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Coherent optical transients with quantized atomic motion HUY NGUYEN, ALEX KUZMICH, PAUL BERMAN, University of Michigan — We consider coherent transients in which a sequence of optical pulses is incident on a sample of trapped atoms and gives rise to phase-matched emission. The trapping potential for the atoms can be state-dependent, necessitating a quantum treatment of the center-of-mass motion. We follow a source-field approach, modified to account for the quantized motion of the atoms. A specific example involving the creation of ground-Rydberg level coherence in an optical lattice is analyzed. Accounting for the state-dependent optical potentials for the hyperfine levels in the Rydberg manifold, we find good agreement between theory and experiment.

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