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Final state distributions of Li Rydberg atoms at high scaled microwave frequency JOSHUA GURIAN[1], HARUKA MAEDA[2], THOMAS GALLAGHER, University of Virginia — We present experimental results of final state distributions of non-ionized Rydberg atoms in the presence of a microwave field of frequency ω, where the scaled frequency, or ratio of ω to the classical Kepler frequency, $1/n^3$, is much greater than one. Recent microwave ionization experiments of Rydberg atoms at high scaled frequency have exhibited a strong periodicity in the ionization rate as a function of binding energy, where the period is determined by the energy of the microwave photon. However, the distribution of final states for the remaining bound atoms does not exhibit a similar periodicity, and is markedly different at ten, five, or one photon to the ionization limit. Notably, we observe population trapped in high lying n states one microwave photon below the ionization limit when the initial state is an integer number of microwave photons below the limit, indicating that the coupling of this last bound state to the continuum is what mediates multiphoton microwave ionization.

[1]Present address: Laboratoire Aime Cotton, CNRS, Universite de Paris Sud, Orsay, France
[2]Present Address: Aoyama Gakuin University, Fuchinobe, Sagamihara 229-8558, Japan.

Joshua Gurian
Laboratoire Aime Cotton, CNRS, Universite de Paris Sud, Orsay, France

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