

Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Parametric Amplification of Scattered Atom Pairs GRETCHEN K. CAMPBELL, JONGCHUL MUN, MICAH BOYD, ERIK W. STREED, WOLFGANG KETTERLE, DAVID E. PRITCHARD, MIT-Harvard Center for Ultracold Atoms, Research Laboratory of Electronics, MIT — We have observed parametric generation and amplification of ultracold atom pairs. A ^{87}Rb Bose-Einstein condensate was loaded into a one-dimensional optical lattice with quasimomentum k_0 and spontaneously scattered into two final states with quasimomenta k_1 and k_2 . Furthermore, when a seed of atoms was first created with quasimomentum k_1 we observed parametric amplification of scattered atoms pairs in states k_1 and k_2 when the phase-matching condition was fulfilled. This process is analogous to optical parametric generation (OPG) and amplification (OPA) of photons and could be used to efficiently create entangled pairs of atoms. Furthermore, these results could explain the dynamic instability of condensates in moving lattices observed in recent experiments.

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Date submitted: 01 Feb 2006

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