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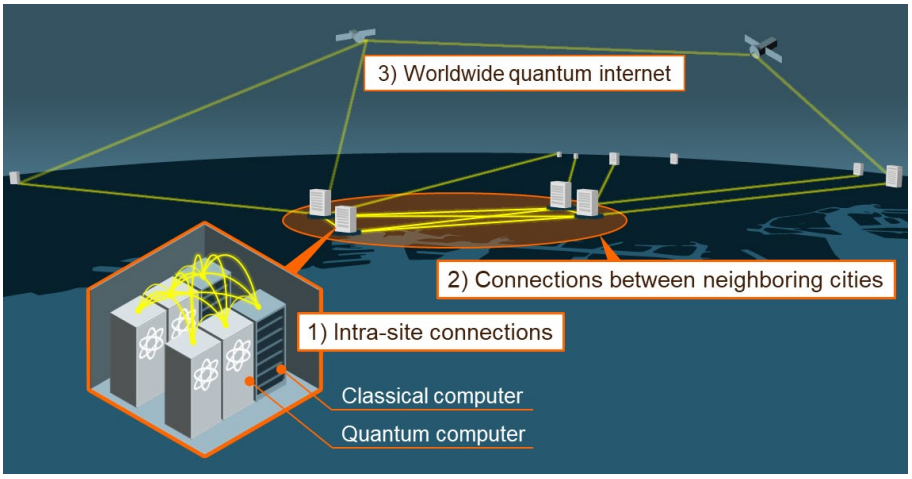
# Mitsubishi Electric Signs Joint Research Agreement with Six Organizations, Aiming to Achieve Deployable and Scalable Quantum Information Processing

*Will help progress the connectivity of multiple quantum devices in practical environments*




The envisaged information processing infrastructure, connecting multiple quantum computers with conventional classical computers

**TOKYO, February 27, 2025** – Mitsubishi Electric Corporation (TOKYO: 6503) announced today it has signed a joint research agreement with Quantinuum K.K., Keio University, SoftBank Corp., Mitsui & Co., Ltd., YOKOHAMA National University, and LQUOM, Inc. Their collaboration aims to enable deployable and scalable quantum information processing by achieving and demonstrating the connection of multiple quantum devices in a practical environment.

Quantum technology is expected to significantly transform information processing in areas such as computing, communication and measurement, which serve as the foundation for scientific and technological advancement. In particular, within the field of computing, it is anticipated that practical quantum computers will emerge in the near future, coexisting with conventional classical computers and heralding their commercial utilization. However, even with the advent of such devices, a single computer will have limited processing capacity and may encounter service disruptions due to malfunctions or maintenance issues. Thus, the ability to connect multiple devices to enhance processing capabilities and enable flexible operation and management is required.

Additionally, photons—elementary particles of light—are employed for the transmission of quantum information; these are frequently lost over long-distance connections, an issue which quantum repeating technology is capable of addressing.

The joint research that will result from this collaboration will focus on scalable quantum information processing technologies, including the interconnection of multiple quantum computers. The necessary steps towards the maturation of the technology are intra-site connections, connections between neighboring cities, and a worldwide quantum internet. The research will concentrate on realizing the first two of these.

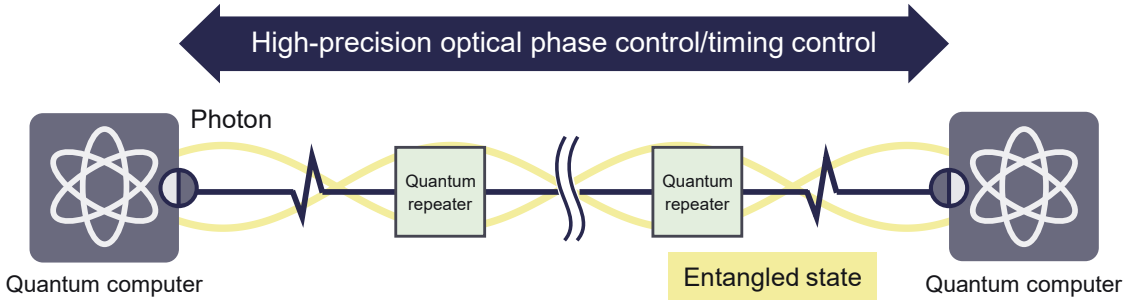
To connect multiple quantum computers located some distance from each other, it is necessary to distribute pairs of photons in a quantum entangled state, a phenomenon where particles form a strong bond, and share this entanglement between the quantum computers.

As part of their joint research, the organizations will develop:

- quantum memory to preserve quantum states for a specified duration
- quantum repeating devices to facilitate the exchange of quantum entanglement necessary for long-distance communication
- high-efficiency converters to transform quantum states within quantum computers into photons for communication
- sub-systems to stabilize transmission paths and restore disturbed quantum states
- control systems to accurately coordinate these quantum information processing devices

Leveraging their individual strengths, the participating organizations will demonstrate the connection of multiple quantum computers and strive to enhance technical readiness levels. Regarding connections between cities, it is necessary to evaluate these within a practical network environment, and the advanced technological knowledge of local universities and startups will be crucial; the organizations will accordingly collaborate with Kawasaki City, Yokohama City, and Kanagawa Prefecture.

This joint research is expected to contribute to the realization of virtual large-scale quantum computing, the efficient and stable operation of quantum computers through the sharing and virtualization of computational capabilities, and the establishment of a comprehensive quantum information infrastructure that facilitates the smooth and secure transfer of measurement data to quantum computers for processing. Additionally, it will help enhance the industry-academia-government ecosystem.




The concept of connecting multiple quantum computers through quantum entanglement

**Primary Responsibilities and Distinctive Characteristics of the Seven Organizations**

| Organization | Primary Responsibilities | Distinctive Characteristics |
|---|---|---|
| Mitsubishi Electric Corporation | Development of a quantum control system | Proven track record in the practical implementation of high-precision optical control technologies and various devices, and accomplishments in security and sensing business applications. |
| Quantinuum K.K. | Advisory on quantum computer and network quantum connection interface | A global industry leader in quantum computing performance, excelling across key benchmarks with the highest-fidelity systems, full connectivity, and scalable Quantum Charged Coupled Device (QCCD) architecture. |
| Keio University | Fundamental research on quantum information transmission technology | Expertise in foundational theory and empirical validation for the future enhancement of quantum information transmission, including the utilization of novel optical fibers. |
| SoftBank Corp. | Identifying technical requirements for future quantum network | Leveraging its proven track record in providing communication services, a leader in the industry fields of AI and quantum technology. |
| Mitsui & Co. Ltd. | Exploration of applications for quantum information processing | Exploring quantum technology applications and creating related markets to meet a wide range of customer needs. Strategic partnership with Quantinuum since 2022. |
| YOKOHAMA National University | Fundamental research on quantum repeating and quantum application technologies | At the forefront of fundamental quantum technology research, driving advancements in quantum repeater, including quantum memory connections. Leveraging this expertise, founded LQUOM and continues to innovate in technologies for quantum applications. |
| LQUOM, Inc. | Development of quantum repeaters | A rapidly growing startup developing quantum repeater technologies by leveraging technology from YOKOHAMA National University. |

**Future Development**

The organizations will conduct their research at the Kawasaki Business Incubation Center in the Shin-Kawasaki Sozo no Mori area of Kawasaki City in Kanagawa Prefecture, aiming to realize the practical application of scalable quantum information processing. They will seek to collaborate with the city's "Quantum Innovation Park" concept, aiming to establish a field network environment by around 2030 and subsequently demonstrate the interconnection of multiple quantum devices.

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**About Mitsubishi Electric Corporation**

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its "Changes for the Better." The company recorded a revenue of 5,257.9 billion yen (U.S.$ 34.8 billion*) in the fiscal year ended March 31, 2024. For more information, please visit www.MitsubishiElectric.com

*U.S. dollar amounts are translated from yen at the rate of ¥151=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2024