

## 1. Mission

- To realize quantum computers by bringing together the quantum and computer science and technology in RIKEN.
- To play the role of headquarters of the Quantum Technology Innovation Hubs in order to contribute the improvement of quantum technologies in Japan.

## 2. Activities

### ① Superconducting quantum computers

**published the Japan-first quantum computer "A" into cloud.**

- Developed a Japan-first 64-Qubit quantum computer "A", and made it into public through the internet.
- The cloud is expected to contribute a human resource development in this field and industry development by the quantum computing.
- the RIKEN RQC-Fujitsu Collaboration Center developed the 2<sup>nd</sup> quantum computer.

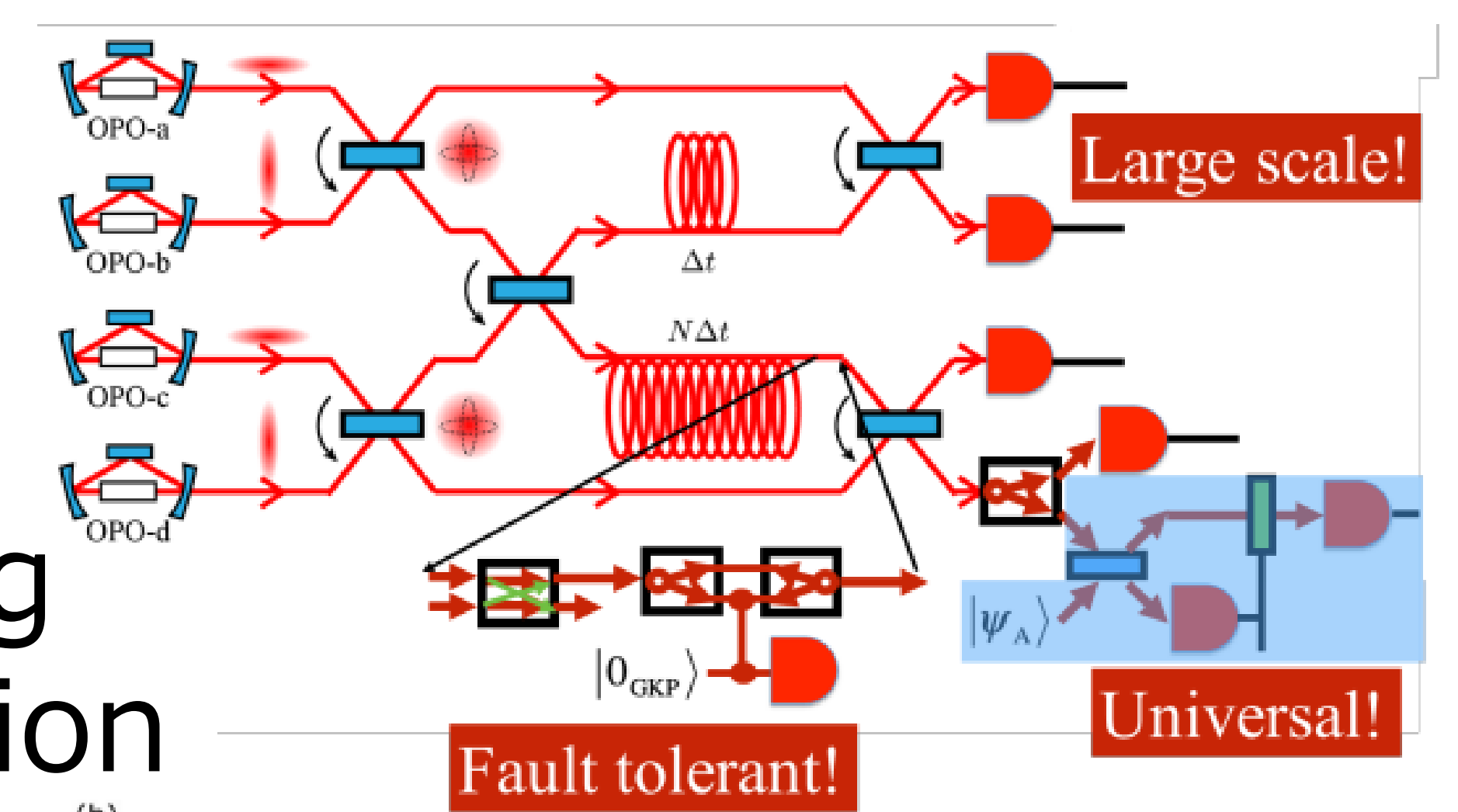


Japan-first 64 qubit quantum computer "A"

### ② Optical quantum computers

**A fault-tolerant optical quantum computers**

- Measurement-induced optical quantum computing based on continuous variable quantum teleportation
- Optical time division multiplexing
- Optical communication wavelength
- Lower device loss and improved stability



Architecture of optical quantum computer

### ③ Semiconductor qubits

**Large-scale semiconductor spin qubits**

- Quantum control of electron spins confined in silicon quantum dots
- Integration technology for large-scale

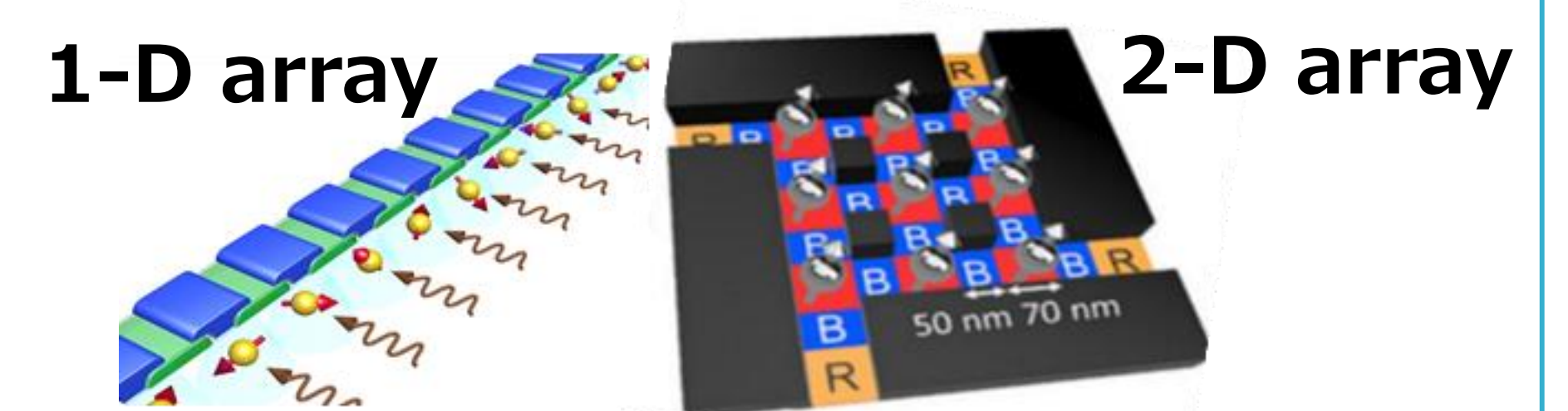


Silicon Quantum computer chip

### ④ Quantum computation theory and software

**NISQ algorithm and fault tolerant computing**

- NISQ applications (materials research, quantum machine learning, etc.) and hybrid NISQ quantum computer and HPC
- Fault-tolerant quantum computation theory

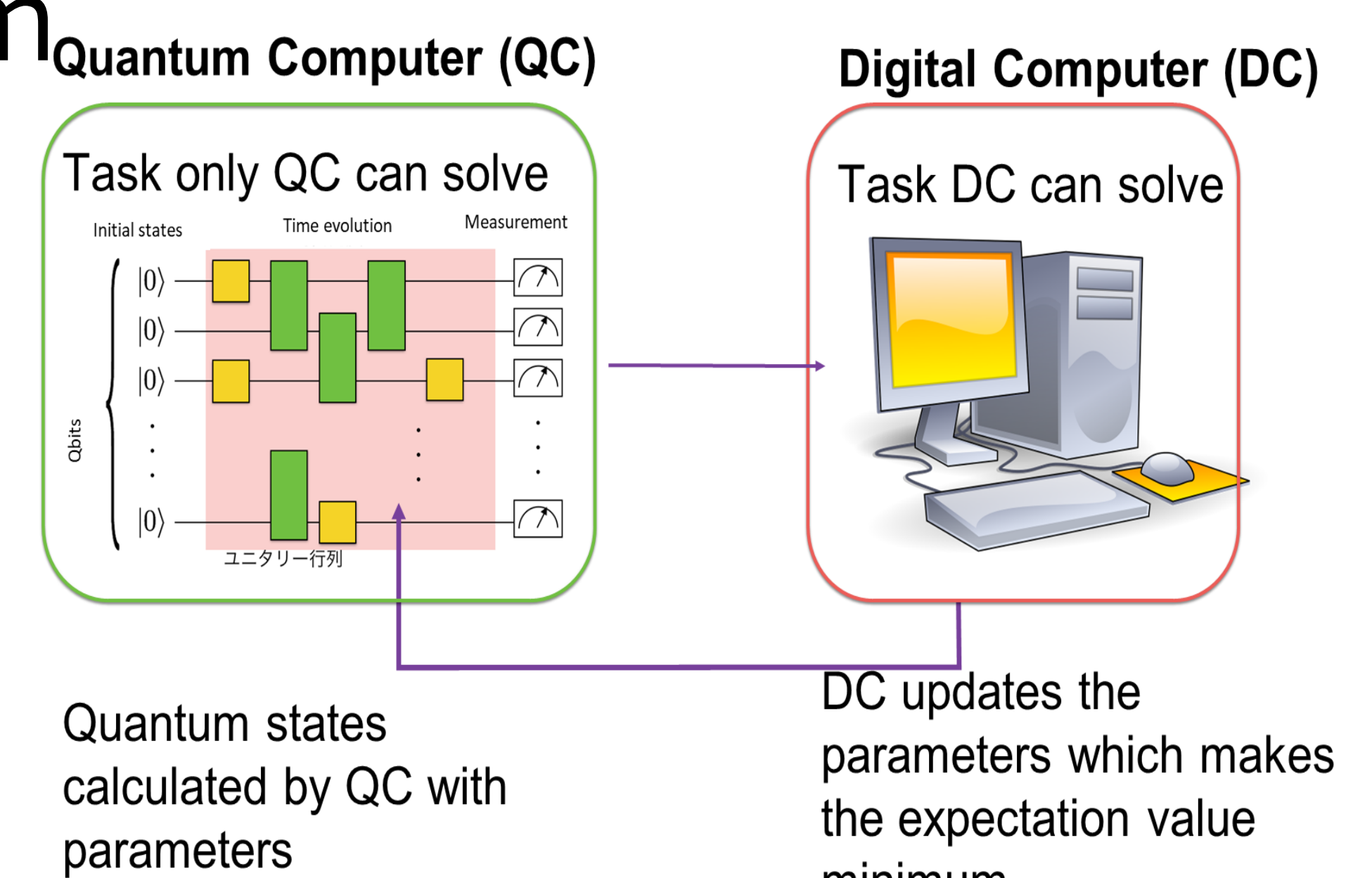


Semiconductor qubit

### ⑤ Basic Technologies for quantum information

**Research on quantum control and measurement in various physical systems**

- Cold atom systems for quantum simulation
- Floating-Electron-Based Quantum system
- Low overhead error correction "bosonic codes"



Quantum states is an extremal function in variational calculus

NISQ algorithm with digital computer