
Beam up my quantum state, Scotty!

FYST85

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1 Introduction

2 Experimental Evidence

Experimental evidence for quantum teleportation in quantum communications.

2.1 Satellite Based

1400km [1]

2.2 Fibre Network Based

100km [2]. Metropolitan [3]

3 Teleportation of Complex Quantum Systems

4 Quantum Repeaters and Quantum Memory

Quantum internet [4]

References

- [1] J.-G. Ren, P. Xu, H.-L. Yong, L. Zhang, S.-K. Liao, J. Yin, W.-Y. Liu, W.-Q. Cai, M. Yang, L. Li, K.-X. Yang, X. Han, Y.-Q. Yao, J. Li, H.-Y. Wu, S. Wan, L. Liu, D.-Q. Liu, Y.-W. Kuang, Z.-P. He, P. Shang, C. Guo, R.-H. Zheng, K. Tian, Z.-C. Zhu, N.-L. Liu, C.-Y. Lu, R. Shu, Y.-A. Chen, C.-Z. Peng, J.-Y. Wang, and J.-W. Pan, “Ground-to-satellite quantum teleportation,” *Nature*, vol. 549, no. 7670, pp. 70–73, 2017.
- [2] H. Takesue, S. D. Dyer, M. J. Stevens, V. Verma, R. P. Mirin, and S. W. Nam, “Quantum teleportation over 100  km of fiber using highly efficient superconducting nanowire single-photon detectors,” *Optica*, vol. 2, no. 10, pp. 832–835, 2015.
- [3] R. Valivarthi, M. I. G. Puigibert, Q. Zhou, G. H. Aguilar, V. B. Verma, F. Marsili, M. D. Shaw, S. W. Nam, D. Oblak, and W. Tittel, “Quantum teleportation across a metropolitan fibre network,” *Nature Photonics*, vol. 10, no. 10, pp. 676–680, 2016.
- [4] K. Azuma, S. E. Economou, D. Elkouss, P. Hilaire, L. Jiang, H.-K. Lo, and I. Tzitrin, “Quantum repeaters: From quantum networks to the quantum internet,” *Reviews of Modern Physics*, vol. 95, pp. 045006–, 12 2023.