

Abstract Submitted  
for the DAMOP06 Meeting of  
The American Physical Society

**Coherent Molecular Vortex Generation from an Atomic Condensate**<sup>1</sup> H. LING, D. GROCHOWSKI, Department of Physics and Astronomy, Rowan University, Glassboro, New Jersey, 08028-1700, USA, S. YI, H. PU, Department of Physics and Astronomy, and Rice Quantum Institute, Rice University, Houston, TX 77251-1892, USA., WEIPING ZHANG, Key Laboratory of Optical and Magnetic Resonance Spectroscopy, Department of Physics, East China Normal University, Shanghai 200062, P. R. China — We consider a two-color photoassociation model in a field configuration in which the dump field is in a Gaussian mode while the pump field is in a first-order Laguerre Gaussian mode. We show that this configuration supports a nonlinear dark state, which is a coherent superposition between an atomic BEC and the ground molecular vortex state of winding number 1. We use this nonlinear dark state as the basis for developing a chirped stimulated Raman adiabatic passage that can lead to an efficient conversion of an atomic condensate into a ground molecular vortex while minimizing the particle loss via the excited molecular state.

<sup>1</sup>This work is supported by US NSF (No. PHY-0307359), China NSF (No. 10474055), and Science and Technology Commission of Shanghai Municipality (No. 04DZ14009).

Hong Ling  
Rowan University

Date submitted: 26 Jan 2006

Electronic form version 1.4