Abstract Submitted
for the DAMOP15 Meeting of
The American Physical Society

Interaction assisted tunneling of a Bose-Einstein condensate out of a quasi bound state SHREYAS POTNIS, RAMON RAMOS, Department of Physics, University of Toronto, KENJI MAEDA, LINCOLN D. CARR, Department of Physics, Colorado School of Mines, AEPHRAIM STEINBERG, Department of Physics, University of Toronto — We experimentally measure the tunneling rate of a ^{87}Rb Bose-Einstein condensate prepared in a quasi-bound state. Using the combination of a magnetic quadrupole trap and a thin 1.1 μm barrier created using a blue-detuned sheet of light, we can create traps with controllable depth and lifetime. The thin tunnel barrier allows for a tunable tunneling rate from $30s^{-1}$ to $1s^{-1}$. The escape dynamics strongly depend on the mean-field energy, which gives rise to three distinct regimes— classical over the barrier spilling, quantum tunneling, and decay dominated by background losses. We show that the tunneling rate goes down exponentially with decreasing chemical potential. Our results show good agreement with numerical solutions of the 3D Gross-Pitaevskii equation and WKB calculations.

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Date submitted: 29 Jan 2015 Electronic form version 1.4