IOWN INTEGRAL NTT R&D FORUM 2024

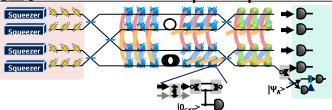
Optical device technologies for optical quantum computing

Emergence of a large-scale optical quantum computer with high performance optical devices

#Customer Experience Value Creation

光通信と光量子の融合でめざす高速光量子コンピュータ Optical Devices for an Ultra-Fast Optical Quantum Computer

<u>連続量光量子コンピュータ An optical quantum computer</u>

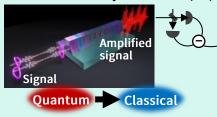


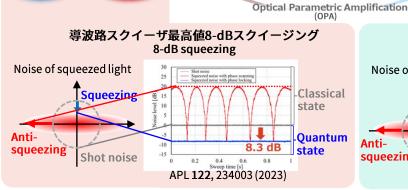
Essential technologies

量子光源 Quantum light sources Squeezed light Pump Classical Quantum

PPLN waveguide modle Quantum Option Parametic Amprilar Classical

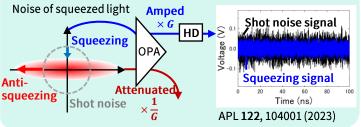
量子状態測定技術 Detection techniques for quantum states OPA x Homodyne detection (HD)





主要技術

従来比1000倍 43 GHz実時間量子信号測定 DC to 43 GHz measurement system



A large-scale optical quantum computing

times faster than conventional quantum

assembled, which will calculate 1000

machine with NTT's optical devices will be

///Technical Issue

Optical devices that suppress quantum noise are eagerly awaited for large-scale quantum computers with continuous variables.

---Technology

Developing fiber-coupled optical devices and ultra-fast detection techniques for quantum states by using NTT's processing technologies and optical device implementation techniques.

---Applicable Business

---Novelty

ones.

///Research Goal

- Generating large-scale quantum entanglements at room temperature.
- Achieving the high-level quantum noise squeezing (8.3 dB) with THz-order bandwidth in quantum light sources.
- Achieving GHz-order real-time quantum-states measurement for the first time.
- Installing NTT's optical device to an optical quantum computing machine in racks by 2030 and on chips by 2050.
- In the information processing industry, having the potential to solve social issues which is difficult to calculate with conventional technologies.