

# Optical Quantum Computers with Quantum Teleportation

**Akira Furusawa**\*<sup>1,2,3</sup>

1. *Department of Applied Physics, School of Engineering, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8656, Japan*
2. *RIKEN Center for Quantum Computing, 2-1 Hirosawa, Wako-shi, Saitama 351-0198, Japan*
3. *OptQC Corporation, 1-21-7 Nishi-Ikebukuro, Toshima-ku, Tokyo 171-0021, Japan*

We succeeded in the realization of unconditional quantum teleportation in 1998 [1]. Then, we invented the scheme of teleportation-based quantum computing in 2013 [2]. In this scheme, we can multiplex quantum information in the time domain and we can build a large-scale optical quantum computer only with four squeezers, five-six beam splitters, and two optical delay lines [3]. We built a real machine of optical quantum computer in Riken and put it on the cloud [4]. We will work on a neural network and Shor's algorithm with the real machine.

## References

- [1] A. Furusawa et al., *Science* **282** 706 (1998) [2] S. Yokoyama et al., *Nature Photonics* **7** 982 (2013)  
[3] W. Asavanant et al., *Science* **366** 373 (2019) [4] S. Yokoyama et al., arXiv:2509.06255 [quant-ph]

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\*akiraf@ap.t.u-tokyo.ac.jp