Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

Numerical studies of localization of atomic excitation in systems with hyperfine structure JUNGU CHOI, DANIEL ELLIOTT, Purdue University — We numerically study coherent population trapping (CPT) within a system such as Rubidium 87 that has multiple Zeeman sub-levels. Due to the multiplicity of hyperfine levels, the system forms a number of superposition states known as dark states, where the resonant laser interaction is suppressed by coherence coupling. The population ratio of the ground components of each dark state is dictated by the ratio of Rabi frequencies of the coupling and probe beams, which of course varies among the hyperfine components of the ground state. We have applied this CPT model to the case of an intense standing wave coupling laser and a uniform probe laser to observe atomic localization. Specifically, we examine the conditions that lead to the greatest degree of localization near the nodes of the coupling beam. We conclude that a long interaction time, as long as a microsecond, is essential to the formation of highly localized states.

Daniel Elliott
Purdue University

Date submitted: 02 Feb 2014 Electronic form version 1.4