Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Phase dependence in above threshold ionization[1] VINCENT CARRAT, ERIC MAGNUSON, TOM GALLAGHER, Univ of Virginia — Exciting an atom with high-frequency radiation in the presence of a low frequency field can result in energy transfer between the photoelectron and the low frequency field, depending on the phase of the low frequency field when the excitation occurs. We excite Li atoms with IR lasers in the presence of a microwave field. In a previous experiment, detection of highly excited states with excitation by a ps laser tuned above the ionization limit clearly showed a phase dependence. The variation of the signal due to a phase change reached 0.1% of the total excitation. We are using a new excitation scheme with a CW amplitude modulated laser, where the modulation is phase locked to the microwaves. We observe a signal variation of 10% of the total excitation. The modulated laser is frequency tuned closer to the limit, explaining some of this increase. Additionally while a ps pulse spreads the population over a broad energy spectrum, the modulated excitation keeps it in narrow bands. By tuning the laser frequency we can couple efficiently those bands to the highly excited states, increasing the collection efficiency. The modulated laser allows the observation of phase dependent transfer to both higher and lower energies. The observations can be described with relatively simple models.

[1]This work is supported by the US Department of Energy.

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Date submitted: 29 Jan 2015 Electronic form version 1.4