Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

**Proposal for a telecom quantum repeater with single atoms in optical cavities** MANUEL UPHOFF, MANUEL BREKENFELD, DOMINIK NIEMIETZ, STEPHAN RITTER, GERHARD REMPE, Max Planck Institute of Quantum Optics, Garching, Germany — Quantum repeaters hold the promise to enable long-distance quantum communication via entanglement generation over arbitrary distances. Single atoms in optical cavities have been shown to be ideally suited for the experimental realization of many tasks in quantum communication. To utilize these systems for a quantum repeater, it would be desirable to operate them at telecom wavelengths. We propose to use a cascaded scheme employing transitions at telecom wavelengths between excited states of alkali atoms for entanglement generation between a single photon at telecom wavelength and a single atom at the crossing point of two cavity modes. A cavity-assisted quantum gate can be used for entanglement swapping. We estimate the performance of these systems using numerical simulations based on experimental parameters obtained for $CO_2$ laser-machined fiber cavities in our laboratory. Finally, we show that a quantum repeater employing the aforementioned scheme and current technology could outperform corresponding schemes based on direct transmission.

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Date submitted: 28 Jan 2016 Electronic form version 1.4