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Towards Hybrid Quantum Communication Networks

WOLFGANG TITTEL, University of Calgary, Canada, OLIVIER ALIBART, PASCAL BALDI, University of Nice, France, NICOLAS GISIN, MATTHAEUS HALDER, University of Geneva, Switzerland, IVAN MARCIKIC, National University of Singapore, Singapore, HUGUES DE RIEDMATTEN, University of Geneva, Switzerland, SEBASTIEN TANZILLI, University of Nice, France, HUGO ZBINDEN, University of Geneva, Switzerland — The last years have seen a remarkable advance of experimental realizations of applications of quantum communication. The most important example is quantum cryptography that is now at the verge of becoming an industrial application. One of the future challenges to make this technology widely available is the integration of point-to-point links into networks that may consist of hybrid quantum communication channels with fibre optic and free-space links. I will report on experiments that allow transferring quantum information between photons at different wavelengths, as required for different quantum channels, either based on quantum teleportation [1], or on parametric up-conversion in a non-linear crystal [2]. [1] I. Marcikic, H. de Riedmatten, W. Tittel, H. Zbinden, N. Gisin, *Nature* 421, 509 (2003). [2] S. Tanzilli, W. Tittel, M. Halder, O. Alibart, P. Baldi, N. Gisin, H. Zbinden, *Nature* 437, 116 (2005).

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