Abstract Submitted
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Efficient single photon detection with cold atoms in hollow fiber SEBASTIAN HOFFERBERTH, MICHAL BAJCSY, Physics Department, Harvard University, THIBAULT PEYRONEL, Physics Department, MIT, MOHAMMAD HAFEZI, VLATKO BALIC, ALEXANDER S. ZIBROV, Physics Department, Harvard University, VLADAN VULETIC, Physics Department, MIT, MIKHAIL LUKIN, Physics Department, Harvard University — Cold atoms confined inside a hollow core photonic crystal fiber are a promising medium for studying nonlinear optical interactions at extremely low light levels. For instance, we demonstrated in recent experiments how such an atomic ensemble consisting of $\sim 10^3$ laser cooled ^{87}Rb atoms results in an optically dense medium whose transparency can be controlled with pulses containing just a few hundred photons [1]. Here, we describe how this medium can be used for high efficiency detection of single stored excitations. This in turn allows for non-destructive detection of single photons with near unity probability, which for example could greatly enhance the efficiency of the DLCZ-scheme for quantum repeaters. We also discuss recent improvements of the atom loading scheme to increase the optical depth of the atomic medium inside the hollow core fiber. [1] M. Bajcsy, S. Hofferberth, V. Balic, T. Peyronel, M. Hafezi, A. S. Zibrov, V. Vuletic, M. D. Lukin, Efficient all-optical switching using slow light within a hollow fiber, arXiv:0901.0336 (2009)

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