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Constellations for space quantum communications

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Abstract

Long-distance quantum communication links enable or enhance a variety of applications in secure communications, distributed sensing timing & navigation, and networked quantum information processing. Distributing entanglement on a global scale will form the basis of the quantum internet, however, the exponential losses in optical fibre and the need for closely spaced quantum repeaters severely limits the prospects of a purely terrestrial-based quantum network. Space-based quantum links have been proposed to overcome the range limitation of fibre with recent satellite demonstrations proving the feasibility of the concept. Quantum satellite constellations will be required to provide wide-scale availability and capacity. Here, I shall cover the challenges and approaches to the use of satellite networks for Earth-spanning quantum-secure communication and entanglement distribution, including the use of space quantum memories and repeaters.