Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

**Coherence Investigations of Erbium doped in Waveguide Structures for a Quantum Memory** M.U. STAUDT, S.R. HASTINGS-SIMON, B. LAURITZEN, M. AFZELIUS, H. DE RIEDMATTEN, N. SANGOUARD, C. SIMON, University of Geneva, W. TITTEL, University of Calgary, N. GISIN, University of Geneva — Erbium doped waveguides are very promising candidates for the realization of a quantum memory based on reversible absorption in a controllably broadened absorption line (CRIB). First of all the wavelength of the "storage transition" matches well with the "telecom wavelength" most often used for long-distance quantum communications in the past. Secondly the interaction length between light and ions can be made very long within a waveguide. Thus high optical depth can be achieved as required for the proposal. We have measured the homogeneous linewidth of the $I_{15/2} \rightarrow I_{13/2}$ transition in a Erbium-doped $SiO_2$glass fiber and a $LiNOb_3$ Crystal with a waveguiding structure at a wavelength of $\lambda$=1530 nm. The homogeneous lifetime in the glass shows an abnormal magnetic field dependency and is in the order of several $\mu$s, which is an improvement of two orders of magnitude compared to existing data in similar material. Also we investigated the preservation of information encoded into the relative phase and amplitudes of optical pulses during storage and retrieval in an optical memory based on stimulated photon echo.

M. U. Staudt
University of Geneva

Date submitted: 16 Nov 2006 Electronic form version 1.4