QUÉBEC QUANTIQUE

Enabling the Quebec quantum ecosystem

quebec-quantique.ca

Glossary
of quantum technologies

Quantum computing

Quantum computing encompasses data processing technologies that use the quantum properties of matter, such as superposition and entanglement to perform operations on data. This allows faster, more efficient calculations that consume less energy. This technology will not replace processors for consumer products but will be used in applications where the performance advantage offered will be needed.

Quantum Communication

Quantum communication is the transmission of any data that uses a quantum network or encryption. This type of communication makes it possible to have unbreakable security, and in some cases to have data that is already optimized to be processed by quantum devices.

Quantum sensors

A quantum sensor is a piece of equipment that uses a quantum phenomenon to interact with the physical world and take a measurement from it. Generally, these sensors offer an advantage over conventional sensors, whether in sensitivity, ambient noise reduction, or simply the ability to obtain data that is currently invisible to conventional sensors.

Enabling technologies

Enabling technologies encompass new processes and techniques that enable the development and use of quantum technologies. Examples include information and communications technologies (ICT), nanotechnologies and optics-photonics. Quantum 1.0 technologies can also be included in this sub-sector.

Created in collaboration with NUMANA

Public partner Québec

Quantum key distribution (QKD)

Quantum key distribution is a specific cybersecurity application of quantum technologies that works by exchanging cryptographic keys that use certain laws of physics. Thus, unlike conventional encryption, it is impossible to decipher a message without breaking the laws of physics, which makes this technology fully secure. A complete application of quantum key distribution requires software and hardware that work together.

Quantum safe cryptography (QSC)

Quantum safe cryptography is a complementary approach to quantum key distribution. The goal remains to secure the data against quantum attacks, but without using specifically quantum software or equipment. This technology works by using underlying mathematics and algorithms that are different from traditional encryption. The main advantage of this technology is that it can be entirely at the software level, which makes migration easier and less expensive. In the very near future, all networks, classical or quantum, will have to be secured with this technology.

Post quantum cryptography

This name is also used for quantum safe cryptography. The principle and the operation are identical, and the final effect is also a classical network which can be protected against quantum attacks.

Quantum optimized networks

This application will be one of the first to be ready and will allow the optimization of processes for computing, data processing and quantum communication.

Hybrid quantum algorithms

This solution is based on the fact that in the short and probably the long term, quantum computers will be used alongside high-performance classical computers. In order to optimize data management, these algorithms make it possible to share tasks between classical computers and quantum computers.

Hybrid quantum computing

Hybrid quantum computations represent operations performed by hybrid quantum algorithms. They offer the same benefits and are, for all intents and purposes, the same technology.

Distibuted quantum algorithms

These algorithms work in a similar way to hybrid quantum algorithms, with the difference that the data and the computational load to be performed can be distributed over several machines, quantum or classical. This solution will allow access to more powerful machines for more users, since it would be too expensive to install a quantum computer in each potential user. Distributed quantum algorithms will require a network capable of quantum and classical communication, whether short or long distance.

Distributed quantum computing

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