Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Cold Rydberg atoms in circular states[1] DAVID ANDERSON, ANDREW SCHWARZKOPF, GEORG RAITHEL, University of Michigan — Circular-state Rydberg atoms are interesting in that they exhibit a unique combination of extraordinary properties; long lifetimes ($\sim n^5$), large magnetic moments ($l = |m| = n-1$) and no first order Stark shift. Circular states have found applications in cavity quantum electrodynamics and precision measurements [1,2], among other studies. In this work we present the production of circular states in an atom trapping apparatus using an adiabatic state-switching method (the crossed-field method [3]). To date, we have observed lifetimes of adiabatically prepared states of several milliseconds. Their relatively large ionization electric fields have been verified by time-of-flight signatures of ion trajectories. We intend to explore the magnetic trapping of circular state Rydberg atoms, as well as their production and interaction properties in ultra-cold and degenerate samples.

[1] P. Bertet et al., Phys. Rev. Lett., **88**, 14 (2002)
[2] M. Brune et al., Phys. Rev. Lett., **72**, 21 (1994)
[3] D. Delande and J.C. Gay, Europhys. Lett., **5**, 303-308 (1988).

[1]We would like to acknowledge support from the AFOSR.

David Anderson
University of Michigan

Date submitted: 30 Jan 2012 Electronic form version 1.4