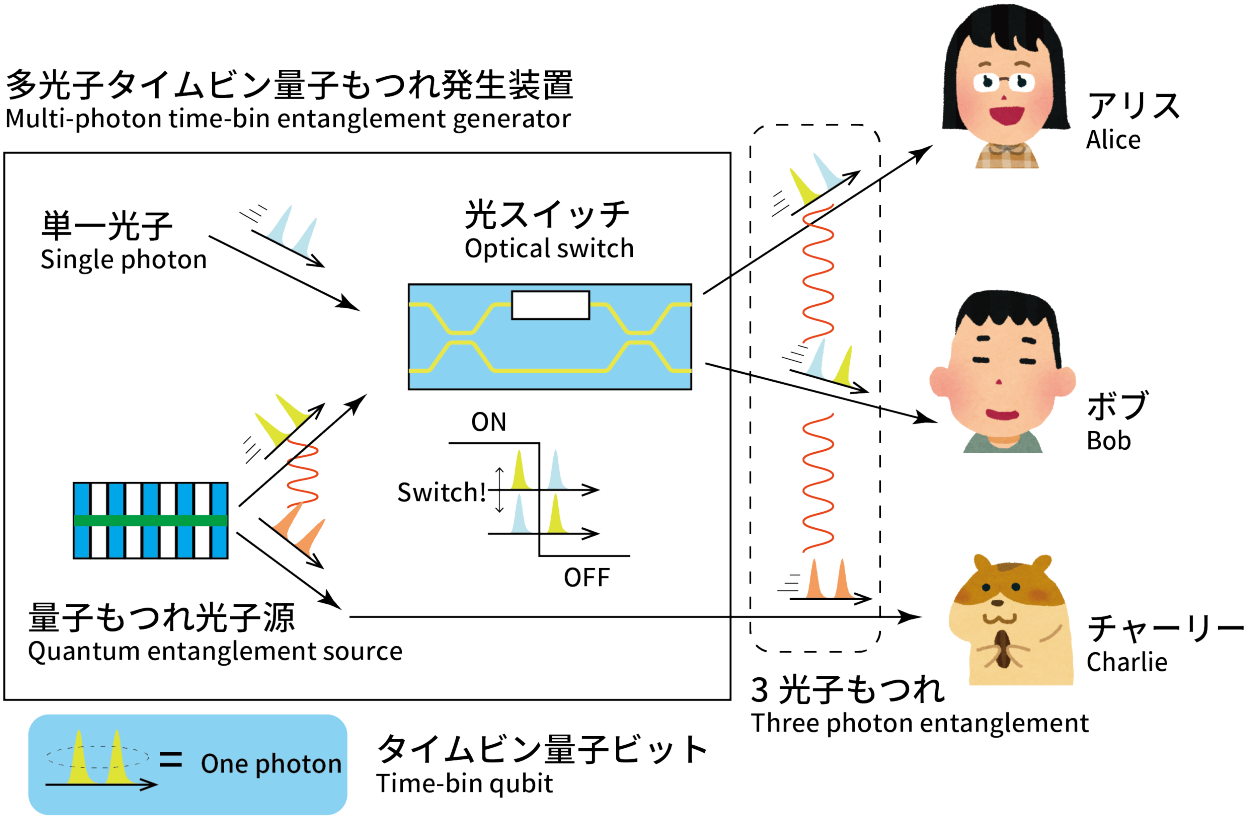
IOWN INTEGRAL
NTT R&D FORUM 2024

RESEARCH
γ 08-03

Quantum communication using multi-photon entanglement

We realize various quantum communication tasks by using multi-photon entangled states

#Customer Experience Value Creation



///Technical Issue

A time-bin quantum state is known as a qubit that is suitable for transmission on fiber. However, generation of multi-partite entanglement based on time-bin qubits has not been a difficult issue.

///Research Goal

With this technology, we realize cryptography and secret sharing that ensures long-term security among many users.

---Technology

We input two time-bin qubits into a two-input, two-output optical switch. By changing the state of the switch depending on the temporal position of the photons, we can generate quantum independent between the two qubits.

---Novelty

Most groups that aim to realize multi-partite quantum communication use superposition states of light polarization as qubits. With our original scheme based on an optical switch, we can create entanglement between time-bin qubits, which are superposition states of temporal positions of light pulses.

---Applicable Business

This technology provides secure communication services that ensures long-term security among many users, including sharing quantum-secure secret keys (multi-party quantum key distribution) and secret sharing (quantum secret sharing).

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