Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Optimal Control of Large Spin-Atomic Systems with Coherent Electromagnetic Fields[1] SETH MERKEL, University of New Mexico, SOUMA CHAUDHURY, POUL JESSEN, University of Arizona, IVAN DEUTSCH, University of New Mexico — Cold atomic systems provide an excellent testing ground for quantum control protocols due to the isolation of these systems from their environment and the availability of high precision fields from the "quantum optics toolbox". In this talk, we look at controlling the sixteen dimensional ground state hyperfine manifold of ^{133}Cs through microwaves and rf-magnetic fields. These controls allow for essentially coherent manipulation of a system that is large enough to exhibit non-trivial dynamics. In particular, we analyze the controllability of this system under different combinations of applied electromagnetic fields. Also, we present a scheme for performing state preparation, which is the mapping a fiducial state to an arbitrary target state, and show simulations that examine the performance of these state preparation protocols.

[1]This research was supported by NSF Grants No. PHY-0355073 and No. PHY-0355040, ONR Grant No. N00014-05-1-420, and DTO Grant No. DAAD19-13-R-0011.

Seth Merkel
University of New Mexico

Date submitted: 26 Nov 2007 Electronic form version 1.4