LUXINNOVATION MARKET INTELLIGENCE

LUXINNOVATION
#MakingInnovationHappen

OVERVIEW OF QUANTUM TECHNOLOGIES MAJOR ECOSYSTEMS

2025 REPORT

NOVEMBER 2025

LUXINNOVATION
#MakingInnovationHappen

INTRODUCTION

GLOBAL QUANTUM RACE

Quantum technologies are at the forefront of the next technological revolution, promising transformative impacts across computing, communication, sensing, and cybersecurity. As nations and regions race to develop quantum capabilities, ecosystems are emerging worldwide, driven by strategic investments, cutting-edge research, and the creation of highly skilled talent pools. These ecosystems are not only shaping the future of science and industry but also redefining global competitiveness in the digital era.

Among these initiatives, the **European Quantum Flagship** stands out as one of the most ambitious and coordinated efforts globally. Launched in 2018 by the European Commission, the Flagship is a ten-year, €1 billion research and innovation program designed to consolidate Europe's scientific leadership and accelerate the industrial exploitation of quantum technologies. It supports projects across four core domains (quantum computing, simulation, communication, and sensing/metrology) while fostering education, international collaboration, and the development of a quantum-ready workforce.

This European momentum resonates strongly with national strategies across Member States. **Luxembourg**, for instance, unveiled its first **Quantum Strategy in May 2025** as part of its broader initiative, *Accelerating Digital Sovereignty 2030*. The strategy focuses on three pillars: developing quantum computing capabilities through the upcoming **MeluXina-Q** system, strengthening secure communication via terrestrial and satellite quantum networks under the EuroQCI framework, and fostering economic value through research, industrial innovation, and job creation. Luxembourg's approach emphasizes talent development, public-private partnerships, and international collaboration, aiming to transform the country into a reference hub for quantum technologies in Europe.

As this report explores the leading quantum ecosystems worldwide, it will analyse their structure through key indicators such as **investment levels, employment, research capacity, and collaborations**, providing a comparative perspective on how different regions are positioning themselves in this rapidly evolving domain.

SCOPE & METHOLODY

The analysis presented in this report is based exclusively on **open-source information**, including official government strategies, publicly available investment data, academic publications, industry reports, and recognised international studies.

A key reference for this report is the study "Mapping the Quantum Ecosystems: How Are Economies Positioning Themselves for Innovation Success" published by the **European Centre for International Political Economy (ECIPE)**. This study offers a unique perspective by focusing on **collaboration networks** rather than solely on financial or technological indicators. Its methodology is grounded in the ECIPE Quantum Database, which aggregates data on more than 18,400 bilateral quantum partnerships involving over 4,100 institutions across 110 countries between 2018 and 2024. These partnerships span universities, research institutes, government agencies, startups, and large firms. The ECIPE approach benchmarks quantum competitiveness through two main dimensions: Industry Involvement Relative to GDP and International Connectivity.

Based on these dimensions, ECIPE identifies **four archetypes** within the global quantum ecosystem:

- **Global Innovation Hubs**: highly connected and commercially mature ecosystems
- **Research Networkers**: strong scientific integration but limited commercial maturity
- **Regional Commercial Leaders**: high level of commercial involvement relative to their economic size
- **Emerging Ecosystems**: early-stage development with growing ambitions

This methodological framework provides a robust lens for comparing national and regional quantum strategies, complementing other indicators such as public investment, workforce development, and research output. By combining these perspectives, the report aims to deliver a comprehensive and nuanced panorama of global quantum ecosystems.

LUXINNOVATION
#MakingInnovationHappen

1

KEY TAKEAWAYS & GLOBAL OVERVIEW

LUXINNOVATION
#MakingInnovationHappen

QUANTUM TECHNOLOGIES ECOSYTEMS

KEY TAKEAWAYS

Quantum technologies are inherently collaborative, requiring diverse expertise and significant resources. The ECIPE study identifies four archetypes of quantum ecosystems: **Global Innovation Hubs**, **Research Networkers**, **Regional Commercial Leaders**, and **Emerging Ecosystems** (*see methodolody*). North America, Asia, and Europe fall primarily into the first two categories, but each region exhibits distinct characteristics in terms of collaboration, commercialisation, and strategic focus.

North America: Global Innovation Hub

North America, led by the United States and Canada, is classified as a **Global Innovation Hub**. This ecosystem is highly connected internationally and commercially mature, characterized by strong industry involvement and dense partnerships. The U.S. is the most central player in the global quantum collaboration network, acting as both a hub and a broker, linking otherwise disconnected countries. Public investment is substantial ($7.67B in the U.S.), but what truly differentiates North America is its **industry-driven approach**: tech giants (IBM, Google, Microsoft, Amazon) dominate quantum computing, complemented by a vibrant startup scene and aggressive venture capital funding. Their key strength is the rapid translation of research into market-ready solutions through strong academia-industry synergy.

Asia: Government-centric and research-heavy

Asia, dominated by China and Japan, fits the **Research Networker** archetype. The region is deeply embedded in global scientific networks but less commercially mature than North America. China leads in **quantum communication research** (39% of global publications) and allocates the largest public funding globally ($15.3B), reflecting its state-centric model. Regulations in China is much less present than in other countries. Japan complements this with initiatives like **Q-LEAP (2018)** and the **Vision of Quantum Future Society (2022)**, focusing on quantum computing and sensing. Private-sector dynamism is limited: startups are few (11 in China, 9 in Japan), and investment flows are volatile, dominated by government programs rather than VC.

Europe: Collaborative and balanced

Europe positions itself as a **Global Innovation Hub**, though with a more **collaborative and risk-mitigated approach** compared to North America. The EU leads in collaboration volume globally, underpinned by initiatives like the **Quantum Flagship** and Horizon Europe. Countries such as the UK, Germany, and France combine strong academic research with structured industrial participation. Europe hosts **542 companies and 293 startups**, supported by stable public funding ($5.49B UK, $3.45B Germany, $2.07B France). Europe can enjoy cross-border collaboration and ecosystem stability, fostering gradual but sustainable commercialisation.

LUXINNOVATION
#MakingInnovationHappen

3 MAJOR HUBS OF QUANTUM TECHNOLOGIES

USA & Canada
- 9.57B public investments
- +600 companies
- ≃140 startups

UK, Germany, Netherlands & France
- 12.12B public investments
- ≃ 330 companies
- ≃ 175 startups

China & Japan
- 23.21B public investments
- ≃ 115 companies
- 20 startups

USD 56.7B

2025 worldwide quantum investments (estimate – source: QURECA)

LUXINNOVATION
#MakingInnovationHappen

BREAKDOWN BY MAJOR COUNTRIES BY HUBS

	US	CA	CN	JP	UK	DE	NL	FR
Public investments (2025) (QURECA)	$7,67B	$1,9B	$15,3B	$7,91B	$5,49B	$3,45B	$1,11B	$2,07B
Academic & research institutions (% of worldwide published research) (MIT)	22% (quantum computing) 12% (quantum communication)	3% (quantum computing) 3% (quantum communication)	23% (quantum computing) 39% (quantum communication)	4% (quantum computing) 3% (quantum communication)	4% (quantum computing) 5% (quantum communication)	5% (quantum computing) 5% (quantum communication)	2% (quantum computing) 1% (quantum communication)	2% (quantum computing) 1% (quantum communication)
Patents mentioning « quantum » (2020 - 2025) (Google Patents)	91,369	2,590	316,380	31,523	No data	4,979	217	1,185
Private sector – corporations (Pitchbook)	515	97	78	36	154	106	37	42
Private sector – Startups (Dealroom)	94	45	11	9	70	48	26	33
Investors (2020 - 2025) (Picthbook)	$8,7B	$1,6B	$2,5B	$282M	$4,2B	$249M	$196M	$629M

LUXINNOVATION
#MakingInnovationHappen

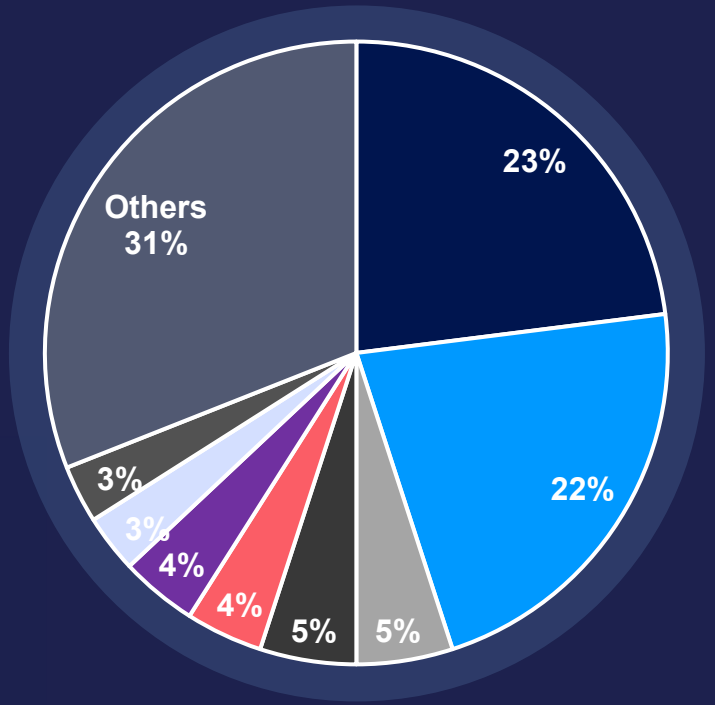
ACADEMIC RESEARCH

SHARE OF PUBLISHED RESEARCH BY QUANTUM SUBCATEORGY (2019 – 2023)

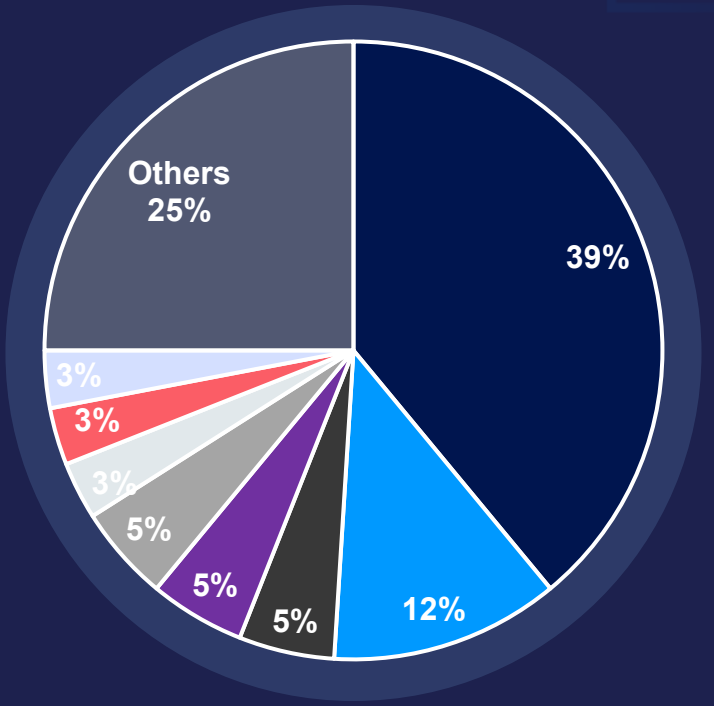
China and the US represent nearly half of worldwide academic publication on quantum computing. The European Union accounts for 22%.

Regarding quantum communication, China leads with over a third of all academic research. The US accounts for 12% and the European Union as a whole for 21%.

Quantum computing



Quantum communication



China
Japan
Canada
Italy
Russia
United States
India
Germany
United Kingdom

Source: MIT Initiative on the Digital Economy, « Quantum Index Report 2025 », 2025

LUXINNOVATION
#MakingInnovationHappen

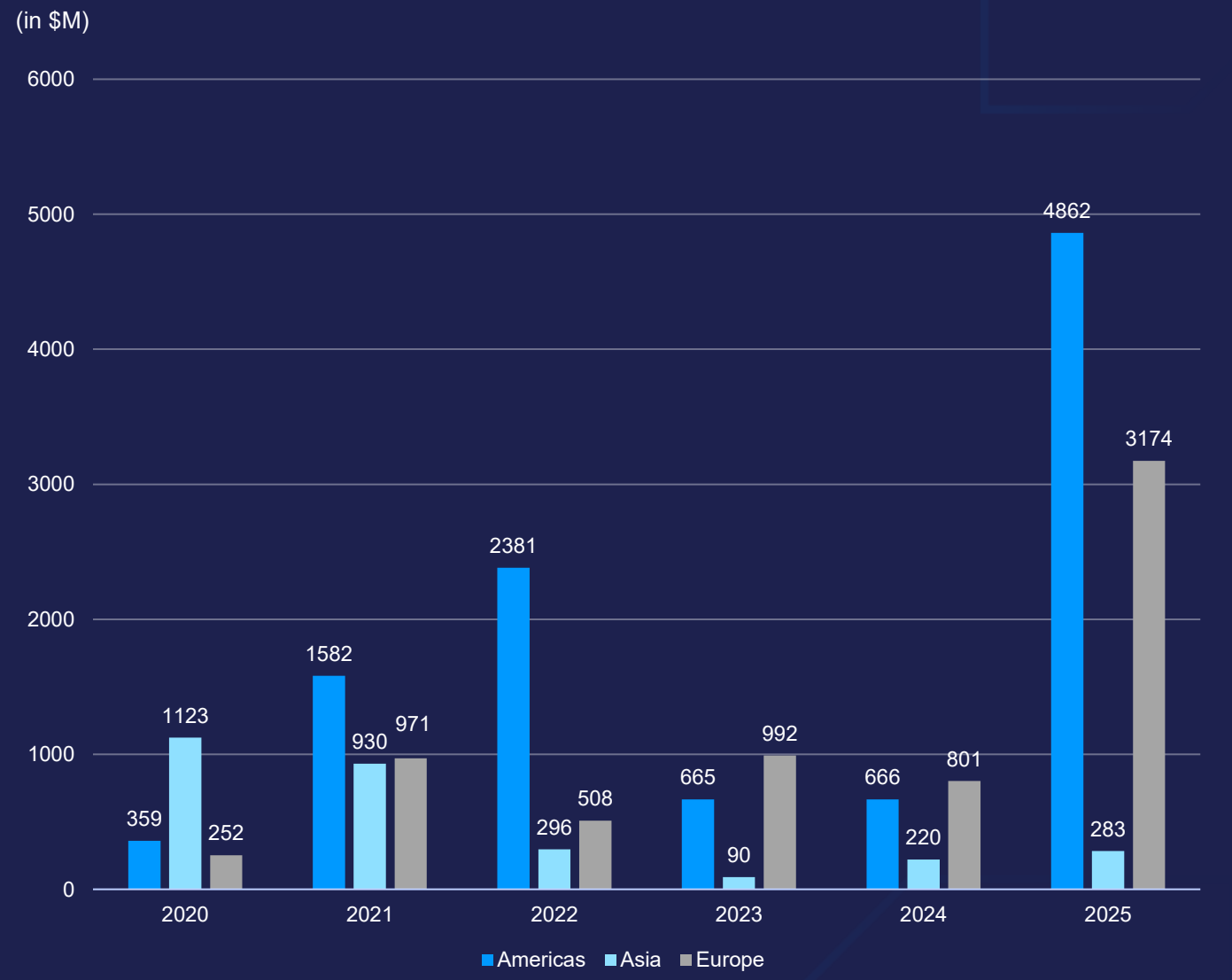
INVESTORS' DEALS

DEAL SIZE BY FUNDED COMPANIES LOCATION (2020 – 2025)

The **Americas have** experienced a major surge in 2021–2022, partly thanks to a handful of major deals, before dropping in the following years. **Asia**, which led in 2020, shows a **consistent decline** throughout the period, reaching its lowest point in 2023 with only a small rebound in 2024. In contrast, **Europe** demonstrates the **most stable and generally upward trend**.

There isn't a single cause to these regional shifts. Quantum startups saw a big spike in 2021–22 (large late-stage rounds) and then a sharp drop in venture activity in 2023 as global VC tightened and investors de-risked. Several sector reports call this a correction (sometimes labelled a short "quantum winter"). In China, investments mainly come from public support, and private VC investments are more unstable.

2025 marks a turning point: after the fluctuations of previous years, the market regained momentum with **major strategic deals across all hubs**, signalling renewed confidence in quantum technologies. In **Europe**, companies such as **Alice & Bob, IQM, Multiverse Computing, Oxford Ionics,** and **Quantinuum** secured significant funding. In the **Americas**, heavyweights like **Infleqtion, PsiQuantum, QuEra,** and **Xanadu** attracted very large investments, confirming North America's commercialisation-driven model. Meanwhile, **Asia** saw notable activity from **Quantum Solutions**, indicating a gradual shift from purely research-driven initiatives toward market-oriented ventures.



Source: Pitchbook

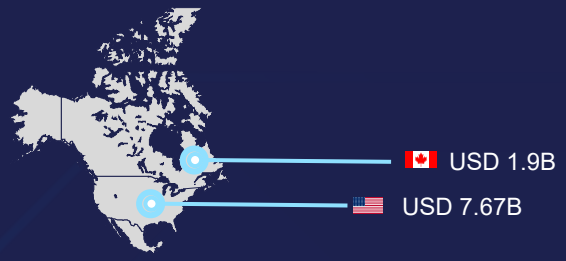
LUXINNOVATION
#MakingInnovationHappen

2

DEEP DIVE INTO EACH MAJOR HUB

MAJOR HUB – DEEP DIVE INTO NORTH AMERICA

KEY FACTS & FIGURES



Investments per country (2025) – source: QURECA

Academic & Research Institutions

North America, led by the United States and Canada, hosts some of the most influential academic and research institutions in quantum technologies. The region accounts for **22% of global publications in quantum computing** and **12% in quantum communication**, positioning it as a major contributor to scientific progress. Key players include universities such as MIT, Harvard, Stanford, and the University of Waterloo, alongside national laboratories like Los Alamos and Oak Ridge. These institutions drive fundamental research and collaborate extensively with industry and government programs.

Government & Public Funding Bodies

Public investment in quantum technologies is substantial, with the **United States allocating $7.67 billion** and Canada **$1.9 billion** in 2025. The U.S. government spearheads funding through agencies such as the Department of Energy (DOE), National Science Foundation (NSF), and DARPA, while Canada supports initiatives via the National Research Council and provincial programs. These bodies aim to accelerate innovation, secure technological leadership, and foster public-private partnerships.

Private Sector – Large Corporations

North America is home to a robust corporate ecosystem in quantum technologies, with **over 600 large corporations** actively involved. Tech giants like IBM, Google, Microsoft, and Amazon dominate the quantum computing landscape, investing heavily in hardware and cloud-based quantum services. Other sectors, including aerospace and defence, also engage through companies such as Lockheed Martin and Honeywell, focusing on quantum sensing and secure communications.

Private Sector – Startups & SMEs

The startup scene is vibrant, with **94 quantum-focused startups** in the U.S. and **45 in Canada**. These companies specialise in areas such as quantum software, cryptography, and enabling technologies like photonics. Notable examples include Rigetti Computing, IonQ, and Xanadu, which have attracted significant attention for their innovative approaches to quantum hardware and algorithms.

Investors

Investment activity in North America surged between 2021 and 2022, reaching record levels thanks to large late-stage rounds, before stabilising in 2023 and 2024. 2025 marks another record as investments boomed thanks to large rounds. Venture capital firms and corporate investors play a critical role, with major deals supporting startups. The region's investment dynamics are characterized by high volatility compared to Europe, reflecting aggressive growth strategies and strong competition for technological leadership.

Main National Initiatives

North America's quantum strategy is anchored by landmark policies. In the U.S., the National Quantum Initiative Act **(2018)** established a framework for research coordination and funding, complemented by the proposed **National Quantum Initiative Reauthorization Act** to expand efforts. Canada launched its National Quantum Strategy in 2022, focusing on talent development, commercialisation, and international collaboration.

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – DEEP DIVE INTO NORTH AMERICA

LARGE COMPANIES LEADING INNOVATION

Google Quantum AI: Google's quantum computing arm is developing large-scale superconducting qubit processors (e.g., the "Willow" chip) and has demonstrated a verifiable quantum-advantage experiment, aiming toward fault-tolerant quantum computing. Recently, Google has claimed its quantum computers are performing heavily above the capabilities of conventional computers (source: The Guardian).

Microsoft Quantum: Microsoft offers the Azure Quantum service — integrating hardware, software and cloud infrastructure — to enable quantum-ready workflows and is pursuing a scalable quantum architecture via its "Majorana 1", a chip based on a new topological core architecture, which accelerates "the advent of commercial quantum computers" (source: Plain Concepts).

IBM Quantum: IBM is running one of the broadest quantum programmes, building superconducting-qubit systems, providing cloud access via IBM Quantum, and publicly publishing roadmaps toward fault-tolerant machines.

Amazon Braket: AWS runs the Braket quantum-computing service that gives customers access to multiple quantum hardware types and simulators via the cloud, helping to democratize quantum algorithm development. In February 2025, Amazon joined the quantum computing chip race, presenting Ocelot, its first quantum chip (source: The Guardian).

Intel Quantum SDK: Intel is among the major players developing full-stack quantum computing hardware (including qubit fabrication) and supporting the broader ecosystem for quantum devices.

Rigetti Computing: Rigetti is a U.S. firm building superconducting quantum integrated circuits alongside a cloud platform for programming and executing quantum algorithms.

Xanadu Quantum Technologies: Xanadu is a Toronto-based Canadian company specialising in quantum computing hardware and software. It builds photonic quantum computers that are accessible via the cloud.

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – DEEP DIVE INTO NORTH AMERICA

COMPANIES LEADING INNOVATION

IonQ: IonQ focuses on trapped-ion quantum hardware and quantum cloud services, positioning itself as a pure-play quantum computing company with a strong roadmap toward scalable fault-tolerant machines. IonQ has recently signed a partnership agreement with the University of Chicago to advance research in quantum science and engineering (source: The University of Chicago).

D-Wave Systems: D-Wave specializes in quantum annealing and has provided quantum-annealer hardware commercially for optimisation and simulation workloads. D-Wave and IonQ are founding members of an alliance, called Q-Alliance, in Italy "aimed at creating one of the world's leading quantum hubs" (source: Quantum Insider).

Quantinuum: Quantinuum (formed from the merger of Honeywell Quantum and Cambridge Quantum) offers integrated quantum hardware (trapped-ion), software, and applications across quantum chemistry, materials and cryptography. In November 2025, Quantinuum has launched its new quantum computer, Helios, which is described as "the world's most accurate general-purpose commercial quantum computer". It would be accurate enough to enable generative quantum AI (source: Quantum Insider).

Quantum Computing INC.: Quantum Computing Inc. (QCi) develops integrated photonic-based quantum hardware and quantum optics products—focusing on room-temperature, thin-film lithium niobate (TFLN) photonic engines for computing, optimisation, secure communications and other commercial applications.

1QBit: 1QBit is a quantum-software company (hardware-agnostic) developing algorithms and applications (in finance, chemistry, life sciences) to run on quantum hardware, especially in the NISQ-era.

PsiQuantum: PsiQuantum is an American quantum computing company developing an error-tolerant photonic quantum computer. They have recently partnered with Lockheed Martin, active in aerospace, to advance defence and aerospace (source: Quantum Zeitgeist).

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – DEEP DIVE INTO ASIA

KEY FACTS & FIGURES

Investments per country (2025) – source: QURECA

Academic & Research Institutions

Asia is a powerhouse in quantum research, mainly led by China. China dominates **quantum communication research**, accounting for **39% of global publications, while Japan focuses more on quantum computing and sensing**. The region's academic strength is anchored in government-backed research networks and top universities such as Tsinghua University, the Chinese Academy of Sciences, and the University of Tokyo. These institutions collaborate closely with national labs and industry to advance both theoretical and applied quantum science.

Government & Public Funding Bodies

Public investment in Asia is significant, with **China allocating $15.3 billion**, **Japan $7.91 billion**, and other countries like Singapore and Australia contributing hundreds of millions. China's ecosystem is heavily government-driven, with strong central planning and funding through programs under the Ministry of Science and Technology. Japan supports quantum development through agencies like NICT and JST, emphasising long-term research and industrial applications.

Private Sector – Large Corporations

Asia hosts **241 corporations** active in quantum technologies, including **78 in China** and **36 in Japan**. Major players include Alibaba and Baidu in China, even though they closed their quantum computing research lab in 2024, and Japanese giants like Toshiba and NEC, focusing on quantum sensing and secure communication. These corporations often collaborate with government programs, reinforcing Asia's state-industry synergy.

Private Sector – Startups & SMEs

The startup ecosystem in Asia is emerging but smaller compared to North America, with **11 startups in China** and **9 in Japan**. These companies are primarily concentrated in quantum hardware and software development, cryptographic solutions, and photonic technologies.

Investors

Investment trends in Asia show volatility, with a peak in 2021 followed by a steady decline through 2024. Funding is largely dominated by state-backed programs and corporate ventures rather than independent VC firms.

Main National Initiatives

China's efforts are embedded in its broader technological leadership agenda, while Japan launched the Q-LEAP Initiative **(2018)** and the Vision of Quantum Future Society **(2022)** to accelerate research and commercialisation. These programs aim to position Asia as a global leader in quantum communication and sensing.

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – DEEP DIVE INTO ASIA

COMPANIES LEADING INNOVATION

Toshiba: Toshiba's Quantum division delivers cutting-edge quantum-safe networking solutions that use quantum key distribution (QKD) to secure data today and protect against tomorrow's quantum threats.

SpinQ: SpinQ is listed among leading quantum computer/manufacturer companies in 2025 and develops quantum hardware.

Horizon Quantum: Horizon Quantum is a start-up building full-stack quantum-software tools to simplify quantum programming and translation from classical algorithms into quantum circuits.

Origin Quantum: Origin Quantum is a Chinese quantum computing company founded by academics from the Chinese Academy of Sciences and the University of Science and Technology of China. It is a full-stack company that provides a quantum computing cloud platform, develops proprietary quantum computers, and works to industrialise quantum technology through chips, software, and other systems.

QuantumCTek: QuantumCTek is a Chinese technology company focused on commercialising quantum information technology, including quantum secure communication and quantum computing.

SpeQtral: SpeQtral is a Singaporean company that is merging space-based transmission with terrestrial fibre to create a quantum key distribution communication network.

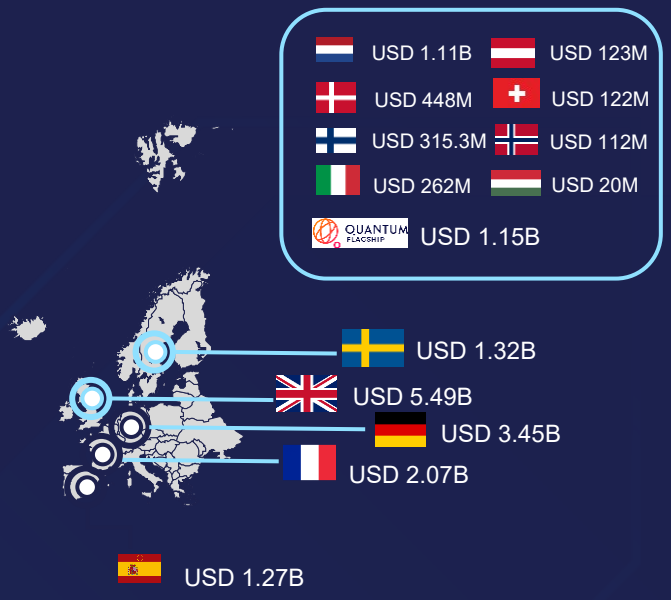
Quintessence Labs: Quintessence Labs is an Australian cybersecurity firm that aims to achieve quantum resilience with post-quantum cryptography.

To be noted: in February 2024, Alibaba and Baidu both shut down their quantum computing research lab (source: IEEE Spectrum).

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – DEEP DIVE INTO EUROPE

KEY FACTS & FIGURES



Investments per country (2025) – source: QURECA

Academic & Research Institutions

Europe is a major contributor to global quantum research, accounting for **21% of worldwide publications in quantum communication** and a significant share in quantum computing. Leading academic centers include the University of Oxford, ETH Zurich, Delft University of Technology, and CNRS in France. These institutions collaborate through pan-European programs and consortia, fostering cross-border research and innovation in quantum sensing, computing, and communication.

Government & Public Funding Bodies

Public investment in Europe is strong, with **$5.49 billion in the UK**, **$3.45 billion in Germany**, and **$2.07 billion in France** by 2025. Additional funding comes from countries like the Netherlands ($1.11B) and Spain ($1.27B). National agencies such as Innovate UK, Germany's BMBF, and France's ANR lead funding efforts, complemented by EU-level programs under Horizon Europe and Quantum Flagship initiatives.

Private Sector – Large Corporations

Europe hosts **542 quantum-related companies**, including **154 in the UK**, **106 in Germany**, and **42 in France**. Large corporations such as Airbus, Thales, Bosch, and Siemens are actively engaged, focusing on quantum sensing, secure communications, and industrial applications.

Private Sector – Startups & SMEs

The European startup ecosystem is dynamic, with **293 startups** spread across the region: **70 in the UK**, **48 in Germany**, **33 in France**, and notable clusters in the Netherlands and Spain. Startups like Pasqal (France), Quantinuum (UK), and Qblox (Netherlands) are pioneering quantum hardware, software, and enabling technologies, supported by strong incubator networks and EU innovation programs.

Investors

Europe demonstrates a relatively **stable investment trend** compared to other regions, with steady growth from 2020 to 2023 before a slight decline in 2024. Investment rounds are generally moderate in size, reflecting a cautious but sustained approach to funding quantum ventures. Corporate venture arms and specialized VC funds such as Quantonation play a key role in supporting early-stage companies.

Main National Initiatives

Europe's quantum strategy is driven by national and EU-level programs. Key initiatives include the National quantum strategy **(2023)**, Germany's Quantum Technologies Conceptual Framework **(2023)**, and France's PROQCIMA program **(2024)**. These complement the broader **EU Quantum Flagship**, which coordinates research and industrial development across member states, aiming to position Europe as a global leader in quantum sensing and computing.

MAJOR HUB – DEEP DIVE INTO EUROPE

LARGE COMPANIES LEADING INNOVATION

Airbus: Airbus leverages quantum tech to drive competitive differentiation in aircraft design, operations and services.

Thales Group: Thales is steering quantum technologies toward operationalised solutions in secure systems and high-precision sensing.

Bosch: Bosch is commercialising quantum sensing hardware to enter multiple verticals with high precision measurement capabilities.

Siemens: Siemens positions quantum as a strategic lever for industrial system optimisation, digital twins and next-generation design/manufacturing services.

MAJOR HUB – DEEP DIVE INTO EUROPE

COMPANIES LEADING INNOVATION

Alice & Bob: Alice & Bob is a French-based quantum-computing company developing architectures aimed at error-corrected quantum computing and fault-tolerance.

Alpine Quantum Technologies: AQT is a European quantum-hardware company working on trapped-ion quantum computers and advanced control systems.

Delft Circuits: Delft Circuits is a Dutch hardware-focused quantum company. The company has teamed up with Bluefors, the world-leading manufacturer of dilution refrigerators, to accelerate Delft Circuits' quantum race (source: Quantum Zeitgeist).

EleQtron: EleQtron is a German startup that is working on a new approach to quantum computing. Unstead of laser-based control, the firm uses microwave radiation to perform quantum operations with reduced energy use (source: IoT Insider).

IQM: IQM is a Finnish-based quantum hardware and software company developing superconducting-qubit quantum computers with an emphasis on European on-premises full-stack quantum systems.

KETS Quantum Security: KETS Quantum Security is a quantum-cybersecurity company (UK-based) working on quantum-safe cryptography and photonic quantum key distribution hardware to protect against quantum-era threats.

Kiutra: Kiutra is a quantum-hardware/quantum-materials start-up developing dilution-refrigeration and other cryogenic solutions that support quantum computing systems.

PASQAL: PASQAL (France) builds neutral-atom quantum computing systems and recently integrated its hardware on Microsoft Azure Quantum, delivering neutral-atom quantum machines in the cloud.

River Lane: River Lane is a UK quantum-software company providing optimisation and verification tools for quantum algorithms and quantum control, aiming to enable fault-tolerant quantum systems.

LUXINNOVATION
#MakingInnovationHappen

3

REAL-WORLD EXAMPLES

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – NORTH AMERICA

QUANTUM COMPUTING

Company & context

D-Wave Quantum is a pioneer in commercial quantum computing, particularly known for its quantum annealing systems. In collaboration with the pharmaceutical arm of Japan Tobacco (JT), D-Wave executed a proof-of-concept that blends quantum computing with generative AI. The goal was to explore whether a hybrid quantum-classical workflow could improve the creation of novel drug-like molecules.

What they did

JT used large language models (LLMs) to generate chemical structures. But rather than relying purely on conventional computing, they integrated D-Wave's quantum processing unit (QPU) during the training phase. This "quantum-hybrid" setup allowed the system to explore chemical space more richly, using quantum annealing to help guide the model toward more meaningful, energetically favourable molecular configurations.

QUANTUM COMMUNICATION

Qunnect, an American-based quantum networking company, was awarded a contract by the U.S. Air Force to advance its metro-scale entanglement-based quantum network components for national defence applications, marking a milestone in moving quantum communications from lab to operational fibre networks.

QUANTUM SENSING

Infleqtion & L3Harris Technologies entered a strategic collaboration to develop a quantum RF-sensing receiver (under the name "SqyWire") based on highly-excited atomic states positioning quantum sensing for defence and intelligence use-cases.

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – ASIA

QUANTUM COMPUTING

Company & context

SpinQ Technology is a quantum hardware and education company, notable for its room-temperature nuclear magnetic resonance (NMR) quantum computers designed for learning, research, and light quantum workloads. Rather than focusing only on large-scale fault-tolerant systems, SpinQ also builds compact, accessible devices and works with partners to show how quantum can deliver near-term value.

What they did

Leveraging SpinQ's Gemini Portable NMR Quantum Computer, LongYing ZhiDa and SpinQ developed a quantum neural network (QNN) algorithm to support ATM-removal decisions across Huaxia Bank's network. The process involved collecting data from more than 2,200 ATMs over two years, including usage rates, failure patterns, replenishment timing, and operational hours. This data was then encoded via a quantum variational embedding approach, enabling a real quantum circuit to learn patterns and make predictions.

QUANTUM COMMUNICATION

SpeQtral, based in Singapore, launched Southeast Asia's first "Quantum Networks EXperience Centre" (QNEX) in partnership with Toshiba Digital Solutions to serve as a platform for prototyping quantum-secure communications (via quantum key distribution) for banks, telcos and data centres.

QUANTUM SENSING

Atomionics, a Singapore-based startup specialising in quantum gravimetry sensors, secured USD 12.7 million in a Pre-Series A round to scale its "Gravio" sensor for subsurface mapping and navigation (mineral exploration, defence use) by combining ultra-sensitive cold-atom interferometry with AI-driven interpretation.

LUXINNOVATION
#MakingInnovationHappen

MAJOR HUB – EUROPE

QUANTUM COMPUTING

Company & context

IQM is a global leader in superconducting quantum computing hardware and full-stack quantum solutions. DATEV eG is a German software and IT service cooperative with over 620,000 customers, mainly serving the tax, accounting and auditing sectors. The two organisations partnered to explore how quantum computing can be applied to portfolio optimisation.

What they did

The project used a 20-qubit quantum system from IQM. IQM and DATEV applied the classical Markowitz portfolio theory model (typically used for financial asset portfolios) to DATEV's catalogue of products. They encoded the decision problem of how to allocate resources (budget) across products under risk/return trade-offs into a combinatorial optimisation format suitable for quantum computing.

QUANTUM COMMUNICATION

Single Quantum and Toshiba: Single Quantum (specialist in superconducting nanowire single-photon detectors) and Toshiba Europe collaborated to validate long-distance quantum key distribution (QKD) over fiber links up to ~300 km, enabling extended range quantum-secure communications and pushing commercial quantum cryptography toward scale.

QUANTUM SENSING

EQUIP-G is a Horizon Europe-funded initiative building a pan-European network of quantum gravimeters, which are ultra-precise sensors based on atom interferometry that can detect minute changes in gravity. The goal is to deploy these sensors across Europe — on the ground, in the air, and eventually on moving platforms — to monitor underground mass changes. This has important applications for environmental risk assessment (e.g. volcanoes, groundwater), geothermal energy, and climate-change monitoring.

LUXINNOVATION
#MakingInnovationHappen

SOURCES

Quantum Flagship, « Quantum Technology Ecosystem »

Quantum Flagship, « Quantum Flagship projects »

QURECA, « Quantum Initiatives Worldwide 2025 », 2025

ECIPE, « Mapping the Quantum Ecosystems: How Are Economies Positioning Themselves for Innovation Success », 2025

POSTQUANTUM, « Global Quantum Innovation Ecosystems: Lessons for TTOs from Around the World »

MIT Initiative on the Digital Economy, « Quantum Index Report 2025 », 2025

MERICS Report, « China's long view on quantum tech has the US and EU playing catch-up », 2024

Quantum Insider, « Quantum Computing Companies in 2025: Mapping the Global Quantum Landscape », 2025

Dealroom, « Quantum Technologies »

Pitchbook

Google Patents

5 Av. des Hauts-Fourneaux
L-4362 Esch-sur-Alzette
Luxembourg
+352 43 62 63-1
www.luxinnovation.lu

DO YOU WANT TO FIND OUT MORE

ABOUT INNOVATION IN LUXEMBOURG ECOSYSTEM?

CONTACT US