Abstract Submitted
for the DAMOP07 Meeting of
The American Physical Society

Towards Quantum Memory WOLFGANG TITTEL, University of Calgary, Canada, MIKAEL AFZELIUS, NICOLAS GISIN, SARA HASTINGS-SIMON, MATTHIAS STAUDT, University of Geneva, Switzerland — The last years have seen a remarkable advance of quantum cryptography, which promises information-theoretic secure communication. A remaining challenge concerns the increase of the transmission distance beyond its current limit of 100 km. This requires the development of a quantum repeater, which relies on the possibility to store and recall photons in unknown quantum states. An original protocol for quantum memory is based on controlled reversible inhomogeneous broadening (CRIB) of a single atomic absorption line [1]. We will present experimental investigations of coherence times of Erbium doped fibres and crystalline waveguides [2], and the possibility to implement a controlled broadening by means of the linear dc-Stark effect [3]. The new findings demonstrate the potential of Erbium doped silicate fibers for CRIB based quantum state storage. [1] B. Kraus et al, Phys. Rev. A 73, 020302 (2006). [2] M.U. Staudt et al, Opt. Comm. 266, 720 (2006). [3] S.R. Hastings-Simon et al, Opt. Comm. 266, 716 (2006).

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Date submitted: 03 Feb 2007 Electronic form version 1.4