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Experimental distribution of entanglement with separable carriers ALESSANDRO FEDRIZZI, School of Mathematics and Physics, The University of Queensland, MARGHERITA ZUPPARDO, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore, GEOFF GILLETT, MATTHEW BROOME, MARCELO DE ALMEIDA, School of Mathematics and Physics, The University of Queensland, MAURO PATERNOSTRO, School of Mathematics and Physics, Queen's University Belfast, UK, ANDREW WHITE, School of Mathematics and Physics, The University of Queensland, TOMASZ PATEREK, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore — Quantum networks will allow us to overcome distance limitations in quantum communication, and to share quantum computing tasks between remote quantum processors. The key requirement for quantum networking is the distribution of entanglement between nodes. Surprisingly, entanglement can be generated across a network without directly being communicated between nodes. In contrast to information gain, which cannot exceed the communicated information, the entanglement gain is bounded by the communicated quantum discord, a more general measure of quantum correlation that includes but is not limited to entanglement. Here we report an experiment in which two communicating parties who share three initially separable photonic qubits are entangled by exchange of a carrier photon that is not entangled with either party at all times. We show that distributing entanglement with separable carriers is resilient to noise and in some cases becomes the only way of distributing entanglement over noisy environments.

Alessandro Fedrizzi
School of Mathematics and Physics, The University of Queensland

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