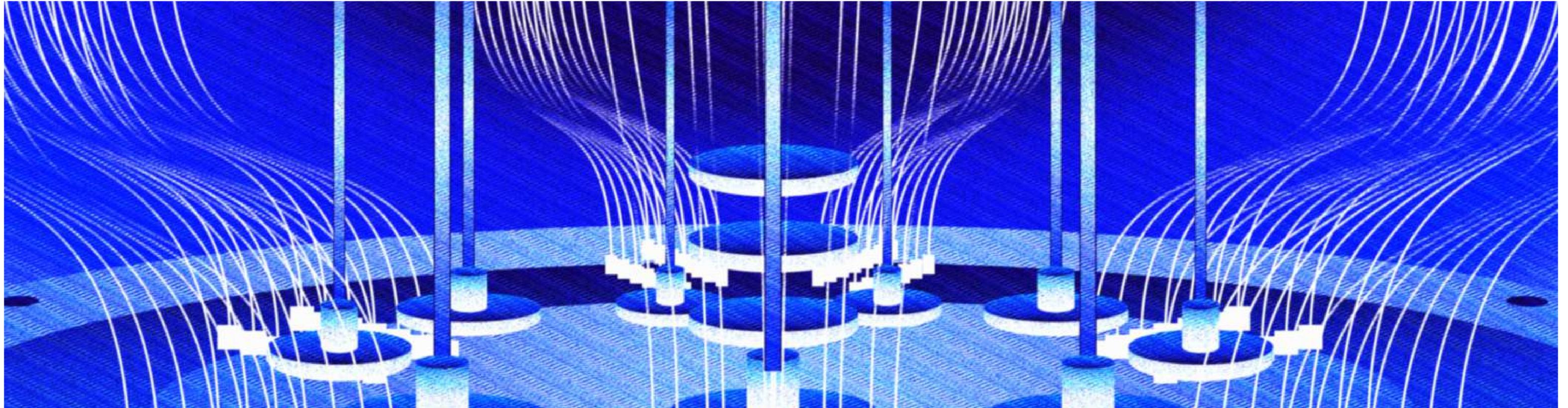# Accelerating → → →
Quantum Advantage

BTQ builds post-quantum infrastructure
to secure mission critical networks

BTQ

🇺🇸 OTCQX: BTQQF   🇨🇦 Cboe CA: BTQ   🇩🇪 FRA: NG3

Disclaimer

The Quantum
Space Race is Here...

BTQ

Moore's Law of Exponential Growth vs.
Neven's Law of Doubly Exponential Growth

Trajectory of Technology Evolution for
Quantum Computers

Doubly Exponential Growth

Trajectory of Technology Evolution for
Classical Computers

Exponential Growth

Computing Power, Log Scale

Time
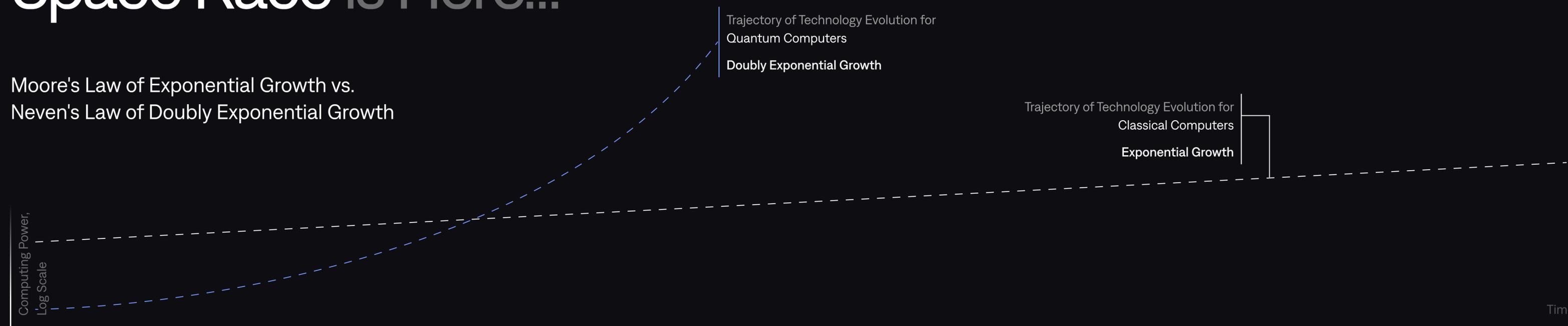
The world is nearing a quantum computing inflection point where Moore's law for classic computers is reaching its limit. Capabilities of Quantum computers are advancing at a "doubly exponential rate" and are closer than ever to commercialization and projected to reach a TAM of US$9+ Billion by 2027

Investment dedicated to quantum research as part of China's 5 year strategic plan

$15B

Government Superpowers Battling for Quantum Supremacy

$3B

Pledged towards quantum information science across all US government agencies

Large Agendas by Public Companies – Big Tech & Pure Play Quantum

$5T+ Market Cap Value

Google   Alibaba Group   Microsoft
Honeywell   IBM   SANDBOXAQ

$3B+ Market Cap Value

IONQ   rigetti   D:WAVE   ARQIT

Private Capital Flocking to Startups Across the Quantum Computing Realm

US$2B+

Of new private capital flowing into Quantum Technology companies in 2022, a record high with 2023 tracking higher

99

Quantum Technology funding rounds in 2022

... and **Threatens** Everyday Encryption

The rapid parallel processing that quantum computers are capable of endangering once-secure data, from private emails to banking logins, resulting in significant cybersecurity concerns for individuals, businesses, and governments alike

On December 21, 2022, President Biden signed into law the Quantum Computing Cybersecurity Preparedness Act, a legislation that aims to encourage federal government agencies to adopt encryption technology that is resistant to decryption by quantum computers

"
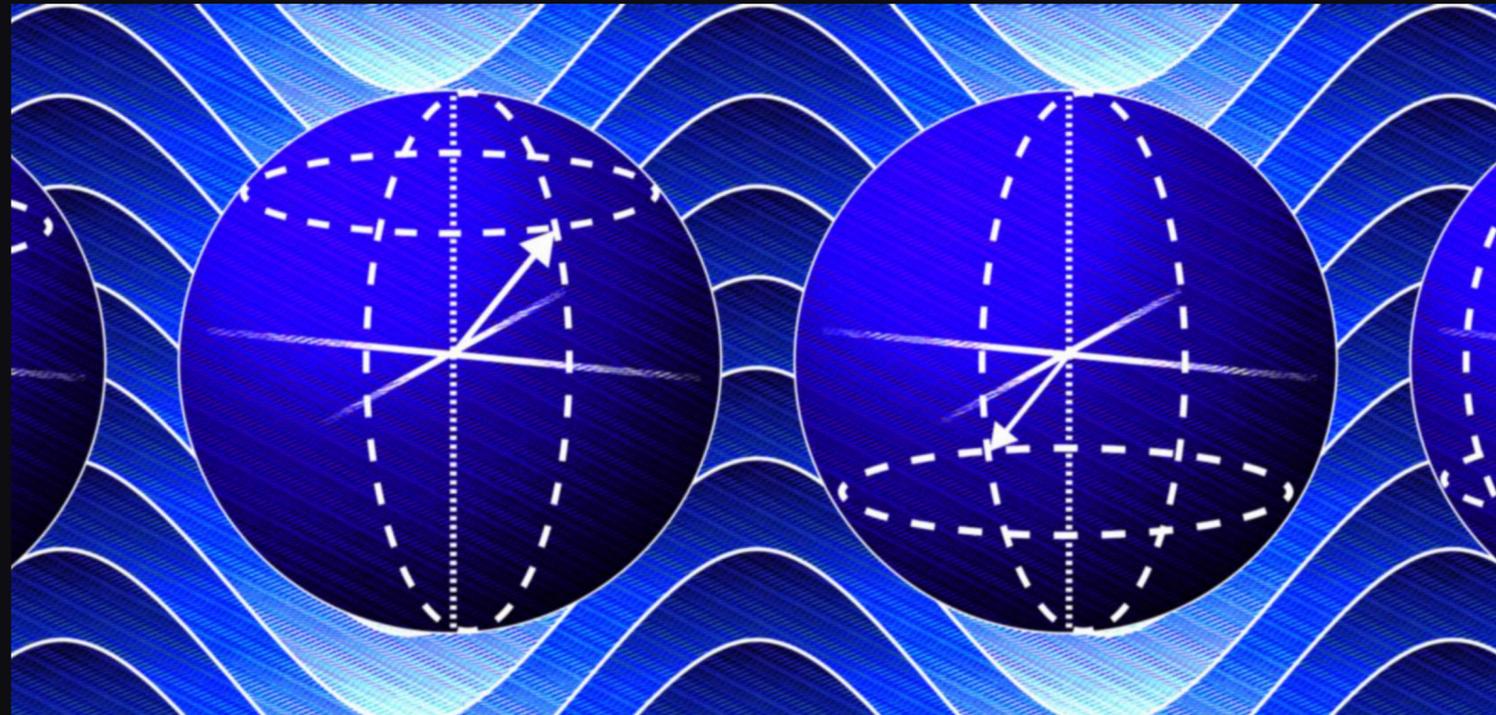
"Technological progress in the sectors [of quantum computing and semiconductors] poses "significant national security risks" because computers could advance in ways that would help develop sophisticated weapons and break cryptographic codes used by spy agencies to protect data"

Joe Biden, August 2023

Within 180 days of the date of this memorandum, agencies shall identify any instances of encryption not in compliance with NSA-approved Quantum Resistant Algorithms for CNSA, where appropriate in accordance with section 1(b)(iv)(A) and (B) of this memorandum, and shall report to the National manager, at a classification level not to exceed TOP SECRET//SI//NOFORN

The United States White House, January 2023

The Imperative of
Quantum Security
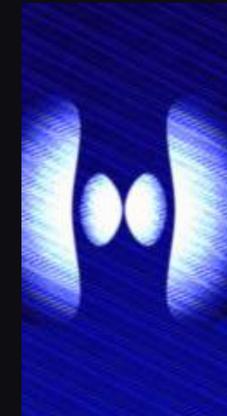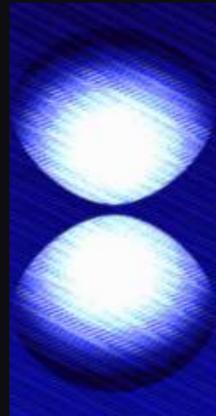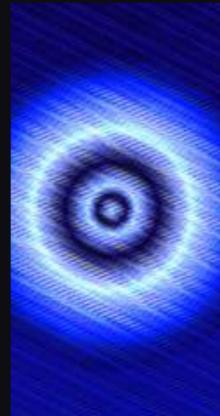
Evolving Threats

As quantum computing progresses, it presents a formidable challenge to traditional encryption methods, leaving sensitive data vulnerable.

Protecting Digital Infrastructure

Quantum security ensures the safety of critical digital infrastructure, from financial systems to national defense networks.

Future-Proofing Data

Implementing quantum-safe encryption today safeguards against future quantum attacks, securing data both now and in the years to come.

Compliance and Trust

Staying ahead in quantum security is essential for compliance with emerging data protection regulations and maintaining public trust.

Innovation Opportunity

Embracing quantum security paves the way for innovative solutions in cybersecurity, offering a competitive edge in a rapidly evolving digital landscape.

Quantum Era:
Market Momentum & Impact

Quantum Threat & NIST's Role:

As quantum capabilities challenge today's encryption, the US National Institute of Standards and Technology (NIST) spearheads the global drive for quantum-safe standards.

Lattice Cryptography & Economic Impact:

Lattice-based cryptography, a digital security approach that uses multi-dimensional grids, presents a robust defense against quantum threats. McKinsey spots a potential $1.3 trillion value unlock by 2035 in key industries including financial, chemicals, automotive and life sciences.

Global Collaboration & Investment Surge:

The G7 emphasizes global quantum collaboration. Transitioning requires robust strategy, but the promise is evident: 2022 saw $2.35 billion in quantum tech start-up investments, surpassing previous records.

Support & Breakthroughs:

To assist businesses in this quantum shift, specialized services offer guidance and risk assessments. Additionally, recent research into the properties of UTe2 in the realm of superconductors hints at game-changing implications for resilient quantum computing.

Quantum is a Priority for the Canadian Government 🇨🇦

Quantum has Deep Roots in Canada

BTQ — Origin: **Vancouver, BC** / Founded: **2021** / Valuation: **~C$85 million**	**D:Wave** — Origin: **Burnaby, BC** / Founded: **1999** / Valuation: **~US$135 million**
XANADU — Origin: **Toronto, Ontario** / Founded: **2016** / Valuation: **~US$1 billion**	**1QBit** — Origin: **Vancouver, BC** / Founded: **2012** / Valuation: **~C$200 million**

Initiatives Across Provinces

Service des Délégués Commerciaux — Trade Commissioner Service

QUÉBEC QUANTIQUE

QUANTUM BC — research · training · innovation

Canadian Quantum Strategy

According to a study commissioned by the National Research Council of Canada (NRC), the quantum sector will become a $139 billion industry in Canada with more than 200,000 jobs and $42 billion in returns by 2045, potentially contributing 3% to Canada's GDP

🇨🇦 Government of Canada

The science of today will be the economy of tomorrow, and quantum science is at the forefront of that shift. [...] We will ensure that quantum continues to be a success story for Canadian businesses and will continue to help the industry provide the world with sought-after solutions.

The Honourable François–Philippe Champagne, Minister of Innovation, Science and Industry

National **Quantum Strategy**

Government of Canada / Gouvernement du Canada — Canada

BTQ is a Global Quantum Commercialization Platform

BTQ

Strategic Global Presence

Vancouver, Canada
Public Company Headquarter

Seoul, South Korea
Research Hub and
Business Development

Vaduz, Liechtenstein
BTQ AG (Subsidiary) Headquarters

Tokyo, Japan
Research Hub

Taipei, Taiwan
Technical/Branch Office,
Manufacturing

Sydney, Australia
Research Hub
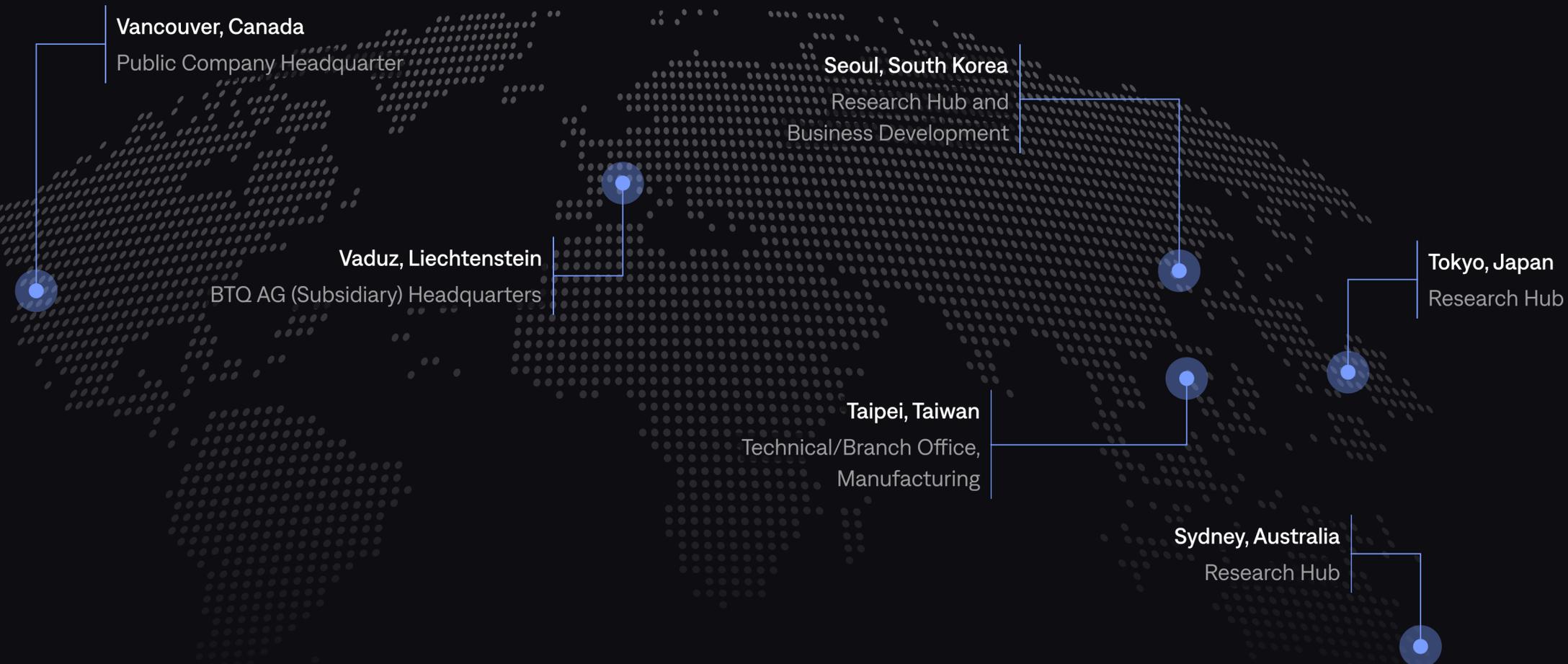
Employees:

35+ (>70% R&D)

Business Model:

Cloud accessible post–quantum
infrastructure & IP licensing with
flat SG&A

Select Use Cases

Distributed ledgers, privacy–
preserving data exchange, CBDCs,
near–term application of quantum
technologies

Diversified Business Model

BTQ Technologies is pursuing a comprehensive global strategy for the development of Post-Quantum Cryptography (PQC) solutions. This involves engaging in government-funded research to address strategic challenges, entering research contracts for collaborative projects, and actively focusing on intellectual property development. By combining these approaches, BTQ Technologies aims to drive innovation in PQC, collaborate with diverse entities, and establish a strong intellectual property portfolio for a competitive edge in the field.

Government-Funded Research

MISSION CRITICAL QUANTUM RESEARCH
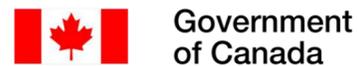
EMERGING TECHNOLOGIES

Research Contracts

PQC RESEARCH AND NIST STANDARDIZATION

QUANTUM AI APPLICATIONS

POST-QUANTUM CYBERSECURITY SYSTEMS

IP Development

POST QUANTUM RESISTANT SIGNATURES FOR BLOCKCHAIN & ZERO-KNOWLEDGE DEVELOPMENT

PQC HARDWARE SUB-LICENSING

ZERO-KNOWLEDGE AND IDENTITY

Management Team &
Selected Advisory Board Members

BTQ

Olivier Roussy Newton

Chief Executive Officer, **Chairman**

Founder HIVE Blockchain Technologies (NASDAQ:HIVE), Founder Latent Capital

Nicolas Roussy Newton

Chief Operations Officer, **Director**

Partner at Latent Capital, focused on quantum technologies. Previously Consultant at GitHub Inc.

Chen-Mou Cheng

Chief Cryptographer

Harvard PhD in Computer Science; previously professor at National Taiwan University, 2348 citations and 24 h-index

Gavin Brennen

Quantum Information Advisor

Director Macquarie Centre for Quantum Engineering (MQCQE) Chief Investigator ARC Centre for Excellence in Engineered Quantum Systems (EQUS)

Po-Chun Kuo

Chief Technology Officer

PhD, Institute of Electronics Engineering at National Taiwan University. Post-quantum cryptographer. 204 citations and 6h-index

Ming Chih

Chief Strategy Officer

M.SC in Computer Science, National Taiwan University. Founded Chelpis Quantum.

Peter Rohde

Senior Quantum Researcher

Associate Investigator ARC Centre of Excellence for Engineered Quantum Systems, Centre for Quantum Software & Information (QSI)

Peter Lavelle

Chief Legal Officer

University of Toronto Sciences, JD, Prev Winkler Partners

Brandt Pasco

Advisory Board Member

Previously General Counsel at In-Q-Tel Former Adjunct Fellow at Hudson Institute, J.D. from Georgetown Law. M.A. from University of Chicago.

Kevin Mulhern

Director

Co-Founder & CEO at AdvisorStream (acquired by Broadridge Financial, NYSE: BR), Bachelor of Commercial Studies from Western University

Investment Highlights
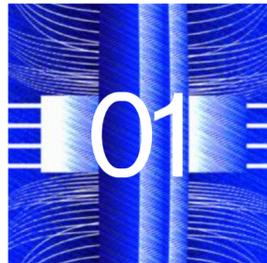
01 First-mover in the post-quantum cryptography space

02 Scalable business model with capex-light approach to revenue generation and a flat SG&A structure

03 Natural barriers to entry with world-class talent in nascent field under long-term contracts

04 Strong macroeconomic tailwinds with quantum risk increasing and governments eager to invest and push innovation in the space

Products Overview

BTQ

Our Products	Technology Type / Business Model	End Uses	Current Customer
PQScale	Software Saas % of Volume	Public blockchains, CBDC frameworks	Stellar STARKWARE
QCIM	Hardware Sub Licensing	Mission Critical Industries (Defense, Automotive, Telecommunications)	FOXCONN 鴻海科技集團
Quantum Consensus	SaaS % of Volume	Public blockchains, CBDC frameworks	
Kenting	Software Saas % of Volume	Public blockchains, CBDC frameworks	

Standards	Technology Type / Business Model	End Uses	Status
NIST Preon	Research Standards	Industry Agnostic	NIST Standardization Candidate
SOLMAE	Research Standards	Industry Agnostic	NIST Standardization Candidate

PQScale

Leading the Development and Integration of
Quantum–Resistant Blockchain Frameworks

BTQ awarded a grant from Starkware Industries
Ltd. to develop the first post–quantum digital
signature aggregation contract on StarkNet

StarkWare is a leading provider of zero-knowledge
proof (ZKP) technology for scaling Ethereum.
Starkware has processed over $1T in cumulative
trading and holds over $500M in assets
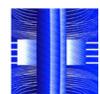
The project completed Falcon signature
verification in a ZK–STARK, marking the first ever
post-quantum signature verification on Starkware

Quantum Consensus

Pioneering Quantum Blockchain Consensus

Traditional blockchain consensus mechanisms such as Proof of Work (PoW) have demonstrated their success but come with considerable drawbacks, notably their energy-intensive nature and vulnerability to attacks.
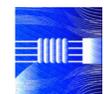
Quantum technologies enable us to significantly reduce the energy required for complex calculations, such as consensus processes while simultaneously bolserting the security of the protocol.
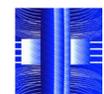
BTQ's quantum-based blockchain consensus research stands at the forefront of innovation, effectively tackling the energy and security challenges that pose existential threats to the growth of the blockchain industry.

Features

ENERGY EFFICIENT

QUANTUM ADVANTAGE

POST -QUANTUM SECURE

FIRST PRACTICAL COMMERCIAL APPLICATION FOR NISQ-ERA HARDWARE
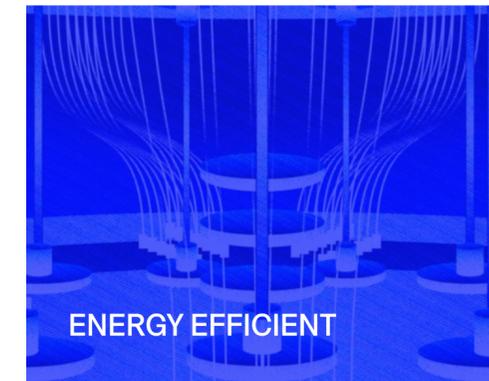
Revolutionizing CBDCs

The Quantum-Secure "Minting Press"

- As the global financial landscape shifts towards Central Bank Digital Currencies (CBDCs), quantum security becomes paramount.
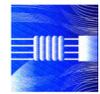
- **BTQ's Solution:** Groundbreaking hardware and software products that together serve as the new 'minting press' for CBDCs.

  - Quantum-Secure Signing and Authentication: Ensuring the integrity of transactions with impenetrable safeguards against quantum threats.

  - Accelerating Transaction Processing: Streamlining CBDC ecosystems by enabling Visa-like transaction speeds for faster settlement.
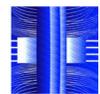
- Post-quantum cryptographic hardware security modules will be necessary in order to sign and authenticate transactions in a quantum-safe CBDC framework.

betakit

Bank of Canada explores impact of quantum computing on CBDCs

September 6, 2023

BIS

BIS Innovation Hub unveils new CBDC prototype

November 14, 2022

Preon

zk–SNARK based Post–Quantum Signature Scheme ▶ Watch ↗

On July 23, 2023, BTQ announced that the National Institute of Standards and Technology (NIST) has selected BTQ's post-quantum cryptography scheme, Preon, in the first round for consideration in their Post–Quantum Cryptography (PQC) standardization process

This announcement comes amidst the fourth round of the ongoing PQC standardization process, wherein several Key Encapsulation Mechanisms (KEMs) including BIKE, Classic McEliece, and HQC are still being evaluated.
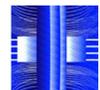
Preon is a post-quantum signature scheme, resilient against classical and quantum attacks. It operates based on a general proving system requiring minimal assumptions. This system is essentially a protocol that enables a verifier to be convinced of a prover's secret knowledge, serving as a foundation for signature schemes

Features

SMALL KEY SIZE
Compact yet powerful. Preon features a minimal footprint with maximum security.

FAST KEY GENERATION
Accelerated protection. With preon, security is a click away.

MINIMAL ASSUMPTION
Less guesswork, more assurance with preon. Solid security, clear assumptions.

FLEXIBLE FUNCTIONALITY
One system, infinite possibilities. Embrace the flexibility of futuristic security.

Quantum Sampling

Proof–of–Work Consensus ▶ Watch ↗

On June 5, 2023, BTQ Technologies Corp. announced that it had co-authored a groundbreaking research paper on "Proof–of–Work Consensus by Quantum Sampling," introducing a novel approach that has the potential to revolutionize blockchain consensus algorithms.
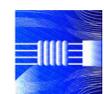
The research paper showcases the application of coarse–grained boson–sampling (CGBS) as a quantum Proof–of–Work (PoW) scheme, enabling users to perform boson–sampling and commit their samples to the network based on current block information.
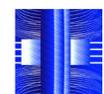
The proposed CGBS scheme incentivizes honest nodes through a strategic combination of rewards for miners submitting honest samples and penalties for miners submitting dishonest samples, leading to a Nash equilibrium and offering dramatic speedup and energy savings compared to classical hardware computation.

THE UNIVERSITY OF QUEENSLAND AUSTRALIA

THE UNIVERSITY OF MELBOURNE

MACQUARIE University SYDNEY·AUSTRALIA

BTQ

SELECTED RESEARCHERS HIGHLIGHT

Prof Gavin Brennan

Director Macquarie Centre for Quantum Engineering (MQCQE)
Chief Investigator ARC Centre for Excellence in Engineered Quantum Systems (EQUS)
Executive Board Member Sydney Quantum Academy (SQA)

Prof Peter Rohde

Associate Investigator ARC Centre of Excellence for Engineered Quantum Systems
Centre for Quantum Software & Information (QSI), University of Technology Sydney
Scientific Advisor Entropica Labs

ADDITIONAL PAPER AUTHORS

Deepesh Singh, Boxiang Fu, Gopikrishnan Muraleedharan, Chen–Mou Cheng, Nicolas Roussy Newton

"We take great pride in our contribution to this pioneering research paper on Proof–of–Work consensus by quantum sampling. The transformative nature of this innovative approach holds the promise of revolutionizing blockchain consensus algorithms by harnessing the immense power of quantum technology. This remarkable research serves as a testament to our unwavering commitment to providing cutting–edge solutions in the era of post–quantum security."

– Olivier Roussy Newton, CEO of BTQ

QCIM

QCIM aims at developing IPs and SoCs that provide efficient and certified PQC engines for a wide range of security chips, e.g. ASICs for IoT devices and automotive electronics. Leveraging ITRI's cutting edge CIM technology, BTQ is focusing on general purpose PQC hardware designs that implement the standard algorithms selected by NIST.

```
                        ┌─────────────────────────────────┐
                        │        PQC Secured Chip          │
                        └─────────────────────────────────┘
                          │                          │
              ┌───────────────────┐        ┌───────────────────┐
              │  PQC Silicon IP    │        │ Crypto Coprocessor │
              └───────────────────┘        └───────────────────┘
                  │          │                       │
    ┌──────────────────┐ ┌────────────┐    ┌──────────────────┐
    │ Provide Crypto   │ │ RISC-V     │    │ Crypto Engine+   │
    │ Engines (AMBA    │ │ PQC ISA    │    │ RISC-V           │
    │ Interface)       │ │            │    │                  │
    └──────────────────┘ └────────────┘    └──────────────────┘
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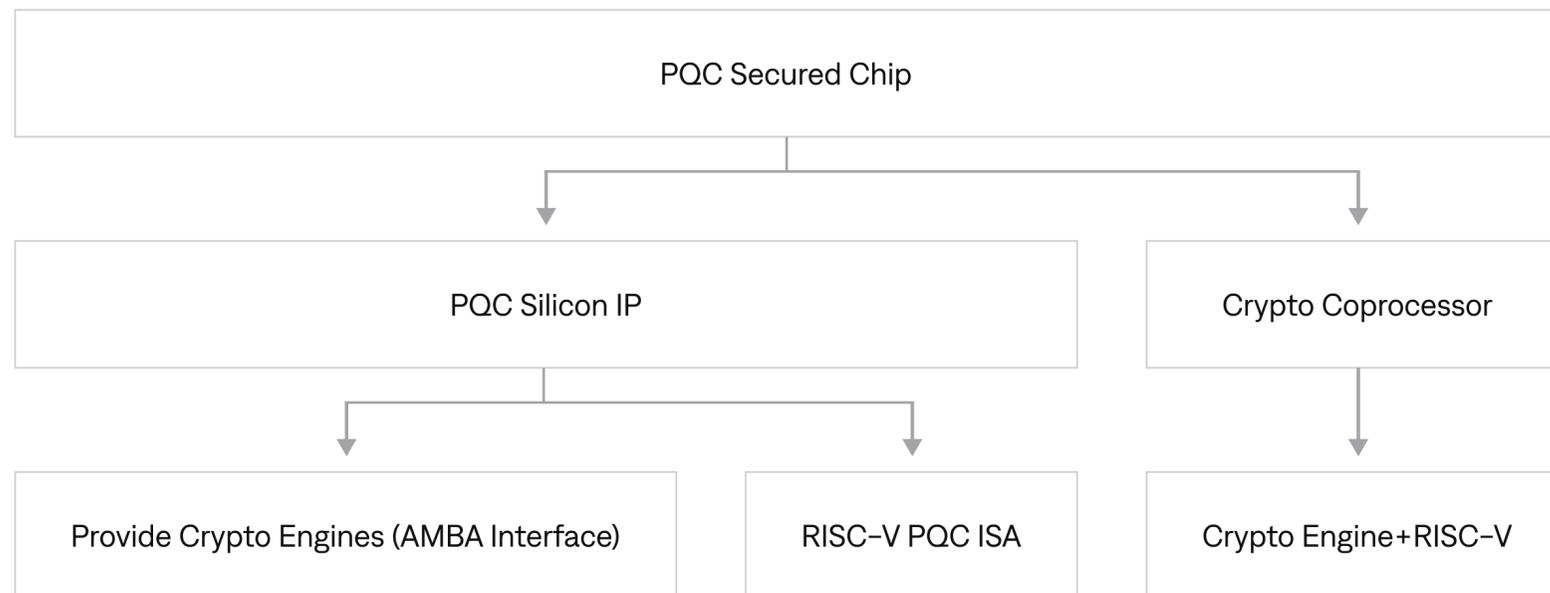
IC Front End/Backend Resources/Firmware

BTQ & ITRI Announce Collaboration To Develop Next-Generation Semiconductor Technology For Post-Quantum Cryptography

Read Article ↗

"

It's kind of like the Y2K problem, except that we don't actually know the date," said Nicolas Roussy Newton, Taipei-based co-founder and Chief Operating Officer of BTQ, which is developing post-quantum software and semiconductors. "There's the threat that data stolen today could be decrypted in the future by quantum computers."

Bloomberg

Read Article ↗

Appendix

Supplemental Research Deep Dive

BTQ
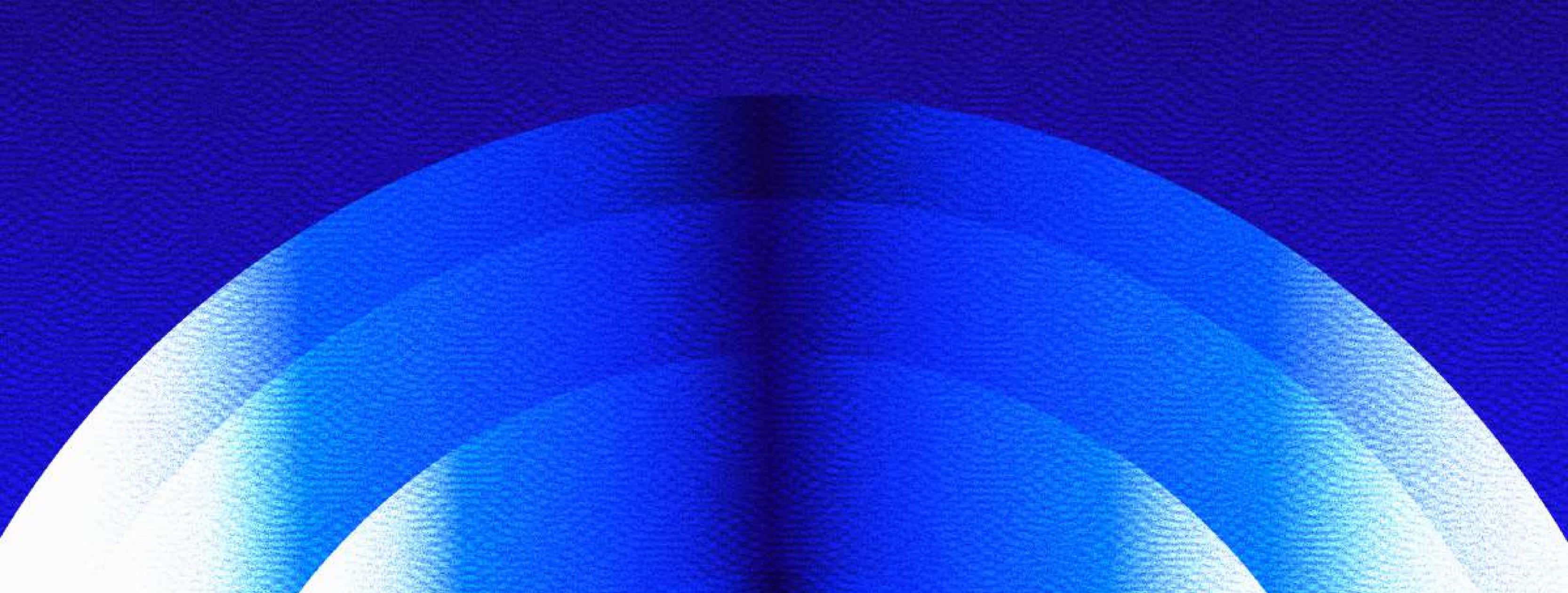
Public Market Overview

BTQ

Public Market Capitalization   BTQ

Ticker Symbol	
🇺🇸 OTCQX: **BTQQF** 🇨🇦 Cboe CA: **BTQ** 🇩🇪 FRA: **NG3**	
Cboe Exchange Listing Date	February 21, 2023
Total Shares Outstanding	123,193,879
Options and Warrants Outstanding	8,207,500
Fully Diluted Shares Outstanding	131,401,379
Listing Price	C$0.40
52–Week High Low	C$0.33 – C$1.00

Share data as of September 30th, 2023; Stock price data as at Friday January 4th, 2024

Share Price Performance   Since listing | in C$ | Volume in 000s

~75% share price appreciation since listing

Listing Timeline for Different Venues

Cboe	OTCQX	BÖRSE FRANKFURT Börse Stuttgart	börse münchen
Feb 2023 BTQ	May 2023 BTQQF	March 2023 NG3	June 2023 NG3

Key Partnerships Across Verticals and Geographies

BTQ

Industry Partners

FOXCONN 鴻海科技集團

Joint effort in post-quantum cryptography research as well as standardization submission

ITRI Industrial Technology Research Institute

Development of security chip that utilizes QCIM (Quantum Computation in Memory) technology

Stellar

Scaling solution to improve transaction verification speed and cost on the stellar blockchain by leveraging zero-knowledge

STARKWARE

Implementation of the PQScale scaling solution on StrarkNet, a permissionless decentralized ZK rollup

holonym

Aiming to create a robust, secure, and private decentralized identity protocol, useful in various sectors

Academic, Governmental, and Professional Partners

mitacs

UNIVERSITY OF WATERLOO

QUANTUM INDUSTRY CANADA

CYBERSECURITY AND PRIVACY INSTITUTE UNIVERSITY OF WATERLOO

MACQUARIE University SYDNEY·AUSTRALIA

CSIRO

ircs

Key Milestones: Public Listing to

February 2023

Public listing debut on the CBOE Exchange at C$0.40 per share (NEO:BTQ)

April 2023

BTQ presents at ETHTaipei to discuss the company's zero-knowledge solutions

June 2023

Joined the Centre for Quantum Technologies (CQT) in the Quantum Energy Initiative (QEI)

Featured in the prestigious New Scientist magazine for its collaborative research paper, "Proof-of-Work Consensus by Quantum Sampling".

Approval from the USPTO for patent application focused on generating a private cryptographic key

August 2023

BTQ Technologies Unveils 'The Quantum State' Podcast: A Deep Dive into Quantum Computing with Leading Experts

2023

March 2023

BTQ Team speaks on Post-Quantum cryptography panel at Quantum Beach in Miami

Frankfurt exchange listing debut ("NG3")

May 2023

Company receives grant from the Stellar Foundation

US OTC QX Best Market Listing debut ("BTQQF")

Company secures office space in Vancouver to house its management team and hire technical talent

BTQ receives acceptance into the Quantum Industry Canada Consortium

Appointment of seasoned accountant Lonny Wong as CFO

July 2023

"Preon" selected by the National Institute of Standards and Technology (NIST)

Strategic research partnership with South Korea's International Research Institute for Cyber Security (IRCS)

Addition of Brandt Pasco, an accomplished legal and private equity professional, to its advisory board

September 2023

BTQ Technologies Selected for 2023 Canada–South Korea Quantum R&D Delegation: Strengthening Global Quantum Collaborations

Present

October 2023

BTQ Technologies Corp. & ITRI Announce Collaboration on Quantum Computation in Memory and Kyber–Hardware

BTQ Announces Ecosystem Partnership With Cysic Over Keelung – A Zero-Knowledge Domain Specific Language for Fast, Private and Secure Applications

BTQ Technologies Deepens Quantum Research and Product Commercialization Expertise with the Addition of Dr. Peter Rohde

December 2023

BTQ Announces Participation and Sponsorship at CfC St. Moritz Conference

2024

November 2023

BTQ and Hon Hai Research Institute Team Up To Help Pioneer Post–Quantum Cryptography Standards

BTQ

Marquee Collaboration with Foxconn and Mitacs

BTQ has secured an exclusive partnership with leading companies Mitacs and Foxconn in order to help Foxconn, Hon, a global leader of technology services provider, expand its operations to Canadian soil
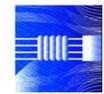
Mitacs assists Canadian organizations in reaching their goals, funds cutting-edge innovation, and creates job opportunities for students and postdocs
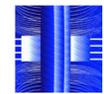
This collaboration is the start of a long-term relationship to help build commercial IP that will serve various end-uses identified by BTQ and Foxconn

FOXCONN® 鴻海科技集團   mitacs

Partnership Flywheel

Secure elite Canadian PQC talent through Mitacs and existing relationships

↓

Proceeds of output IP shared between BTQ and HonHai

↓

Reinvest in brand and expand partnership with additional support from governmental programs
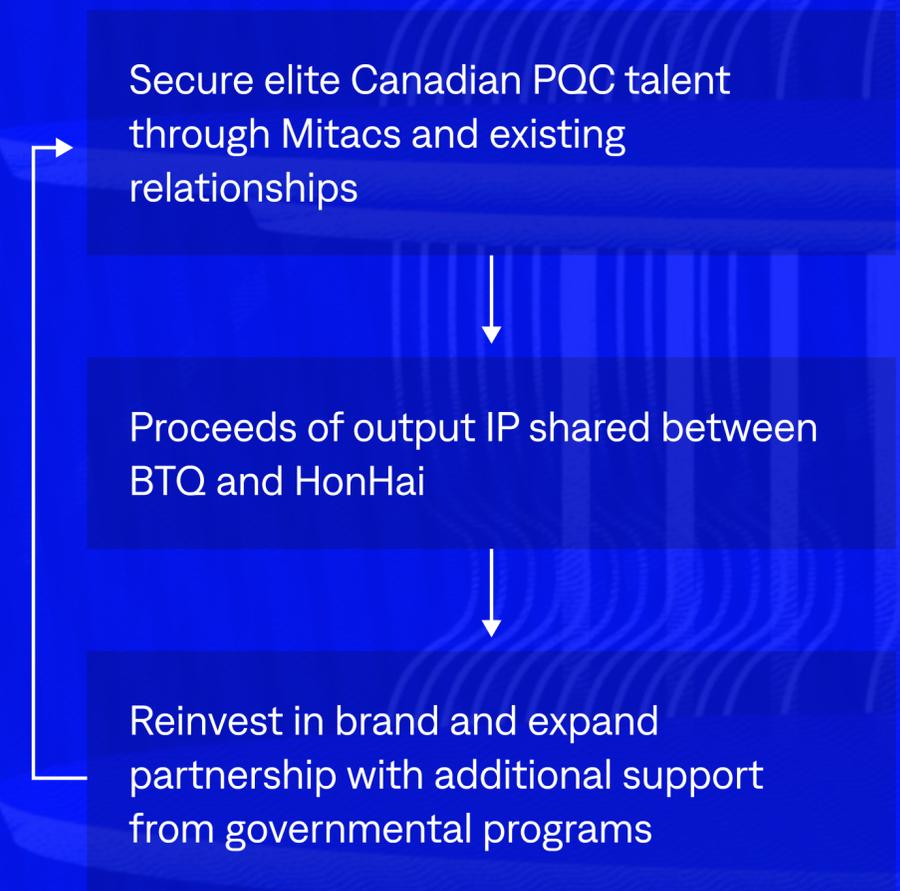
Waterloo Cybersecurity and Privacy Institute Overview

The Cybersecurity and Privacy Institute (CPI) at the University of Waterloo fosters interdisciplinary research collaborations and increasing the visibility and strength of Waterloo's cybersecurity and privacy research.

In November 2023, the CPI secured $3.3 million from the National Cybersecurity Consortium (NCC) under the Cyber Security Innovation Network (CSIN) program.

CPI Sponsors, Partners, and Supporters

BTQ   BlackBerry   RBC Foundation

aws   mastercard   TAURIA

CPI Areas of Focus

| Cryptography | Network Security | Operation Security | Quantum-Safe Communication |

| Data Science – Security and Privacy | Human & Societal Aspects of Security and Privacy | Privacy-Enhancing Technologies |

| Legal and Policy Aspects of Security and Privacy |

BTQ

CPI Key Stats

#1 in Canada

#10 in the world

69 researcher

60 student members

Representation from 7 faculties

The Quantum State Podcast: Presented by BTQ

BTQ

Innovative Insights

"The Quantum State"podcast delves into the latest research and innovations in quantum computing.Join us for thought-provoking discussions and in-depth analyses.

Expert Perspectives

Hosted by Anastasia Marchenkova, with co-hosts Gavin Brennen and Peter Rohde, the podcast brings together leading experts to explore various facets of quantum technology.

Diverse Topics

From quantum hardware's role in encryption to the ethical, investment, and innovative aspects of quantum technologies, each episode offers a fresh perspective on this transformative field.

Accessible Knowledge

Whether you're a quantum enthusiast or a professional in the field, "The Quantum State" makes complex quantum concepts understandable and engaging.

Anastasia Marchenkova

A quantum researcher with experience at Georgia Tech, the University of Maryland Joint Quantum Institute, and the Lawrence Berkeley National Lab. Founder of Bleximo, focusing on superconducting quantum processors. Vice Chair for the IEEE QuantumComputing Standards project and a key contributor to global internet connectivity initiatives.

Gavin Brennen

Director at Macquarie Centre forQuantum Engineering (MQCQE) and Chief Investigator at ARC Centre for Excellence in Engineered Quantum Systems (EQUS). Executive Board Member of the SydneyQuantum Academy (SQA), contributing significantly to quantum engineering and research.

Peter Rohde

Associate Investigator at ARCCentre of Excellence for Engineered Quantum Systems and part of the Centre forQuantum Software & Information (QSI). His work focuses on the interplay of quantum software and hardware, enhancing the field of quantum computing.

StayUpdated

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BTQ

Quantum Computing Industry Headlines

National Security and Quantum Readiness: U.S. agencies and NIST urging organizations to prepare for post-quantum cryptography standards.

IBM and Cleveland Clinic: Installation of the world's first quantum computer dedicated to healthcare research.

Quantum Computing Cybersecurity Act: Signed by President Biden, addressing the transition to post-quantum cryptography in federal agencies.

Quantum Skills Gap: IBM, Microsoft, and Google addressing the shortage of skilled workers in quantum computing.

Verizon's Quantum-Safe Technology: Trials of quantum key distribution networks and quantum-safe VPNs.

Post-Quantum Cryptography: Deloitte's prediction of a breakthrough year in 2024 for post-quantum cryptography.

Dell's Quantum Computing Advice: Emphasizing the importance for CIOs to engage with quantum technology in 2023.

China's Quantum Leap: Claims of a significant advancement in quantum computing capabilities.

Salesforce's Quantum Investment: First investment in quantum technology, focusing on quantum sensing and computing.

Media Coverage

New Scientist

Quantum computers could slash the energy use of cryptocurrencies

COINTELEGRAPH The future of money

Scientists propose quantum proof-of-work consensus for blockchain

coindesk

BTQ Selected as Project to Watch by Coindesk

yahoo! finance

BTQ Prepares Today to Defend Against Tomorrow's Quantum-Computing Threat

THE QUANTUM INSIDER

Latest Quantum Startup — BTQ Technologies Corp. — Goes Public on NEO Exchange

SEMAFOR

Taiwan's Tech Muscle Strengthens Even as Chinese Threat Grows

Bloomberg

The Race Is On to Fight a Cyber Threat That Doesn't Exist

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Quantum
Commercialization Platform

STANDARDIZATIONS

NIST Preon ↗

SOLMAE

OPEN SOURCE

Keelung

OUR PRODUCTS

PQScale ↗

QCIM

Quantum Consensus ↗

Kenting

 BTQ

Illustrative
Product Pipeline

STANDARDIZATIONS		MONETIZATION	END USERS	R&D STAGE	FORMALIZATION	TECHNICAL EVALUATION	STANDARDIZATION
NIST Preon		To be Determined	Focused on AI and Large Language Models				
SOLMAE			Industry Agnostic				

OUR PRODUCTS		TECHNOLOGY TYPE / BUSINESS MODEL	END USERS	R&D STAGE	ALPHA TESTING	BETA TESTING	COMMERCIALIZATION
PQScale		Software Saas % of Volume	Public blockchains, CBDC frameworks				
QCIM		Hardware Sub Licensing	Mission Critical Industries				
Quantum Consensus		SaaS % of Volume	Public blockchains, CBDC frameworks				
Kenting		Software Saas % of Volume	Public blockchains, CBDC frameworks				

Preon Submission Led by World–Class Research Team

Chen-Mou Cheng

Chief Cryptographer at BTQ

Po-Chun Kuo

CTO at BTQ

Sheng-Te Hu

Head of Software Engineering at BTQ

Jen-Hsuan Hsiang

Research Engineer at BTQ

Wei-Chih Hong

Head of Hardware Engineering at BTQ

Shiuan Fu

Researcher at BTQ

Ming-Shing Chen

Postdoctoral Researcher at Academia Sinica

Feng-Hao Liu

Associate Professor at Florida Atlantic University

Justin Thaler

Associate Professor at Georgetown University

Wei-Bin Lee

CEO at Hon Hai Research Institute

Yu-Shian Chen

Research Fellow at Hon Hai Research Institute

IRCS & BTQ
Collaboration Overview

BTQ

On July 5, 2023, BTQ announced a strategic research partnership with South Korea's International Research Institute for Cyber Security (IRCS) set to enhance the development of post-quantum cryptography

The agreement specifically focuses on the SOLMAE (quantum-Secure algOrithm for Long-term Message Authentication and Encryption) signature scheme and other lattice-based cryptosystems, thereby expanding BTQ's influence in the Asia-Pacific region
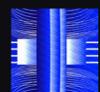
The scheme offers versatile capabilities for authentication and securing communication channels in retail and commercial industry, such as for those leveraging artificial intelligence (AI)

SOLMAE   Ircs

KpqC Algorithm Public Parameter Size Comparison

DS
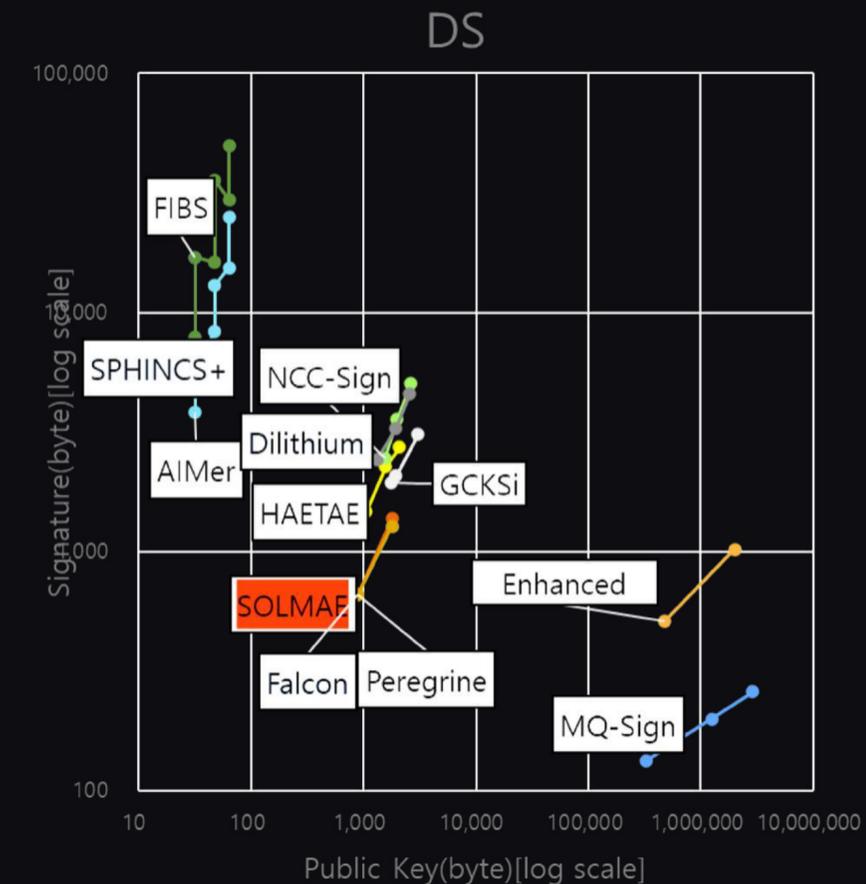
IRCS & BTQ
Illustrative Timeline

BTQ

| SYSTEMATICAL PREPARATION	2023	2024	2025	2026	2027	2028	2029	2030	2031–2032	2032–2035
Technology Acquisition	Development of Domestic Quantum-Resistant Cryptography		• Selection and Standarization of Domestic Quantum-Resistant Cryptography • Transition / Testing Evaluation / Vulnerable Cryptography Detection Identification Technology							
System Regulation		• Security Strength Re-establishment • Establishment and Notification of Long Term Polifices for Cryptographic Model Verification System • Preparation for Implementation of New Cryptographic Modul Verification System								
Procedure Establishment		Action Plan by Field	• Establishment of Preparation Items such as Transition Target Identification Criteria • Support for Pilot Projects and Establishment of Transition Preparation Plan							

TRANSITION SUPPORT & ECOSYSTEM

	2023	2024	2025	2026	2027	2028	2029	2030	2031–2032	2032–2035
Support for Transition					• Best Practice Discovery • Guideline Dissemination	• Operation of Transition Testbed and Integrated Support Center				
Certification Infrastructure			Public Certification Infrastructure Enhancement (Preparation for Compatibility and Minimum Disruption Transition System, etc)			Gradual Enhancement of Public Infrastructure				
Market Growth			• Development of Human Resource Training Measures • Consulting and Specialized Enterprise Development		• Operation of Cryptography Council • Raising Public Awareness of Quantum-Resistant Cryptography Transition					

Extra

Supplemental Research Deep Dive

BTQ
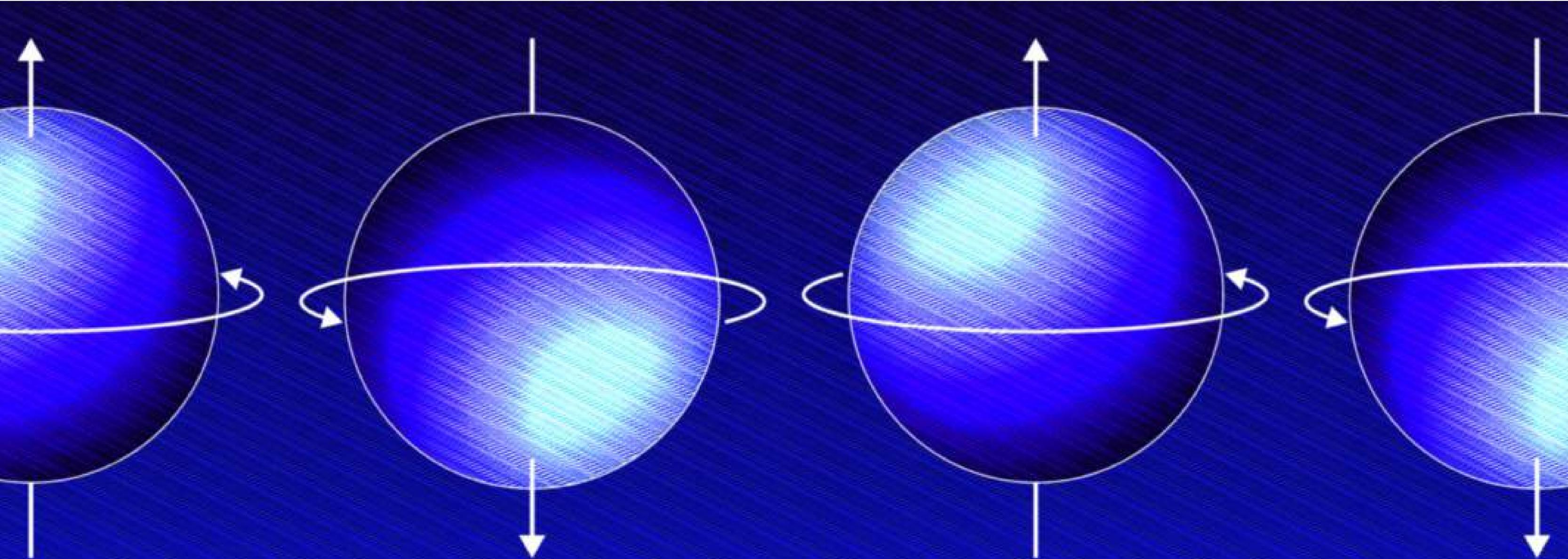
Foxconn
Engagement Overview

BTQ has entered into a Research and Collaboration Agreement with Hon Hai Precision Industry Co., Ltd., globally known as Foxconn

BTQ is assisting Foxconn with global IP & commercialization development related to post-quantum encryption, quantum computing, and quantum sensing

Foxconn ranked 20th on the Fortune Global 500 rankings in 2022 with an annual revenue of over US$213 billion. Some of its largest customers include big-tech giants like Apple, Microsoft, Amazon, HP, and IBM

Founded in 1974 and Headquartered in Taiwan, Foxconn is the largest electronics manufacturer in the world and therefore has a pressing need to introduce quantum-resistant technologies to its vast product portfolio which spans across consumer electronics, cloud and networking products, computing products, and components
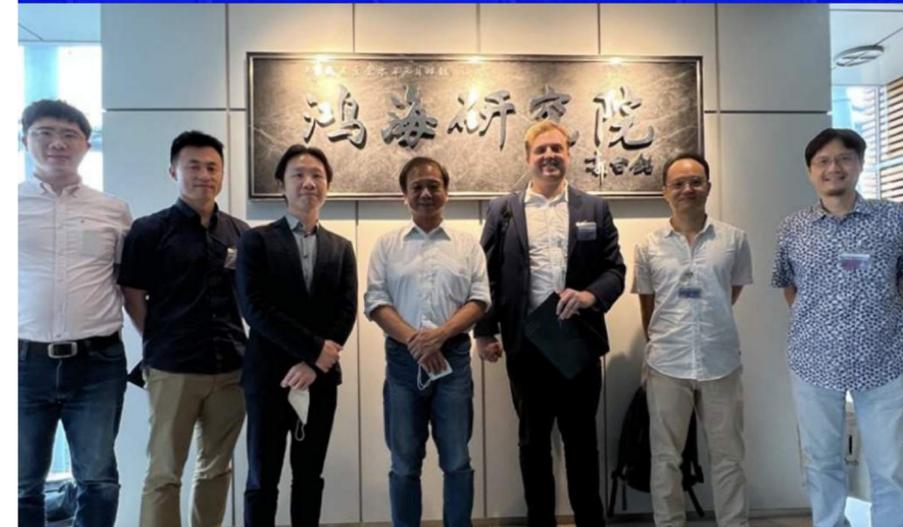
BTQ leadership meeting with Foxconn in Taiwan

CBDC
Overview

 BTQ awarded a grant from the Stellar blockchain to develop an efficient scaling mechanism for lattice-based post-quantum signatures.
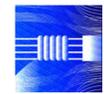
 Stellar (XLM) is a peer-to-peer (P2P) decentralized network created in 2014 by The Stellar Development Foundation or Stellar org. Stellar has a market capitalization of $2.5 billion and a daily transaction volume of $35 million.

 The project upgraded existing vulnerable digital signatures to post-quantum digital signatures, while reducing the size of each block by aggregating signatures associated with multiple transactions in a block.

 BTQ developed an Aggregate-Signature-as-a-Service(ASaas) which includes an API gateway to process quantum-resistant Stellar transactions.

Quantum 101:
Prospects and Challenges

QUANTUM THEORY FUNDAMENTALS

Quantum computing leverages principles like superposition, where quantum bits (qubits) exist in multiple states at once, and entanglement, which allows distant qubits to connect in a way that one instantly affects the other. This is akin to flipping a coin that never lands (superposition) or having two coins that show the same face instantaneously, no matter the distance apart (entanglement).

QUBITS EXPLAINED

Imagine a globe where traditional bits are at the poles, representing 0 or 1. Qubits, however, can exist at any point on the globe, representing an infinite number of possibilities. This allows for a richer and more complex form of computing.

SPEED ADVANTAGE

For tasks like database searches or factoring large numbers, quantum computers use their multi-state qubits to process vast amounts of possibilities simultaneously, significantly cutting down the time needed for complex calculations.

ENTANGLEMENT IN ACTION

Entangled qubits can be used to increase the speed of computations and to create secure communication channels that are theoretically immune to eavesdropping, due to the immediate connection between qubit pairs.

DIVERSE APPLICATIONS

Quantum computing could revolutionize drug discovery by simulating molecular structures, optimize logistics by solving complex routing problems in seconds, and provide unprecedented security in cryptography.

INVESTMENT IN QUANTUM

With government and private sector funding increasing, quantum computing is becoming a field ripe for investment. This funding is driving innovation and bringing quantum computing closer to practical, commercial use.

QUANTUM READINESS

As quantum computing advances, businesses need to assess their infrastructure's readiness for integration with quantum technologies, ensuring they can leverage these advances as they become commercially available.

THREAT TO CYBERSECURITY

The power of quantum computing poses a threat to traditional encryption methods. This is spurring the development of new cryptographic techniques, known as post-quantum cryptography, to protect sensitive data against future quantum attacks.

MARKET GROWTH

Analysts predict a significant growth trajectory for the quantum computing market, potentially impacting sectors like finance, healthcare, and logistics, offering new business opportunities and competitive advantages.

QUANTUM ADVANTAGE

The 'quantum advantage' will be realized when businesses can solve practical problems faster or more efficiently with quantum computing than with classical methods, providing a new frontier for innovation and development.

Quantum Glossary

QUANTUM ENTANGLEMENT

A phenomenon where particles become interconnected and the state of one instantly influences the state of another, regardless of distance.

QUANTUM SUPERPOSITION

The principle that a quantum system can exist in multiple states simultaneously until it is measured.

QUANTUM ALGORITHM

A step-by-step procedure, used for calculations, that takes advantage of quantum states and phenomena.

QUANTUM ERROR CORRECTION

Techniques to protect quantum information from errors due to decoherence and other quantum noise.

QUANTUM KEY DISTRIBUTION (QKD)

A method for secure communication using quantum cryptography.

QUANTUM SUPREMACY

The point where a quantum computer can solve problems that classical computers practically cannot.

QUANTUM COMPUTING

The area of study focused on developing computer technology based on the principles of quantum theory.

QUANTUM SIMULATION

Using a quantum computer to simulate complex quantum systems.

QUBIT

The basic unit of quantum information, analogous to a bit in classical computing.

QUANTUM TELEPORTATION

The transfer of quantum states from one location to another.

QUANTUM CIRCUIT

The basic model for building and operating quantum algorithms.

QUANTUM ANNEALING

A method to solve optimization problems by exploiting quantum tunneling.

QUANTUM CRYPTOGRAPHY

The use of quantum mechanics to secure data in transmission.

NO-CLONING THEOREM

A theorem stating that it is impossible to create an identical copy of an arbitrary unknown quantum state.

BELL TEST

Experiments to demonstrate the reality of quantum entanglement and rule out classical descriptions of reality.

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desk@btq.com

Nicolas Roussy Newton, Co–founder & COO

BTQ