Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Bloch-Zener oscillations of atoms inside an optical cavity[1] PRASANNA VENKATESH BALASUBRAMANIAN, McMaster University, MICHAEL TRUPKE, EDWARD HINDS, Centre for Cold Matter, Imperial College, DUNCAN O'DELL, McMaster University — Cold atoms in an optical lattice execute Bloch-Zener oscillations when they are accelerated. We investigate the corresponding behavior of the atoms and the light when the optical lattice is provided by the intra-cavity field of a driven Fabry-Perot resonator. When the atoms oscillate inside the resonator, we find that their back-action modulates the phase and intensity of the light transmitted through the cavity. We solve the coupled atom-light equations self-consistently and show that, remarkably, the Bloch period is unaffected by this back-action. The transmitted light provides a way to observe the atomic oscillation continuously, allowing very high precision measurements to be derived from a single cloud of atoms.

[1]NSERC (Canada), EPSRC (UK), Royal Society

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Date submitted: 22 Jan 2009 Electronic form version 1.4