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**Quantum teleportation over 143 kilometres using active feed-forward** XIAOSONG MA, THOMAS HERBST, THOMAS SCHEIDL, DAQING WANG, SEBASTIAN KROPATSCHEK, WILLIAM NAYLOR, ALEXANDRA MECH, IQOQI Vienna, BERNHARD WITTMANN, JOHANNES KOFLER, Univ of Vienna, ELENA ANISIMOVA, VADIM MAKAROV, THOMAS JENNEWEIN, IQC, RUPERT URSIN, ANTON ZEILINGER, IQOQI Vienna — Quantum teleportation is a quintessential prerequisite of many quantum information processing protocols. By using quantum teleportation, one can circumvent the no-cloning theorem and faithfully transfer unknown quantum states to a party whose location is even unknown over arbitrary distances. Ever since the first experimental demonstrations of quantum teleportation of independent qubits and of squeezed states, researchers have progressively extended the communication distance in teleportation. Here we report the first long-distance quantum teleportation experiment with active feed-forward in real time. The experiment employed two optical links, quantum and classical, over 143 km free space between the two Canary Islands of La Palma and Tenerife. To achieve this, the experiment had to employ a combination of advanced techniques such as a frequency-uncorrelated polarization-entangled photon pair source, ultra-low-noise single-photon detectors, and entanglement-assisted clock synchronization. The average teleported state fidelity was well beyond the classical limit of 2/3.

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