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Excitation Energy Dependence in Near Threshold Atom-Microwave Interaction[1] ERIC MAGNUSON, VINCENT CARRAT, TOM GALLAGHER, Univ of Virginia — When laser excitation of an atom occurs in the presence of a strong low frequency field, the final atomic state distribution depends on the energy of the laser excitation and the phase of the low frequency field when the excitation occurs. We explore how this phase dependence varies with laser excitation energy and microwave field amplitude. The excitation CW laser is tunable in an 80 GHz range centered on the ionization limit, and is amplitude modulated synchronously with a microwave field. Surviving bound atomic states of $n > 150$ are detected. Although we find bound final states are most probable when the excitation laser frequency is an integer number of microwave photons from the limit, the phase dependent contrast of the signal does not strongly depend on whether the laser is tuned to these resonances. We observe that the microwave field amplitude which maximizes the signal's phase dependence varies continuously with excitation laser frequency. In addition, we observe the microwave phase when ionization is most probable shifts by 180 degrees as the laser frequency crosses the ionization limit. This suggests one phase maximizes energy transfer, ionizing electrons excited below threshold and capturing electrons excited above threshold.

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