Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Quantized motion of Rydberg atoms in an amplitude-modulated lattice potential VLADIMIR MALINOVSKY, US Army Research Laboratory, Adelphi, MD 20783, KAITLIN MOORE, ANDIRA RAMOS, GEORG GEORG, Department of Physics, University of Michigan, Ann Arbor, MI 48105 — We present a model description of the spectroscopic line shape of Rydberg transitions in an amplitude-modulated Rydberg-atom lattice taking into account the quantization of the center-of-mass motion. In our model, the wave function of both ground and excited states are subject to the periodic potentials that arise from the optical-lattice fields. In contrast to other spectroscopic scheme, in our work the coupling (the effective Rabi frequency) is also periodic as function of the translational coordinate, and it is perfectly phase-locked to the lattice trapping potential. By solving the time-dependent Schrödinger equation in momentum representation we obtain the spectrum of the excited-state population. The numerical results for the momentum components of the ground and excited wave functions are averaged over the thermal momentum distribution of the Rydberg atoms. The effect of the lattice parameters and the interaction strength on the line shape of the Rydberg transitions is discussed.

Vladimir Malinovsky
US Army Research Laboratory, Adelphi, MD 20783

Date submitted: 29 Jan 2017 Electronic form version 1.4