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Progress towards the development of a source of entangled photons for Space¹ ALESSANDRO FEDRIZZI, THOMAS JENNEWEIN, RUPERT URSIN, Institute for Quantum Optics and Quantum Information (IQOQI), Austrian Academy of Sciences, ANTON ZEILINGER, IQOQI; Institute for Experimental Physics, University of Vienna — Quantum entanglement offers exciting applications like quantum computing, quantum teleportation and quantum cryptography. Ground based quantum communication schemes in optical fibres however are limited to a distance of the order of ~ 100 km. In order to extend this limit to a global scale we are working on the realization of an entanglement-based quantum communication transceiver for space deployment. Here we report on a compact, extremely bright source for polarization entangled photons meeting the scientific requirements for a potential space to ground optical link. The pair production rate exceeds $4 \cdot 10^6$ pairs/s at just 20mW of laser diode pump power. Furthermore, we will present the results of various experiments proving the feasibility of quantum information in space, including a weak coherent pulse single-photon downlink from a LEO satellite and the distribution of entanglement over a 144km free space link, using ESAs optical ground station.

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