

# The Global Photonic Quantum Computing Market 2026-2036

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## Abstracts

The global photonic quantum computing market is emerging as one of the most consequential technology sectors of the decade, defined by a fundamental departure from the engineering constraints that limit competing quantum modalities. By encoding and processing quantum information in photons — individual particles of light — photonic quantum computers operate at temperatures orders of magnitude warmer than superconducting platforms, communicate natively over standard optical fibre, and manufacture their core components using the same CMOS silicon photonics foundry processes that underpin the classical telecommunications and data centre industries. These structural advantages explain why photonic quantum computing attracted \$2.1 billion in private capital in 2025 alone — overtaking superconducting as the single largest quantum hardware investment sub-category — representing 21% of all global quantum technology private investment.

The market sits at Technology Readiness Level 4–5 for hardware, with commercially deployable near-term systems already operational in rack-mounted formats at national computing facilities. ORCA Computing's PT-2 system was installed at the UK National Quantum Computing Centre within 36 hours of contract signing, demonstrating the operational simplicity that distinguishes photonic deployment from cryogenically demanding competing platforms. Quandela's Belenos photonic quantum computer — the most powerful photonic system at the time of its launch — is now accessible via cloud to over 1,200 researchers across 30 countries and has been delivered to EuroHPC infrastructure at CEA's computing centre in France. Xanadu's Borealis demonstrated a 216-mode Gaussian boson sampling computation beyond classical simulation capability and, following its 2026 NASDAQ listing, became the world's only publicly traded pure-play photonic quantum computing company.

Three distinct architectures define the current commercial landscape. Continuous-variable systems, led by Xanadu, encode quantum information in the quadrature amplitudes of squeezed optical fields, enabling quantum machine learning and simulation applications through the PennyLane software framework. Discrete-variable systems, pursued by PsiQuantum, Quandela, ORCA Computing, QuiX Quantum, and Quantum Source, operate on individual photons using linear optical circuits and measurement-induced computation, targeting fault-tolerant universal quantum computing. Hybrid spin-photon architectures, represented by Photonic Inc. with Microsoft backing, use photonic interconnects to link silicon spin qubits in a distributed fault-tolerant architecture aimed at room-temperature-ready quantum networking. Supporting all three are a global component supply chain encompassing single-photon sources (Sparrow Quantum, Quandela), superconducting nanowire single-photon detectors (Single Quantum, Nu Quantum, ID Quantique), photonic integrated circuit foundries (GlobalFoundries via PsiQuantum, Ligentec, LioniX International), and precision laser and frequency comb suppliers (Toptica Photonics, Menlo Systems, Vexlum).

The market's commercial trajectory is shaped by three concurrent dynamics. In the near term, quantum random number generation and quantum key distribution provide immediate revenue from commercially mature photonic products. In the medium term, cloud-based access to photonic QPUs is generating growing revenue from research institutions, government facilities, and enterprise pilot programmes in quantum machine learning, quantum chemistry, and financial optimisation. In the long term, the silicon photonics manufacturing thesis — that photonic quantum chips can be produced using existing CMOS foundry infrastructure at the volumes required for billion-component fault-tolerant systems — underpins the investment case for PsiQuantum's \$7 billion valuation and the sector's most ambitious commercial projections.

The Global Photonic Quantum Computing Market 2026–2036 is a comprehensive strategic intelligence report providing the most detailed and data-rich analysis of the photonic quantum computing sector currently available. Spanning 169 pages, 26 data tables, and 9 figures, the report equips technology investors, enterprise strategy teams, government procurement officers, and quantum industry participants with the quantitative forecasts, technology assessments, competitive intelligence, and company profiles required to navigate the market.

The report is structured across thirteen chapters, providing systematic coverage from technology fundamentals through market forecasts, investment landscape, and granular company-level intelligence:

Executive Summary — market definition and scope; pros and cons of photonic quantum computers; market dynamics and growth drivers; technology roadmap; competitive landscape; regional market distribution; challenges

Introduction — photonic quantum computing fundamentals; initialisation, manipulation, and readout; hardware architecture; types of photonic quantum computers; technology architecture and design paradigms including continuous variable, discrete variable, T-centre, and hybrid photonic-electronic systems; performance advantages and limitations; novel and emerging architectures

Component Technologies and Supply Chain — chips and chipsets; laser systems and light source technologies; frequency comb technologies; advanced photon detection systems; control and interface electronics; silicon photonics platforms; integrated quantum photonic circuits; manufacturing capabilities and constraints; software development platforms and SDKs; supply chain risk assessment

Application Markets — photonic computers and HPC; data centre scale systems; rack-mounted photonic computers; photonic quantum edge computing; quantum and AI; quantum chemistry and materials science; financial services and risk modelling; machine learning and AI integration; optimisation and logistics; defence, intelligence, and aerospace; energy and utilities; automotive and transportation; pharmaceutical and biotechnology; research and academic markets; emerging application areas

Deployment Models and Infrastructure — cloud-based quantum computing services; quantum cloud platforms and access models; service provider ecosystem; data centre-scale systems; rack-mounted solutions; edge computing applications; hybrid classical-quantum computing integration; HPC integration strategies

Regional Market Analysis — United States; Canada; United Kingdom; Germany; Netherlands, Denmark, and Switzerland; EU Quantum Initiative impact; China; Japan; South Korea and Australia; India

Market Forecasts and Growth Projections 2026–2036 — global market size and revenue projections; shipment volume forecasts by system type; market penetration timeline by application sector; regional growth rate analysis; accelerated, conservative, and technology disruption scenarios

Investment Landscape and Funding Analysis — venture capital and private investment trends; government funding and national initiatives; corporate R&D investment patterns; IPO and public market activity; strategic partnership and M&A activity

Challenges and Market Barriers — technical challenges and limitations; manufacturing and scalability issues; cost and economic viability concerns; skills gap and human capital requirements; regulatory and standardisation challenges

Company Profiles — 41 detailed commercial company profiles spanning system developers, component suppliers, software platforms, and service providers

Research Institutes and Academia — 26 leading research institutions and university groups worldwide driving photonic quantum computing advances

Appendices — research methodology; technology comparison matrix; regional policy and funding summary; glossary of terms and acronyms

References — 135 curated references including web links sourced from company profiles, academic publications, and market data

Companies profiled include Aegiq, Duality Quantum Photonics, Ephos, g2-Zero, Iceberg Quantum, ID Quantique, M-Labs, Menlo Systems, MITRE Corporation/CVE, Nanofiber Quantum Technologies, Nexus Photonics, Nicslab, NTT, ORCA Computing, Photonic, PsiQuantum and more...

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