Abstract Submitted
for the DAMOP08 Meeting of
The American Physical Society

Influence of Spontaneous Emission on a Single-State Atom Interferometer[1] S. BEATTIE, B. BARRETT, M. WEEL, I. CHAN, C. MOK, York University, S.B. CAHN, Yale University, A. KUMARAKRISHNAN, York University — We have studied the effects of spontaneous emission (SE) on a single-state time domain atom interferometer (AI) that uses trapped Rb atoms. The AI uses two standing waves pulses separated by time T to produce an echo signal at time $2T$ due to interference between momentum states. We find that SE influences both the shape of the echo signal and its periodic time dependent amplitude in a manner consistent with theoretical predictions. The results show that the time dependent signal from the AI is related to the effective radiative decay rate of the excited state. We also present results that test theoretical predictions for several properties of the echo formation such as the variation in momentum transfer due to the change in the angle between the traveling wave components of the excitation pulses, strength of the atom-field interaction, and the effect of spatial profile of the excitation beams. These studies are important for realizing precision measurements of the atomic fine structure constant and gravity using this interferometer. The details of this work are described in PRA **77**, 013610 (2008).

[1]Work supported by CFI, OIT, NSERC, OCE, and York University.

Scott Beattie
York University

Date submitted: 01 Feb 2008 Electronic form version 1.4