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Passive relays for continental distance quantum communication

Tuesday 10 June 2025 11:00 (15 minutes)

Recent advances in quantum technology have highlighted the need for long-distance quantum communication in order to enable technologies such as quantum key distribution, very-long-baseline interferometry, and distributed quantum computing. Fiber attenuation limits optical fiber links to hundreds of kilometers, while present day satellite links are limited to line-of-sight connections of approximately 1200km. We propose a satellite configuration using a satellite-borne entangled photon source with passive relays placed in trailing orbits. With realistic assumptions on ground station telescopes, lenses, and performance of entangled photon sources, we show that this scheme is able to bridge the continental distances for quantum communication across Canada and intercontinental distances linking North America and Europe. This represents a method of immediately providing entanglement distribution across many thousands of kilometers, a key step towards a global quantum internet.

Keyword-1

Quantum Communication

Keyword-2

Quantum Networking

Keyword-3

Space Technologies

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