Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Radiation Guiding In a Dense, Elongated Cold-Atom Cloud

ANDIRA RAMOS, YUN-JHIH CHEN, Physics Department, University of Michigan, 450 Church Street, Ann Arbor, MI 48109, JAMIE MACLENNAN, Applied Physics Program, University of Michigan, 450 Church Street, Ann Arbor, MI 48109, GEORG RAITHEL, Physics Department, University of Michigan, 450 Church Street, Ann Arbor, MI 48109 — Radiation guiding through a dense, elongated cold-atom cloud in a deep optical lattice created by an in-vacuum cavity has been experimentally observed [1]. When atoms are loaded into the optical lattice, a cylindrically symmetric depletion zone surrounding the lattice location is created. This variation in atomic density gives rise to a position-dependent index of refraction which allows for a probe beam properly coupled into the atomic cloud to be guided through it. For a Hermite-Gaussian mode (HG_{00}), this mini fiber exhibits a transmission pattern consisting of a central feature and multiple concentric rings around it, with higher cavity modes also being accessible in the current experimental setup. Simulations that look to properly model these features are presented. This form of radiation guiding can be useful for Rydberg polariton and EIT experiments, where the atomic fiber would guide one or more trains of single-photon pulses, depending on the cavity mode [2]. [1] Yun-Jhih Chen, Stefan Zigo, and Raithel, G. "Atom trapping and spectroscopy in cavity-generated optical potentials." PRA 89, 063409 (2014). [2] T. Peyronel, O. Firstenberg, Q. Y. Liang, S. Hoerberth,A. V. Gorshkov, T. Pohl, M. D. Lukin, and V. Vuletic, Nature 488, 57 (2012).

Andira Ramos
Physics Department, University of Michigan, 450 Church Street, Ann Arbor, MI 48109

Date submitted: 29 Jan 2016 Electronic form version 1.4