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2024 Global Overview of Quantum Unicorn Enterprises

August, 2024

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Introduction

In exploring the field of quantum technology, a group of enterprises stands out—quantum unicorns. These enterprises can be considered "genuine choices" in terms of their substantial investments. From these unicorns, we might discern the forefront of quantum innovation and the future of the industry.

Currently, the quantum industry is in its early development stage, and the number of enterprises that meet the unicorn criteria defined in this report is relatively limited. To provide a more comprehensive view of the innovation vitality and development potential in the quantum technology field, this report also pays attention to near-unicorn enterprises.

By analyzing quantum unicorns and near-unicorns, this report aims to delve into the current state and future trends of these enterprises, presenting global quantum startups with growth potential and value. It seeks to offer some reference for investors, entrepreneurs, and policymakers. Additionally, through an analysis of factors such as the company's location, sub-sector, growth duration, financing valuation, and future IPO prospects, this report helps readers gain a deeper understanding of the development trends of quantum enterprises, grasp future investment opportunities, and contribute to the advancement of the global quantum industry.

Definitions of Quantum Unicorns, Quasi-Unicorns, and Publicly Listed Unicorns

In this report, the terms “Quantum Unicorn Enterprises” and “Quantum Quasi-Unicorn Enterprises” refer to:

▶ Quantum Unicorn Enterprises

- Established for no more than ten years, these enterprises have achieved rapid growth within a relatively short period.
- Having received private equity investment from professional investment institutions and not yet listed, they demonstrate high recognition and potential value in the capital market.
- With a post-money valuation exceeding (or equal to) \$1 billion in their most recent financing round, these enterprises show a high level of market recognition and industry status.

This criterion ensures that we focus on quantum enterprises with genuine unicorn potential while aligning with the valuation standards used outside the quantum industry for defining unicorns, thereby maintaining cross-industry comparability.

Definitions of Quantum Unicorns, Quasi-Unicorns, and Publicly Listed Unicorns

▶ Quantum Quasi-Unicorn Enterprises

- Having received private equity investment from professional investment institutions and not yet listed.
- With a post-money valuation exceeding (or equal to) \$100 million in the most recent financing round, and having been established for no more than five years.
- With a post-money valuation exceeding (or equal to) \$500 million in the most recent financing round, and having been established between five and ten years ago.

▶ Publicly Listed Unicorn Enterprises

A company that was a unicorn before going public and has now successfully listed.

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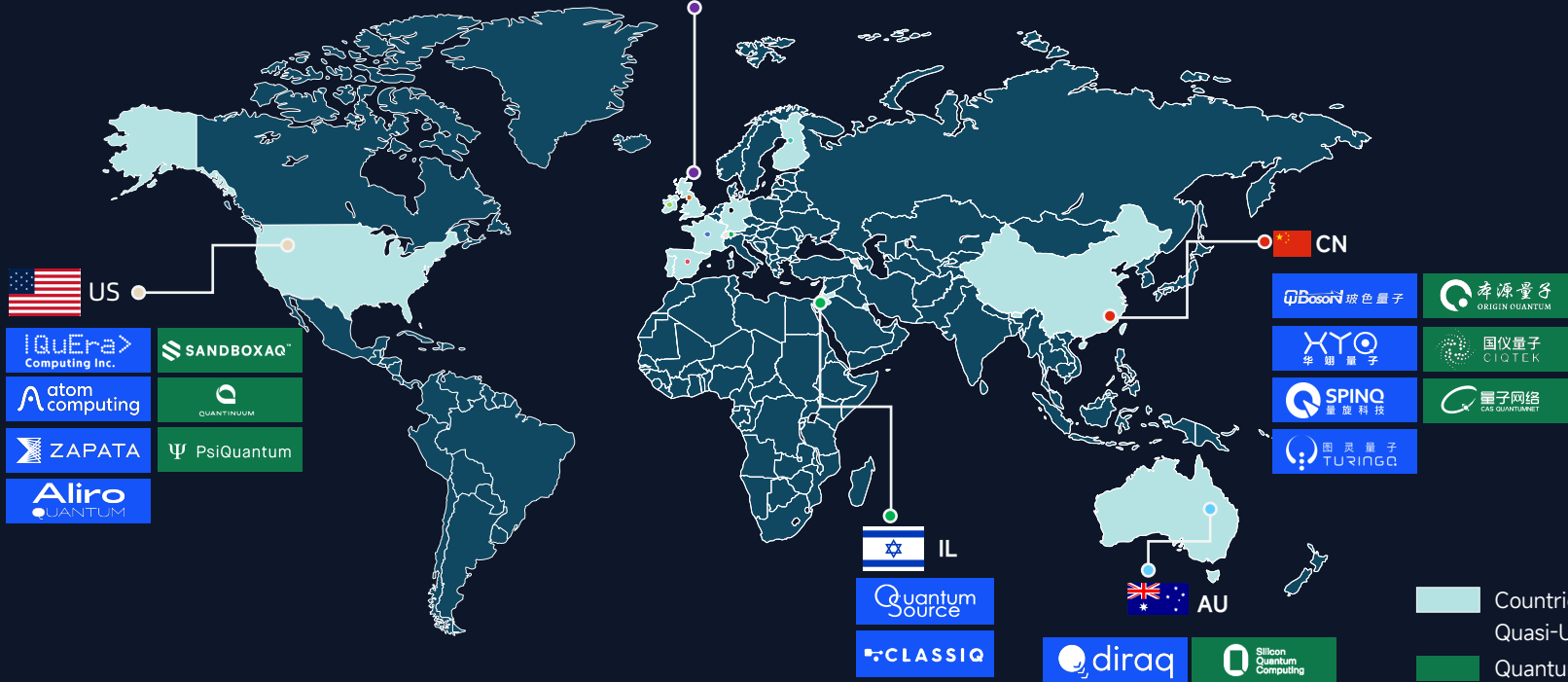
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PART ONE

Analysis of Global Quantum Unicorn Enterprises

Globally, there are a total of 9 quantum unicorn enterprises and 30 quantum quasi-unicorn enterprises.

Distribution of quantum unicorn enterprises/Quasi- Unicorn enterprises



Countries with Quantum Unicorn/ Quasi- Unicorn Enterprises
 Quantum Unicorn Enterprises
 Quasi- Unicorn Enterprises

The total valuation of global quantum unicorn enterprises is \$19.555 billion, with China and the United States accounting for approximately 80% of this value.

Global Distribution of Quantum Unicorn Enterprises by Country

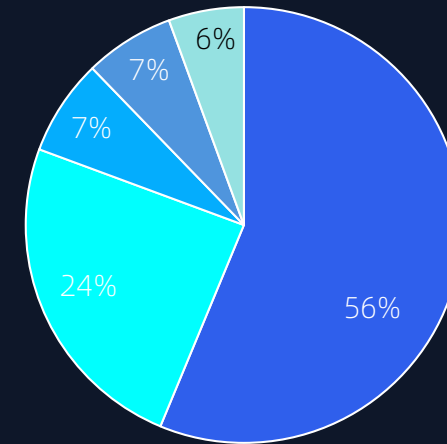
Enterprises	Country	Established Time	Growth Period	Total Valuation (in Billions of USD)
SandboxAQ	USA	2022	1	50.00
PsiQuantum	USA	2016	8	30.00
Quantinuum	USA	2021	3	30.00
Qtict	China	2016	5	22.50
Origin Quantum	China	2017	5	15.00
IQM	Finland	2018	4	13.95
Silicon Quantum Computing	Australia	2017	5	13.00
Pasqal	France	2019	4	10.90
CIQTEK	China	2016	5	10.20

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Data Source: Yahoo Finance.

Proportion of Total Valuation by Country for Quantum Unicorn enterprises

■ USA ■ China ■ Finland ■ Australia ■ France

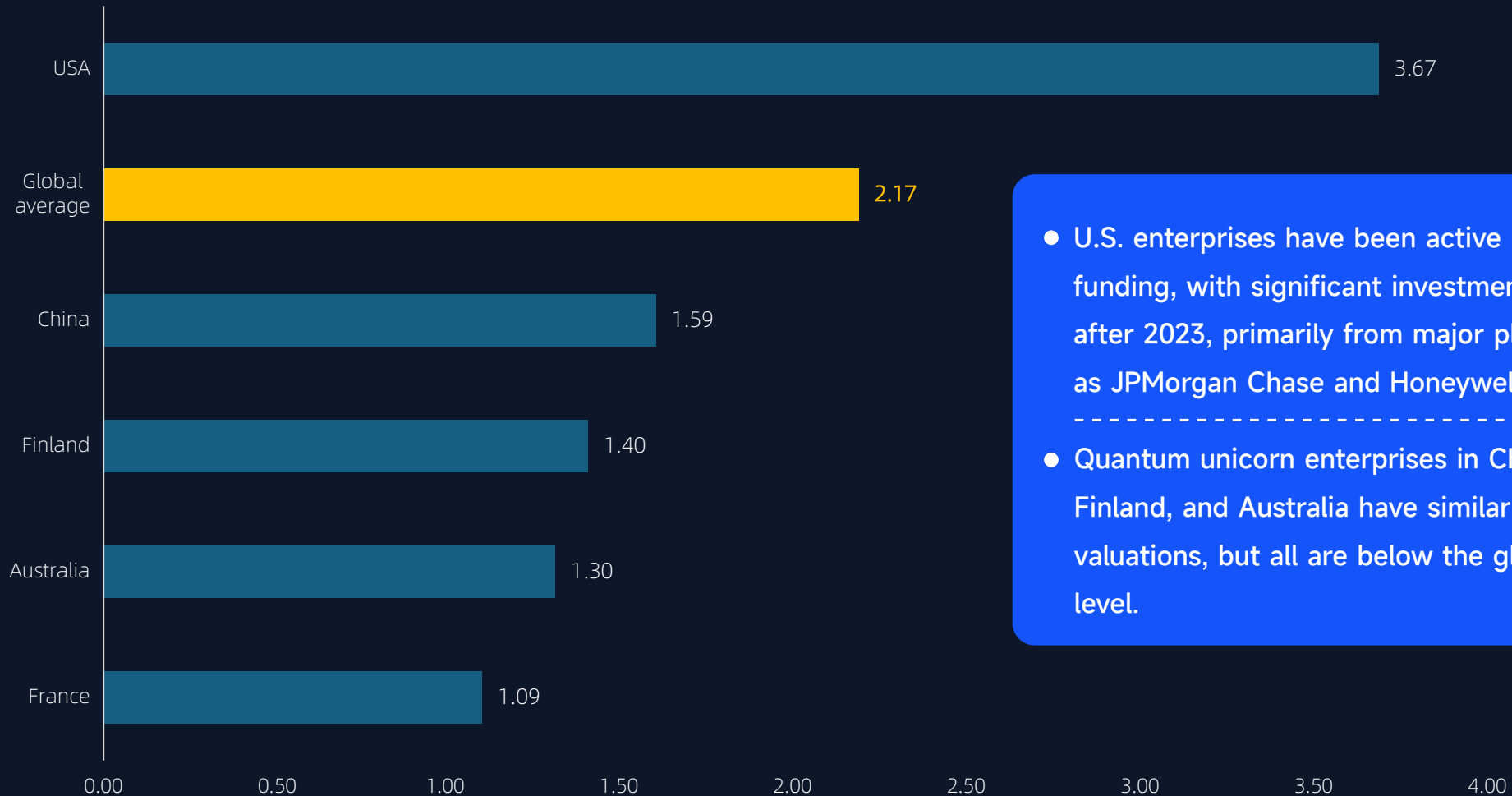


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- The total valuation of U.S. enterprises is \$11 billion, the highest among all countries, accounting for approximately 56% of the total valuation across countries.
- China follows closely with a total company valuation of \$4.77 billion, accounting for approximately 24% of the total valuation.

The average valuation of U.S. quantum unicorn enterprises is \$3.67 billion, significantly higher than the global average.

Average Valuation of Quantum Unicorn enterprises by country (Unit: USD Billion)



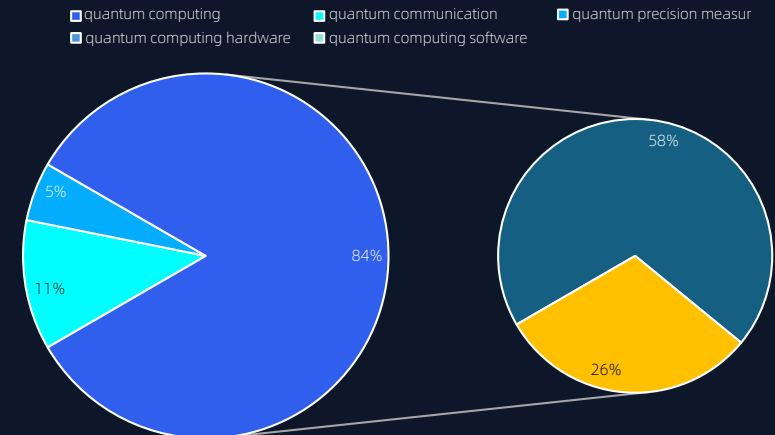
- U.S. enterprises have been active in securing funding, with significant investments received after 2023, primarily from major players such as JPMorgan Chase and Honeywell.
- Quantum unicorn enterprises in China, France, Finland, and Australia have similar average valuations, but all are below the global average level.

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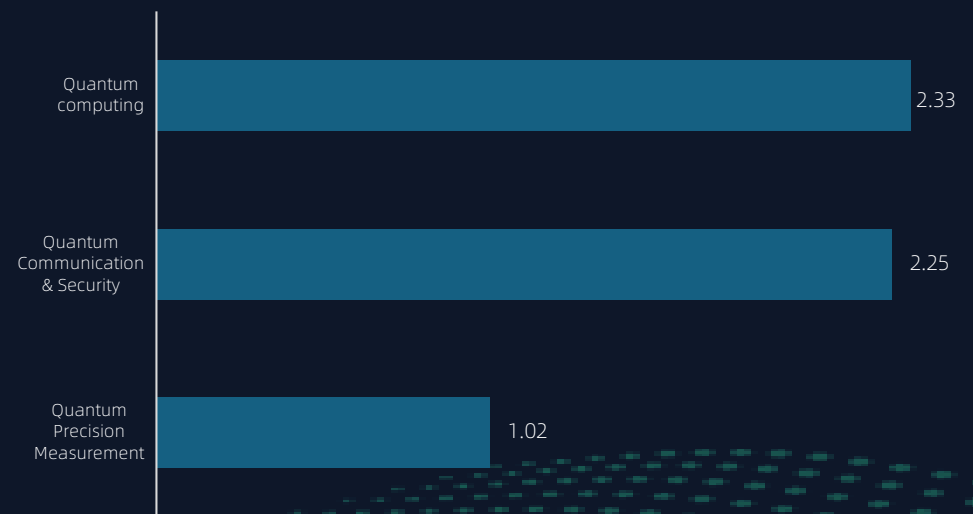
Quantum unicorns are mostly in quantum computing, 78% of the total number and valuation.

- Quantum unicorn enterprises are primarily concentrated in three major fields: quantum computing, quantum communication and security, and quantum precision measurement.
- In the field of quantum computing, 7 enterprises account for 78% of the global total, with 6 focusing on quantum computing hardware (67%) and 1 on software. There is 1 company each in the fields of quantum communication and security, and quantum precision measurement.
- In terms of valuation, enterprises in the quantum computing field have a total valuation of \$16.285 billion, representing 78% of the global valuation. The valuation share of enterprises in quantum communication and security, as well as quantum precision measurement, is both below 15%. The total valuation of quantum computing hardware enterprises is \$11.285 billion, while the sole quantum computing software company has a valuation of \$5 billion.

Global Valuation Distribution of Unicorn enterprises in Various Quantum Fields (Unit: Percentage, USD Billion)



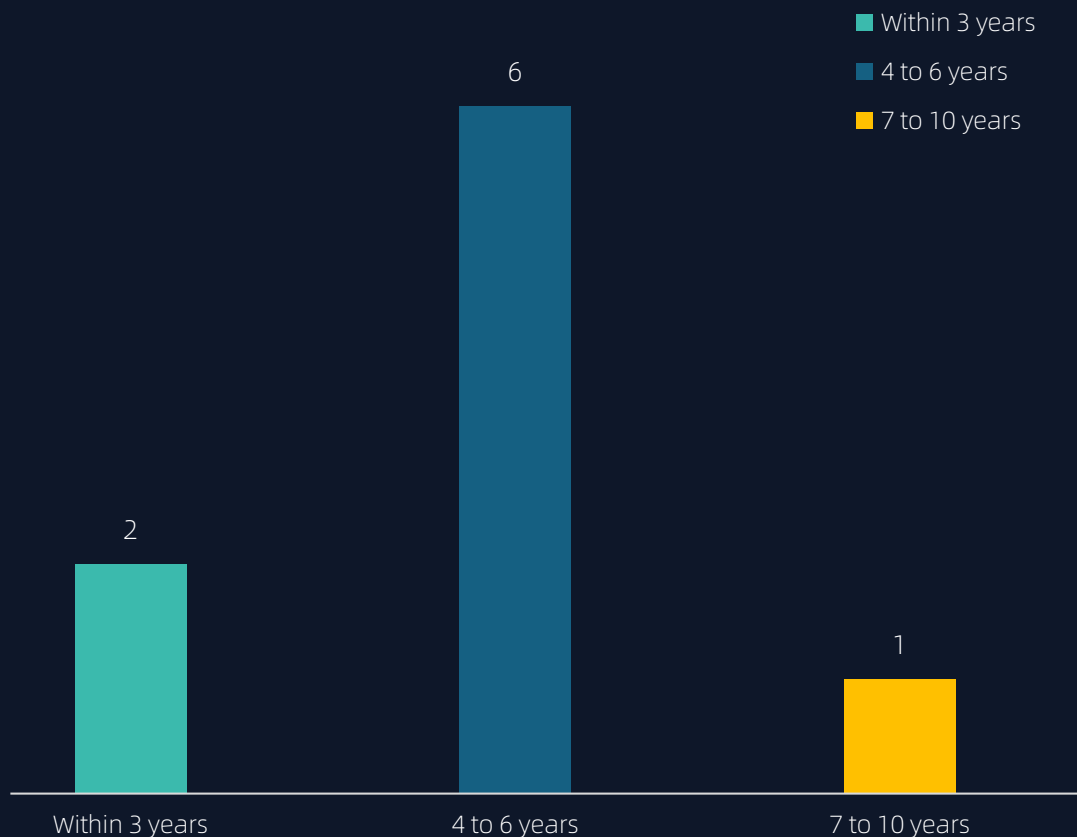
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The average time for global quantum unicorn enterprises to reach unicorn status is 4.4 years. In the U.S., SandboxAQ and Quantinuum achieved unicorn status within three years.

Distribution of Time from Founding to Unicorn Status for Quantum Unicorn enterprises

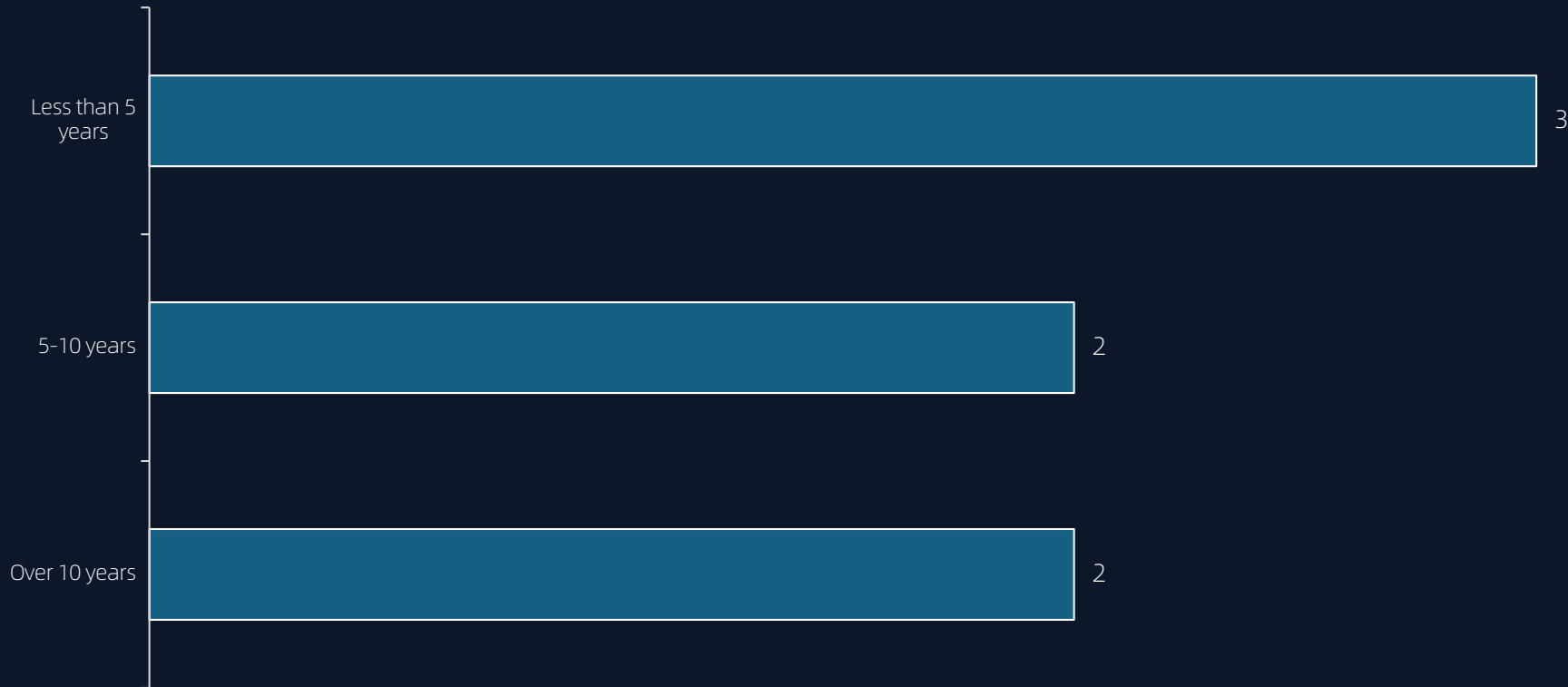


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- The average time for the 9 global quantum unicorn enterprises to reach unicorn status is 4.4 years, with most achieving this within 4 to 6 years.
- In the U.S., SandboxAQ and Quantinuum reached unicorn status within three years, demonstrating efficient research and development, effective market promotion, and strong investor confidence.
- Although PsiQuantum has been established for 8 years, its steady development and technological innovation are equally noteworthy.

Most of the publicly listed unicorn enterprises have gone public after 2020

The distribution of the number of enterprises by time period from establishment to IPO



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Currently, 7 quantum pre-unicorn enterprises have gone public, with most listing after 2020. The time from establishment to IPO for these enterprises is approximately 9 years.

Listed unicorn enterprises are facing the challenge of negative net profits

Overview of publicly listed unicorn enterprises (in million USD)

Company	Country	Established Time	Release Date	Fields	Listed exchange	Market Value	Revenue in 2022	Revenue in 2023	Annual revenue growth rate	NI in 2022	NI in 2023	Net profit growth rate
QuantumCTek	China	2009	2020.07	QC	SSE	4075	18.53	21.47	16%	-11.85	-17.04	44%
qtec	China	2012	2016.06	QM	NEEQ	66	5.57	7.26	30%	-2.87	-7.31	155%
IONQ	USA	2015	2021.01	QC	NASDAQ	1709	11.13	22.04	98%	-48.51	-157.77	225%
Rigetti Computing	USA	2013	2022.03	QM	NYSE	181	13.10	12.01	-8%	-71.52	-75.11	5%
Quantum Computing Inc	USA	2018	2021.07	QC	NASDAQ	60	0.14	0.36	164%	-38.59	-29.73	-23%
D-Wave	Canada	1999	2022.08	QC	NYSE	176	7.17	8.76	22%	-53.70	-82.72	54%
Arqit	UK	2017	2021.09	QM	NASDAQ	63	7.21	0.64	-91%	65.08	-70.39	-208%

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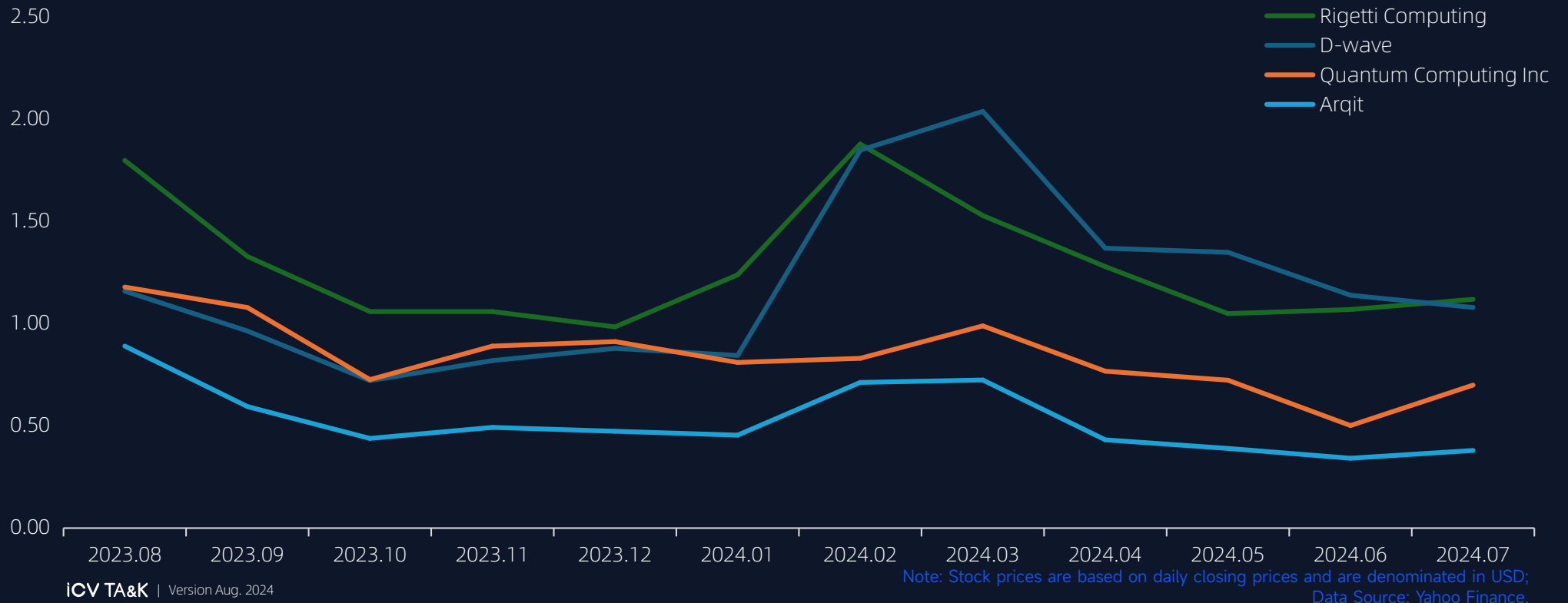
Note: Quantum Computing (QC) , Quantum Communication & Safe (QM)
Data Source: Yahoo Finance.



The 2023 annual reports of listed quantum unicorn enterprises indicate that net profits are generally negative. Although revenue has increased, financial losses have been severe over the past two years. In 2023, the average loss was \$60.3 million, representing a 173% increase compared to 2022, with losses continuing to expand.

Some listed pre-unicorn enterprises have experienced prolonged periods of low stock prices.

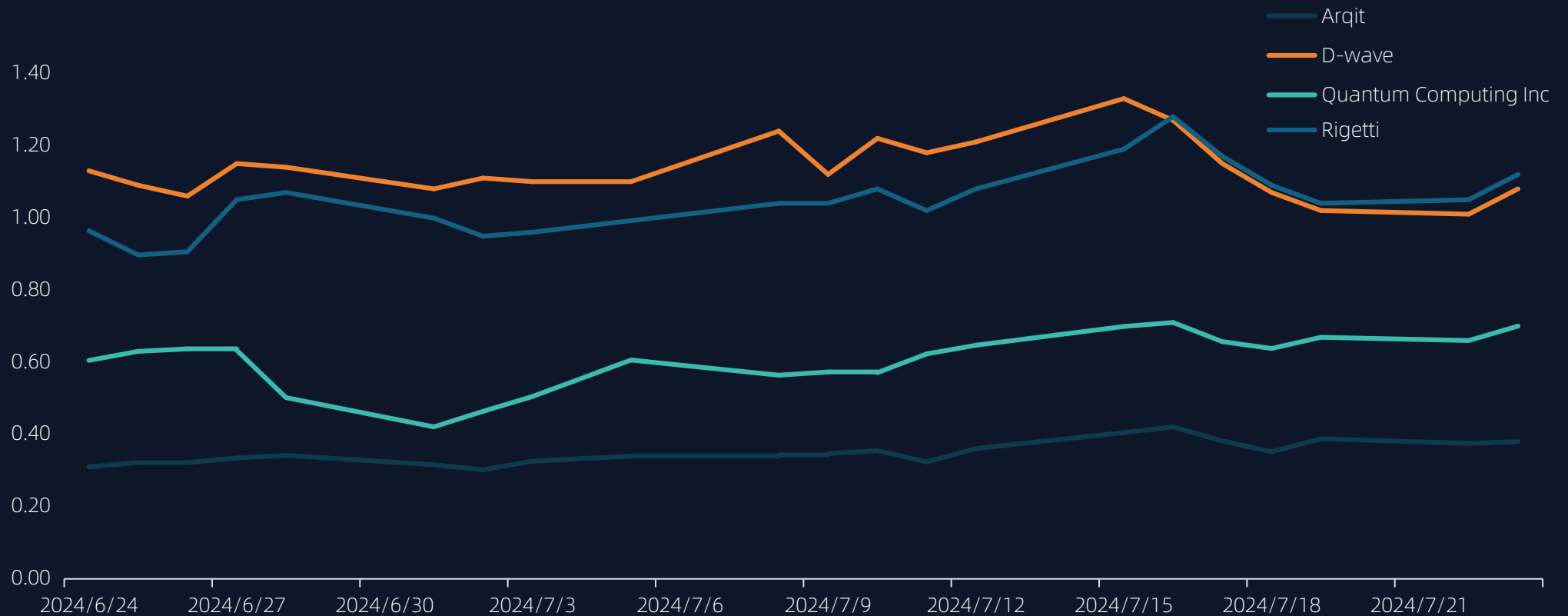
Monthly average stock price changes for D-Wave, Quantum Computing Inc., Rigetti Computing, and Arqit (August 2023 - July 2024)



Over the past year, the stock prices of D-Wave, Quantum Computing Inc., Rigetti Computing, and Arqit have remained below two dollars for extended periods. Notably, Quantum Computing Inc. and Arqit both had stock prices below one dollar for at least 10 months, with Arqit's stock price remaining below one dollar for the entire year.

Some listed pre-unicorn enterprises are currently facing the risk of delisting

Daily stock price changes for Rigetti, IONQ, D-Wave, and QCI. (June 24, 2024 - July 24, 2024)



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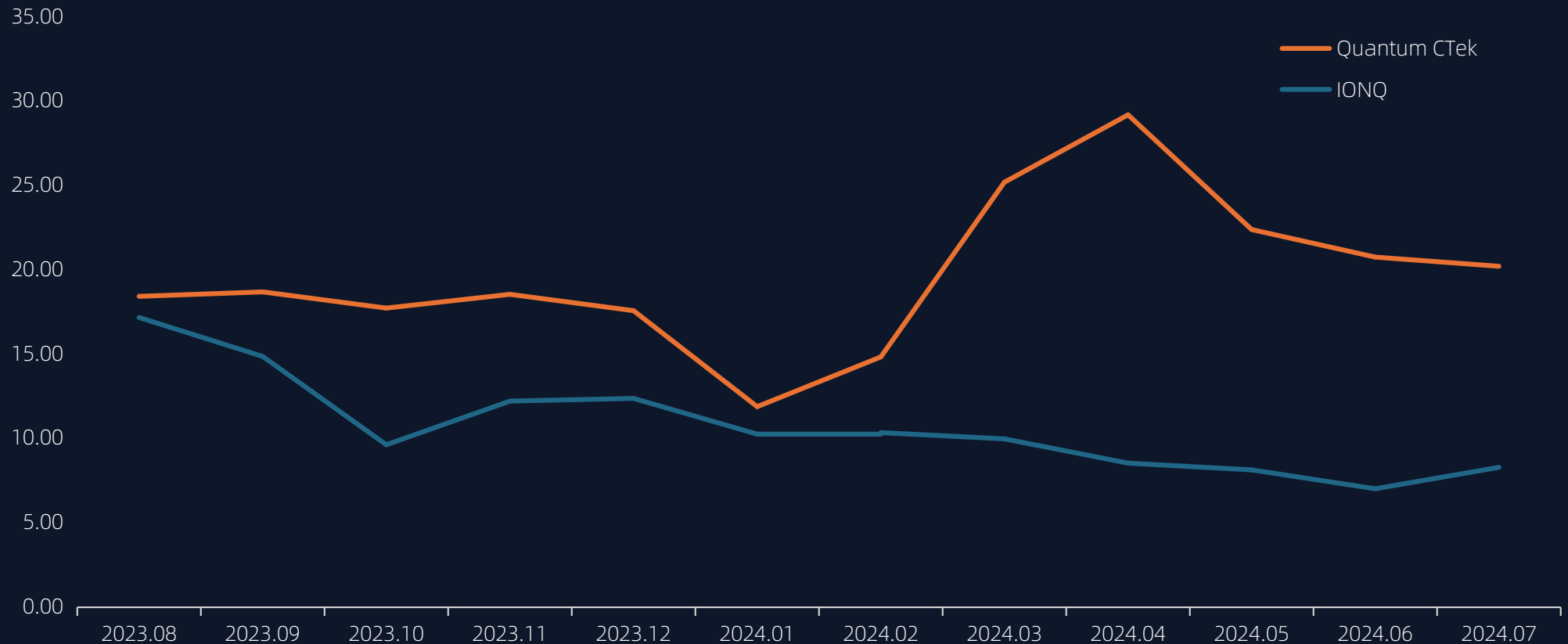
Note: Stock prices are based on daily closing prices and are denominated in USD;
Data Source: Yahoo Finance.



The stock prices over the past 30 days show that Quantum Computing Inc and Arqit have consistently traded below \$1, posing a risk of delisting from Nasdaq. Although D-Wave and Rigetti Computing are listed on the NYSE, their stock prices have also been fluctuating around \$1, which similarly presents a significant risk of delisting.

The stock prices of publicly traded former unicorn enterprises with no risk of delisting have shown no significant upward trend.

The monthly average stock price changes for IONQ and Quantum CTek (August 2023 - July 2024, in USD).






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Note: The stock prices are based on daily closing prices, with the data up to July 24, 2024.
Sources: Yahoo Finance, Sina Finance.



Over the past year, IONQ's stock price has decreased but has remained above \$5, while Guodun Quantum's stock price has stayed above \$15, exceeding \$20 in the past six months, though with significant volatility. Both enterprises do not face delisting risks. However, from August 2023 to January 2024, the overall trend for quantum unicorns has been a downward fluctuation.

SandboxAQ and Quantinuum are leading in valuation and growth. Pasqal, with its neutral atom quantum computing and €100 million in Series B funding, shows strong growth prospects.

Company	Company Overview	Technical Advantages	Core Team	Key Developments
	<ul style="list-style-type: none"> Founded by Jack Hidary in 2016 and spun off from Alphabet in 2022. The company focuses on the integration of AI and quantum technology. 	<ul style="list-style-type: none"> Combining AI and quantum computing to address complex problems The company focuses on quantum security and quantum sensing. 	<ul style="list-style-type: none"> CEO: Jack Hidary Chairman of the Board: Eric Schmidt Chief Scientist: Stefan Leichenauer 	<ul style="list-style-type: none"> In March 2024, the company launched the AQtive Guard encryption management platform. In June 2024, it released the AQNav navigation system.
	<ul style="list-style-type: none"> Formed by the merger of Honeywell Quantum Solutions and Cambridge Quantum Computing. The company is dedicated to integrating quantum hardware and software. 	<ul style="list-style-type: none"> Utilizing ion trap technology, the company offers high qubit fidelity and long coherence times. The company focusing on the development of high-performance quantum computers and advanced quantum algorithms. 	<ul style="list-style-type: none"> CEO: Rajeeb Hazra Chairman of the Board: Ilyas Chief Scientist: Bob Coecke 	<ul style="list-style-type: none"> In March 2024, the company addressed scalability issues in quantum computing. In July 2024, it achieved a breakthrough in fault-tolerant quantum computing through a collaboration with Microsoft.
	<ul style="list-style-type: none"> Founded in 2019 and headquartered in Paris, France. The company focuses on neutral atom quantum computing technology. 	<ul style="list-style-type: none"> Using neutral atom technology The company offers scalability and high control precision, making it suitable for simulating complex quantum systems and solving combinatorial optimization problems. 	<ul style="list-style-type: none"> CEO: Georges-Olivier Reymond Chief Science Officer: Thierry Lahaye Chief Technology Officer: Antoine Browaeys 	<ul style="list-style-type: none"> In June 2024, more than 1,000 atoms were loaded at once. In May 2024, a satellite scheduling problem was solved.

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PART TWO

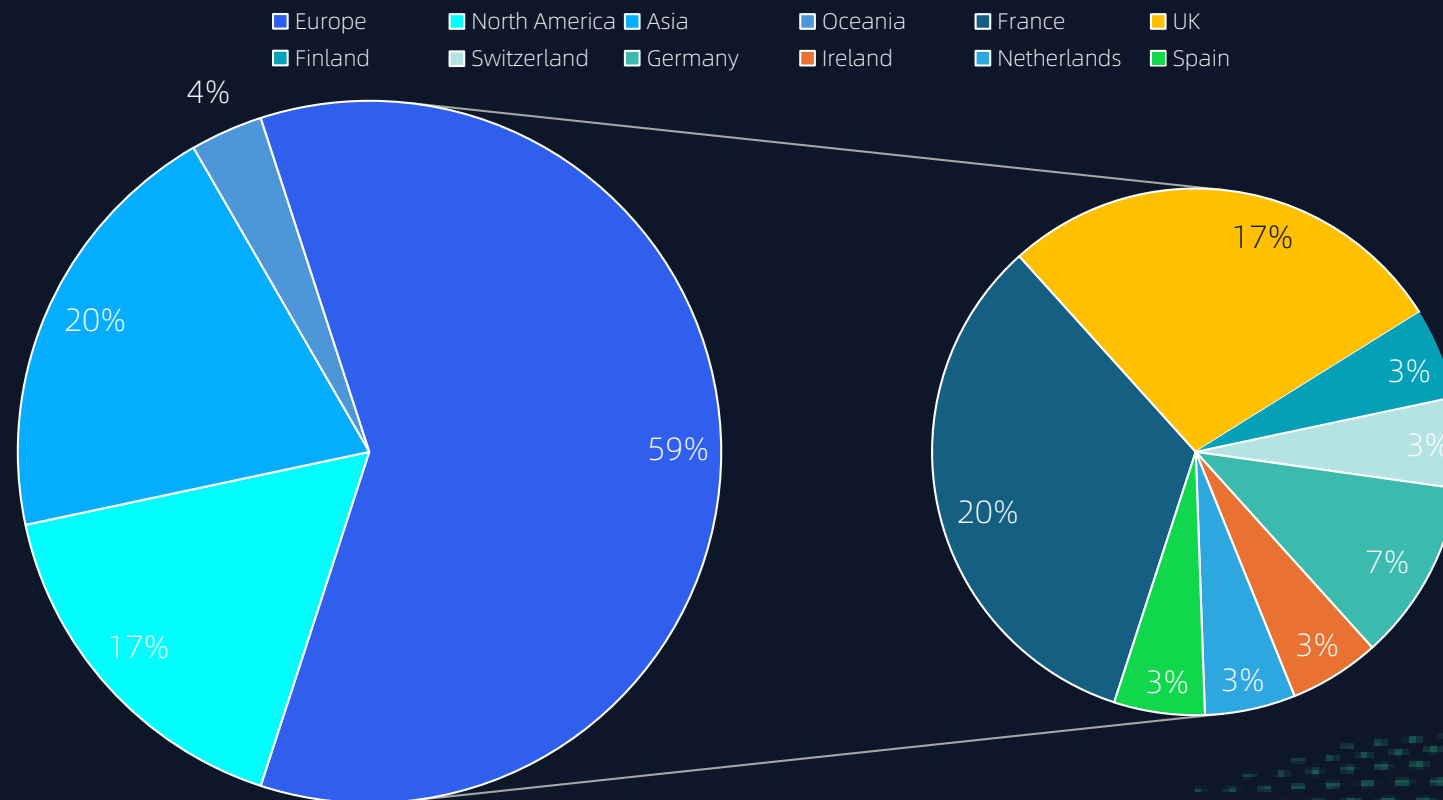
Analysis of Global Quantum Quasi- Unicorn Enterprises



There are a total of 30 quantum quasi-unicorn enterprises globally, with a concentration in Europe.

Globally, there are 30 quantum quasi-unicorn enterprises, distributed across North America, Asia, Oceania, and Europe. Europe is the most concentrated region for these enterprises, with 18 of them, accounting for 60% of the total number of quantum quasi-unicorn enterprises worldwide.

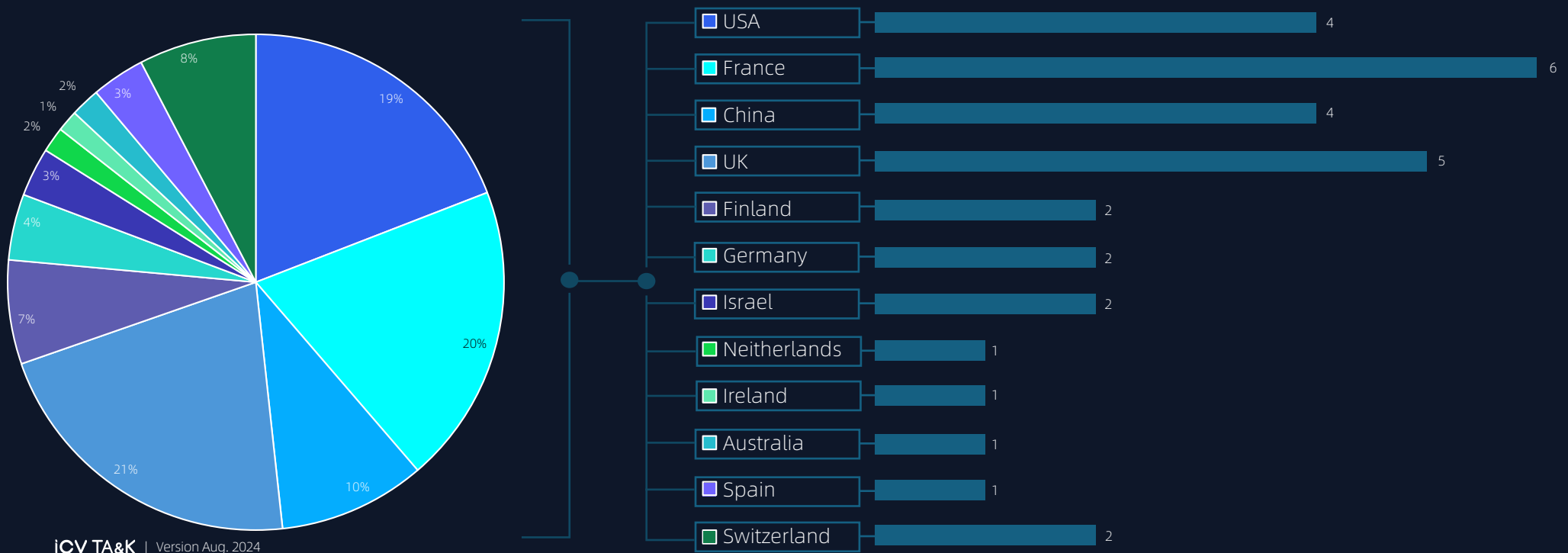
The distribution of quantum quasi-unicom enterprises by country and region globally



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The total valuation of global quantum quasi-unicorn enterprises is \$7.466 billion. The top three countries are the United Kingdom, France, and the United States, with China accounting for 10% of the global total.

Ranking of countries by the number of global quantum quasi-unicorns and their share of the total valuation



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- The total valuation of global quantum quasi-unicorn enterprises is \$7.466 billion. The United Kingdom, France, and the United States each have valuations exceeding \$1.5 billion, making them the top three countries.
- The UK leads with a valuation of \$1.678 billion, followed by France with \$1.578 billion and the U.S with \$1.5 billion.
- China's valuation is approximately half that of the United States, accounting for 10% of the global total. Other countries have valuations of less than 10% each.

The average valuation of quantum quasi-unicorns is highest in Switzerland at \$600 million, with the UK and the US next. China's average is \$188 million, highlighting a need for better growth and market recognition.

Average valuation of quantum quasi-unicorn enterprises by country(Unit: USD Billion)

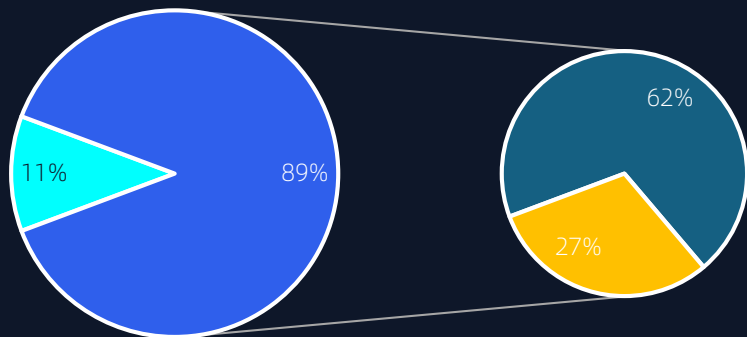


- Switzerland leads with \$600 million, followed by the United Kingdom with \$336 million and the United States with \$300 million.
- Spain's single enterprise is valued at \$273 million, ranking fourth. France is fifth with \$256 million, and other countries have not exceeded \$200 million.
- China averages \$188 million, and needs to enhance growth potential and market recognition.

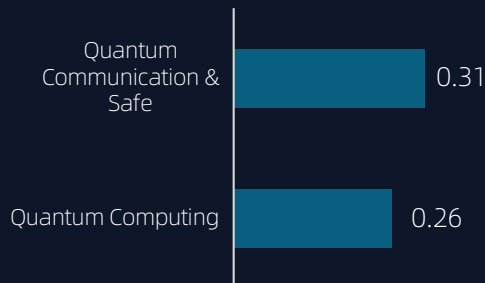
Global quantum quasi-unicorn enterprises are primarily concentrated in the quantum computing field.

Distribution of the total valuation of global quasi-unicorn enterprises across various quantum fields

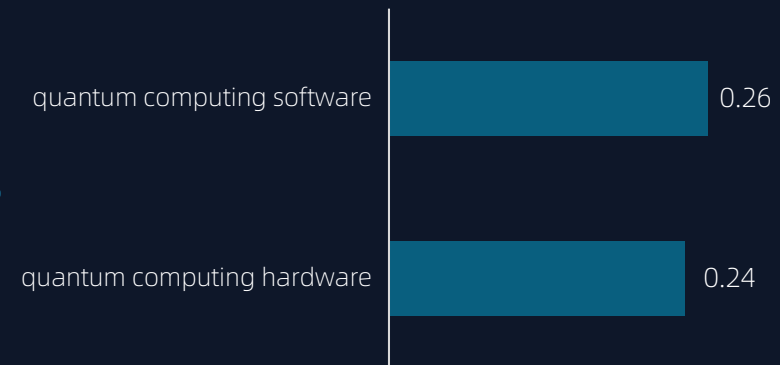
- Quantum Computing
- Quantum Computing Software
- Quantum Computing Hardware
- Quantum Communication & Safe



Average valuations of quantum unicorn enterprises across different fields (Unit: USD Billion)



Average valuation of quantum unicorn enterprises within the technology routes of the quantum computing field (Unit: USD Billion)



- Quantum computing has a total valuation of \$7.145 billion, representing 90% of the market. Within this, hardware enterprises are valued at \$4.967 billion, and software enterprises at \$2.178 billion. Quantum communication and security have a valuation of \$920 million, accounting for 10% of the market, with fewer enterprises in this sector.
- Despite significant differences in total valuations across fields, the average valuation of enterprises within each sector (including technology routes) ranges between \$200 million and \$300 million, with no notable differences observed.

Most quantum quasi-unicorn enterprises are in the early stages of development, with 66.7% of their funding occurring at the Series A round or earlier.

The funding round situation for global quantum quasi-unicorn enterprises



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Note: A2 and Pre-A rounds are merged into Series A; Pre-B and B+ rounds are merged into Series B.

- Out of a total of 30 funding rounds for quantum quasi-unicorn enterprises, 19 rounds occurred at the seed stage or Series A, accounting for approximately 66.7% of the total.
- Most quantum quasi-unicorn enterprises are still in the early stages of development, with relatively low levels of social capital investment.
- In the quantum computing field, about 25% of enterprises, whether in quantum computing hardware or software, have advanced to Series B funding rounds.
- In contrast, quantum communication sector enterprises largely remain at the Series A funding stage.

Funding series	Quantum Computing Software	Quantum Computing Hardware	Quantum Communication & Safe
Seed	Quantum Source, quobly	quantum, Qubit pharmaceuticals, genmat	
A	OQC, IONICS, QUPIX, diraq, KYO, 华翔量子, Boson, 蓝色量子, NOTHING DIFFICULT, 突破量子科技, QUANTUM BRILLIANCE	algorithmiq, MULTIVERSE, CLASSIQ, ZAPATA	Aliro QUANTUM, Terra Quantum
B	atom computing, QUANDELA, QUANTUM MOTION, SPINQ 星智科技		
Others	equal1, C12, IQEra> Computing Inc.	QuantrolOx	CRYPTONEXT SECURITY

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Leading enterprises Atom Computing and Quandela have valuations of \$600 million and \$545 million, respectively, placing them at the forefront of quantum quasi-unicorn enterprises. Both have demonstrated significant growth within a span of approximately five years.

Company	Company Overview	Technical Advantages	Core Team	Key Developments
	<ul style="list-style-type: none"> Founded in 2018, this American startup focuses on developing neutral atom quantum computers. 	<ul style="list-style-type: none"> Based on neutral atom qubits, This technology offers the advantages of long coherence times and room temperature operation, ensuring high performance and precision. 	<ul style="list-style-type: none"> CEO: Ben Bloom Chief Scientist: Jonathan King Chief Product Officer: Justin Ging 	<ul style="list-style-type: none"> In October 2023, the company created a 1,180-qubit, 1,225-site atomic array. In August 2023, it partnered with NREL (National Renewable Energy Laboratory) to optimize power grid operations.
	<ul style="list-style-type: none"> Founded in 2017 and headquartered in Paris, France The company specializes in single-photon quantum computing and communication technology. 	<ul style="list-style-type: none"> Quantum dot single-photon source technology produces high-purity, high-efficiency single photons, enhancing quantum information processing performance. Its modular design helps reduce development costs. 	<ul style="list-style-type: none"> CEO: Valérien Giesz CTO: Niccolò Somaschi Co-founder: Pascale Senellart 	<ul style="list-style-type: none"> In May 2024, the company launched Quandela Cloud 2.0. In July 2024, it collaborated with EDF and others to optimize the energy consumption of quantum computers.

Conclusions and Outlook

Compared to cutting-edge fieldlike AI, the total valuation of quantum unicorn enterprises is relatively low.

As of July 2024, the total valuation of global quantum unicorn and quasi-unicorn enterprises is approximately \$27.2 billion, significantly lower than the \$3.8 trillion valuation of the 1,229 unicorn enterprises worldwide. Although the average valuation of quantum enterprises is \$2.173 billion—below the global average of \$3.092 billion—the average growth time is only 4.4 years, much faster than the 7.1 years for other industries. This rapid growth is attributed to cutting-edge innovations in quantum technology, technological barriers, capital investment, and policy support.

However, quantum technology faces constraints such as technical challenges, commercialization hurdles, and talent shortages, which impact commercialization and investor willingness. Despite the valuation and quantity gap compared to frontier technologies like artificial intelligence, the rapid growth and technological innovation potential of quantum technology indicate significant future development opportunities.

Whether it is quantum unicorn enterprises or quasi-unicorn enterprises, they are all concentrated in the field of quantum computing.

Among the 37 unicorn and quasi-unicorn enterprises in the quantum field, over 90% are involved in quantum computing, indicating a high concentration in this area.

Quantum computing encompasses various technology routes, including superconducting, neutral atoms, ion traps, photonic, and cold atoms, providing numerous opportunities for development. In contrast, quantum communication and quantum precision measurement are more limited in scope and high in cost, primarily serving government, financial institutions, and high-precision research sectors, which restricts participation from small and medium-sized enterprises.

In the future, quantum computing enterprises are expected to remain at the forefront, while improvements in infrastructure and policy support could expand the application scope of quantum communication and quantum precision measurement, potentially increasing the number of enterprises in these areas.

Quantum unicorn enterprises are primarily concentrated in China and the U.S, while quasi-unicorn enterprises are distributed across 12 countries.

Quantum unicorn enterprises are primarily distributed across five countries: the United States, China, Finland, France, and Australia. Among these, the United States and China each have 3 enterprises, accounting for a total of 66.7%. These two countries lead in technological innovation, R&D investment, and government policy support, with investments of \$380 billion and \$9.2 billion in the quantum computing field, respectively. The latter represents 42.1% of global investment.

Quantum quasi-unicorn enterprises are more widely distributed, spanning 12 countries, with France leading with 6 enterprises, and the UK and the US each having 5. These countries are emerging as significant players in the quantum technology field through policy and financial support, such as the UK's plan to invest \$1.3 billion and France's plan to invest \$2 billion over the next five years.

Some quasi-unicorn enterprises have demonstrated significant growth potential.

Terra Quantum and Atom Computing are two quasi-unicorn enterprises with high growth potential, both established approximately 5 years ago. Terra Quantum focuses on quantum computing and quantum communication, with a broad scope in these fields. In November 2022, it completed a \$60 million Series A funding round, achieving a valuation of \$600 million, making it the highest-ranked among quasi-unicorn enterprises.

Atom Computing specializes in neutral atom quantum computing and completed a \$60 million Series B funding round in January 2022, also reaching a \$600 million valuation, reflecting strong market recognition of its technology and future prospects. Both enterprises are expected to become quantum unicorns within the next two years.

**"Over-aged"
unicorn
enterprises still
have significant
growth potential.**

As of July 2024, there is one “over-aged” unicorn company in the global quantum field, Infleqtion. Established in 2007, the company focuses on cold atom quantum computing and quantum precision measurement. After completing a \$110 million Series B funding round in 2022, its valuation reached \$1.1 billion, representing approximately a 15-fold increase from the \$68 million valuation in July 2018.

Despite fluctuations in its valuation over the past four years, the overall trend has been upward, reflecting strong capital market recognition of its technological capabilities and future potential. This also indicates the core position and extensive commercialization prospects of quantum technology in the global tech competition.

Contact Us

ICV TA&K

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& Knowledgebase



Canada

5250 Fairwind Dr. Mississauga,
Ontario.
L5R 3H4.
Canada



infer@icvtank.com



<https://www.icvtank.com>



Singapore

101 Upper Cross Street,
#04-17.
People's Park Centre,
Singapore