Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Splitting a Bose-Einstein Condensate in Two Translating Traps[1]
B. SUN, M.S. PINDZOLA, F. ROBICHEAUX, Auburn University, AUBURN UNIVERSITY TEAM — Motivated by an earlier proposal of splitting a one dimensional atomic wave packet using two translating traps (see M. Zhang et al., PRL **97**, 070403 (2006)), we report results of simulating the splitting dynamics for a three dimensional Bose-Einstein condensate at zero temperature. Different from the single atom case where the population in one of the traps shows full oscillations as a function of the translating velocity, we find that such oscillations are damped as the translating velocity decreases. The damping mechanism is attributed to the formation of solitons which decay to vortex rings and cuase complicated flow patterns to damp the population oscillations. The damping effect is more evident as the interaction strength increases. Therefore, the condensate can only be split by 50/50 in the adiabatically translating regime. Our conclusions are supported by simulations with N = 5400 and N = 54000 ^{87}Rb atoms.

[1]The work was supported by the U.S. National Science Foundation.

Michael Pindzola
Auburn University

Date submitted: 20 Jan 2009 Electronic form version 1.4