starting Vol. 2. The Q2 earnings wave (IonQ Aug 5, Rigetti Aug 11) and Quantinuum's first public print all land before Vol. 2 — the ledger will not have to wait long.

Our Forecasts — Vol. 1

Eight falsifiable predictions, each gradeable from public data on its resolve date. We are opening this ledger in the gap between announced and delivered — several forecasts instrument that gap directly.

ID	CLAIM	P	RESOLVES	BASIS
SOQC-2607-01	IBM publicly announces a quantum-advantage demonstration by 2026-12-31, meeting its own Nov 2025 deadline	55%	2027-01-15	CEO reiterated Apr 30, 2026, and vendors rarely let self-imposed deadlines lapse silently — but nothing published by mid-July qualifies, per IBM's own collaborators (IBM Newsroom[1]; QCR, Jun 2026)
SOQC-2607-02	At least one independent (non-Google-affiliated) classical-simulation challenge to Quantum Echoes is published (paper or preprint) by 2027-01-31	60%	2027-01-31	Every prior advantage claim (2019 RCS, D-Wave 2025) drew challengers; only a Google-affiliated defense[2] exists so far

ID	CLAIM	P	RESOLVES	BASIS
SOQC-2607-03	IonQ Q2 2026 revenue (reports Aug 5) ≥$65M, consistent with the raised $270M FY guide	60%	2026-08-10	Q1 was $64.7M[3]; guide raised in May; Tempo/KISTI deliveries in train; risk is system-sale lumpiness
SOQC-2607-04	Quantinuum's first earnings report as a public company shows quarterly revenue below $10M	65%	2026-12-31	TTM revenue $17.08M as of Jul 20[4]; no disclosed large bookings; first print lands before Vol. 3
SOQC-2607-05	Atom Computing's promised toric-code paper appears (preprint or journal) with disclosed qubit counts and error rates by 2026-12-31	65%	2027-01-15	Paper promised "later this year" on Jun 3, 2026; a reported $300M raise creates publication pressure; the numbers get graded when they land
SOQC-2607-06	Pasqal completes a US public listing (Nasdaq, SPAC or otherwise) by 2027-03-31	50%	2027-03-31	Bleichroeder SPAC announced May 26; €340M closed pre-listing; Nasdaq pursuit reported Jun 30 — but SPAC pipelines slip
SOQC-2607-07	The NQI Reauthorization Act is signed into law by 2026-12-31	50%	2027-01-15	Unanimous Senate committee passage + House committee passage + two supportive EOs, against scarce floor time in an election year

ID	CLAIM	P	RESOLVES	BASIS
SOQC-2607-08	Neither PsiQuantum site (Brisbane or Chicago) has an announced operational utility-scale machine by 2027-06-30	80%	2027-07-15	Brisbane already ~12 months behind its end-2027 target, consultation unstarted, no public funds drawn as of Dec 2025, plus a mid-project CEO transition — this instruments both the Brisbane slip and the “useful in two years” fundraise claim

Forecast Watch — External

Named, dated external forecasts this ledger tracks to resolution. IBM’s end-2026 advantage claim is the sector’s nearest-dated falsifiable forecast.

FORECASTER	MADE	CLAIM	RESOLVES	STATUS
IBM (roadmap; CEO Krishna)	2025-11	Quantum advantage delivered by end of 2026 (reiterated Apr 30, 2026)	2026-12-31	OPEN
IBM (roadmap)	2025-06	Fault-tolerant Starling: 200 logical qubits, 100M gates, by 2029	2029-12-31	OPEN
Google Quantum AI leadership (per Reuters; named exec unconfirmed)	2025-02	Commercial/real-world quantum applications “within five years”	~2030	OPEN
Microsoft	2026-06	Scalable quantum computer by 2029 — announced simultaneously with contested underlying science	2029-12-31	OPEN

FORECASTER	MADE	CLAIM	RESOLVES	STATUS
Quantinuum	2024-09	Apollo fault-tolerant system / “quantum advantage” by 2029 (five-year roadmap)	2029-12-31	OPEN
QuEra + AWS	2026-06	Libra: 256 logical qubits, fault-tolerant, on Amazon Braket by 2028	2028-12-31	OPEN
PsiQuantum / Australian govts	2024-04	Brisbane utility-scale machine operational by end-2027	2027-12-31	TRENDING MISS
PsiQuantum	2025-09	Useful quantum computer “ready in two years” — fundraise-tied projection	2027-09-30	OPEN
Trump EO	2026-06	“Commercially relevant quantum computer by 2028” — policy target, publicly falsifiable	2028-12-31	OPEN
McKinsey QTM 2026	2026-04	~$4.4B industry revenue by 2028 — the first near-dated McKinsey checkpoint	2028-12-31	OPEN
McKinsey QTM 2026	2026-04	QC market $28–72B by 2035 (secondary summaries also report $43–71B — unreconciled)	2035-12-31	OPEN
Jefferies	2025-12	“$198B industry in the next 15 years” (~2040)	~2040	OPEN

FORECASTER	MADE	CLAIM	RESOLVES	STATUS
BCG	2024-07	$450–850B economic value created by 2040 — no 2025/26 update surfaced; the gap is noted	2040-12-31	OPEN
Wedbush	2026-06	56% sector upside within a year	2027-06-30	TRENDING MISS
AWS quantum exec vs Amazon CTO Vogels	2026-06 / 2025-11	“Small-scale commercially useful QC in 5–7 years” (exec, Jun 17, 2026) vs useful QC “decades away” (Vogels, Nov 30, 2025) — one company, two clocks; carried as a pair	2031–2033	OPEN

Scorecard — Already Resolved

External forecasts that resolved — or were withdrawn, superseded, or disputed — during or before the coverage window. The pattern worth naming: in quantum, forecasts don’t just miss, they get *retracted and replaced* by their own forecasters. Our own Vol. 1 forecasts get graded starting Vol. 2.

FORECASTER	CLAIM	VERDICT	EVIDENCE
IBM	“Nighthawk delivered by end of 2025” (Nov 12, 2025)	HIT	On the platform alongside Heron as of Jan 13, 2026 (The Quantum Insider).
IBM	Real-time qLDPC decoding milestone, per internal schedule	HIT (EARLY)	Claimed landed one year ahead of schedule (IBM Newsroom[1], Nov 12, 2025) — vendor-graded; the schedule and the grade are both IBM’s.
Quantinuum	Helios delivery per its Sep 2024 five-year roadmap	HIT	Shipped Nov 2025, on schedule against the 2024 roadmap.

FORECASTER	CLAIM	VERDICT	EVIDENCE
IonQ	FY2025 company revenue guidance	MISS (LOW, FAVORABLY)	Actual $130.0M beat guidance by 20% (Stock Titan, Feb 25, 2026) — even the seller undershot its own year.
Jensen Huang, Nvidia	Useful QC “15–30 years away” (Jan 2025)	WITHDRAWN	Walked back Mar 2025, full reversal to quantum bull by ~May 2026 (NAI500 retrospective). Grade the behavior, not the claim: the sector’s loudest forecast lasted ten weeks.
Microsoft	“Practical quantum computers by ~2035” (Feb 19, 2025)	SUPERSEDED	Replaced by its own 2029 claim on Jun 2, 2026 — a 6-year acceleration in 16 months, with the underlying science still publicly contested. When a forecast moves that fast, the ledger tracks both.
PsiQuantum / Australian govts	Brisbane “operational by end-2027” (Apr 29, 2024)	MISS-TO-DATE	~12 months behind as of Dec 2025; consultation unstarted; no public funds drawn (Startup Daily, Dec 9, 2025, citing Senate Estimates).
D-Wave	Mar 2025 Science “supremacy” claim	DISPUTED	Challenged within days in 2025; renewed by Flatiron May 2026 (“a laptop” vs D-Wave’s “a million years on Frontier”). Carried as an open row, not graded.
McKinsey (QTM 2025)	“$28–72B QC market by 2035” (Jun 2025)	HELD, NOT RAISED	QTM 2026 repeats the same band while declaring a “commercial tipping point” — a flat forecast under a bullish title is itself a data point.

The bet embedded in this issue: error correction is real and the market is real, but they are not yet the same market. Forty-eight logical qubits sold commercially cannot yet carry ~$41B of market cap on ~$1B of industry revenue — either advantage arrives on IBM's clock and the announced becomes the delivered, or the gap closes from the other side. The ledger is open; the Aug 5–11 earnings wave grades the first tranche before Vol. 2.

SOURCES

[1] newsroom.ibm.com

[2] arxiv.org/abs/2604.15427

[3] stockanalysis.com/stocks/ionq

[4] stockanalysis.com/stocks/qnt

THE STATE OF QUANTUM COMPUTING

VOL. 2 — AUGUST 2026

IBM Newsroom · Quantinuum · Nature · arXiv · The Quantum Insider · Quantum Computing Report · stockanalysis.com · Reuters · WSJ · NIST · McKinsey Quantum Technology Monitor 2026