Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

The population trapping of Rydberg states in microwave ionization[1] ALEXANDR ARAKELYAN, STEFAN SALANSKI, THOMAS GALLAGHER, University of Virginia — Previously, it was reported that when Rydberg atoms of Li are excited in the presence of a 17 or 36 GHz microwave field, the atom remains bound even if the excitation is above the limit [1]. We present another, more sensitive way to explore such microwave stabilization. Atoms of Li are excited to a high np Rydberg states during a 200 ns 38 GHz microwave pulse and surviving bound atoms are detected. As the last transition frequency is swept, the stable states spaced by an integer number of microwave photons are evident from at least -2000 GHz below the ionization limit (the energy of the zero field of n=45 state) up to 200 GHz over the limit with a microwave field of 85 V/cm. The interesting result is that these states exist even for binding energies in excess of 1100 GHz, which corresponds to a state of n=55, with a Kepler frequency of 38 GHz. Similar weakly bound final states are observed if bound Rydberg states are excited in zero field and then exposed to the microwave pulse. In this case the population transfer by a microwave pulse to the high lying states is about 10% of the total number of atoms initially excited to the Rydberg state, even when the microwave field is high enough that no other bound states survive.

[1] J.H. Gurian et al., Phys. Rev. A 82, 043415(2010).

[1]This work has been supported by The National Science Foundation

Alexandr Arakelyan
University of Virginia

Date submitted: 31 Jan 2012 Electronic form version 1.4