

Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Optical Production and Control of Photonic Structures ALEX WALDROP, OLGA KOCHAROVSKAYA, Texas A&M University — Coherent control of the refractive index with vanishing absorption in multilevel systems and its applications were a subject of intense recent experimental and theoretical research [1-3]. We study the new possibility to use the coherent control of refractive index for optical production and control of photonic structures, such as distributed Bragg reflectors (DBR), holey fibers, photonic band gaps, and photonic crystals. We consider the construction of photonic structures in resonant homogeneous atomic media through the illumination laser field standing waves. Using sharp variation of refractive index, we can make the detuning from resonance spatially dependent and eliminate a resonant absorption on this detuning. This can be realized in three-level atoms in nearly degenerate ladder configuration with a populated intermediate level which position in space is modulated by an external control standing wave of a laser field via ac-Stark effect. We analyze the optimal geometry for realization of the proposed method and its possible implementation in rare-earth doped crystals with excited state absorption.

- [1] N. Priote, et al., PRL 101, 147401 (2008).
- [2] C.O'Brien and O.Kocharovskaya, Phys. Rev. Lett., 107, 137401 (2011).
- [3] A. Kalachev and O. Kocharovskaya, Phys. Rev. A 83, 053849 (2011).

Alex Waldrop
Texas A&M University

Date submitted: 27 Mar 2012

Electronic form version 1.4