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Photonic qubits for remote quantum information processing[1] P. MAUNZ, S. OLMSCHENK, D. HAYES, D. N. MATSUKEVICH, Joint Quantum Institute and Department of Physics, University of Maryland, L.-M. DUAN, FOCUS Center and Department of Physics, University of Michigan, C. MONROE, Joint Quantum Institute and Department of Physics, University of Maryland — Quantum information processing between remote quantum memories relies on a fast and faithful quantum channel. Recent experiments employed both, the photonic polarization and frequency qubits, in order to entangle remote atoms [1, 2], to teleport quantum information [3] and to operate a quantum gate between distant atoms. Here, we compare the different schemes used in these experiments and analyze the advantages of the different choices of atomic and photonic qubits and their coherence properties. [1] D. L. Moehring et al. Nature 449, 68 (2007). [2] D. N. Matsukevich et al. Phys. Rev. Lett. 100, 150404 2008). [3] S. Olmschenk et al. Science, 323, 486 (2009).

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