Abstract Submitted
for the DAMOP19 Meeting of
The American Physical Society

Site-selective loading of atoms into a lattice for homogeneous coupling between atoms and probe light BAOCHEN WU, GRAHAM P. GREVE, CHENGYI LUO, JAMES K. THOMPSON, JILA, and University of Colorado, Boulder — Many AMO experiments utilize atoms trapped along a 1D optical lattice. The atoms are manipulated or interrogated with a standing wave probing laser wavelength incommensurate with the lattice, and the positions of the atoms along the lattice axis lead to inhomogeneous coupling between the atoms and the probing light. As a result, optomechanical issues arise, coherent interactions are degraded, and the underlying physics may be obscured. We explore a new scheme for homogeneous coupling involving a "microwave-knife" that allows blowing away atoms at lattice sites that are not maximally-coupled to the probing laser. As such, it may be appropriate in situations where other techniques, e.g. a commensurate lattice, a ring cavity, or time-averaged probing measurements, are not feasible.

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Date submitted: 01 Feb 2019 Electronic form version 1.4