Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Optical characteristics of silicon nitride integrated waveguides for atom trapping FREDRIK FATEMI, Army Research Laboratory, Adelphi, MD 20783, MARCEL PRUESSNER, RITA MAHON, DOEWON PARK, DMITRY KOZAK, BLAKE SIMPKINS, JED ZIEGLER, TODD STIEVATER, Naval Research Laboratory, Washington, DC 20375 — A number of recent experiments have demonstrated enhanced atom-light interactions by confining atoms in the evanescent field of optical nanofibers (ONF). To achieve a scalable, robust, and versatile platform analogous to ONFs, integrated waveguide approaches are being pursued. However, although the fundamental confinement principle in integrated waveguides is the same as in ONFs, the optical characteristics of these waveguides can be substantially different. In this work, we investigate experimentally and numerically birefringence in sub-wavelength silicon nitride rib waveguides suitable for atom trapping. We use both near- and far-field imaging techniques to measure beat lengths between propagating modes, and show that typical waveguide geometries lead to high birefringence between the lowest order modes not observed in ONFs. These beat lengths can be only a few optical wavelengths long. We discuss the impact of this high birefringence, and show how it can be used to tailor novel trapping geometries.

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Date submitted: 29 Jan 2016 Electronic form version 1.4