

Abstract Submitted
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Linewidth broadening in a ^{87}Rb Bose-Einstein Condensate J.H.T. BURKE, B. DEISSLER, K.J. HUGHES, C.A. SACKETT, University of Virginia — Bose-Einstein Condensates have been predicted to exhibit linewidth broadening [1,2]. We examine a condensate of ^{87}Rb by probing the $5^2S_{1/2}F = 2 \leftrightarrow 5^2P_{3/2}F = 3$ transition. Our magnetic trap has unusually weak confinement, which helps keep the resonant optical density from being too large to measure. Using this advantage, we measure the lineshape by scanning the probe in frequency across the resonance. We see approximately a %30 broadening of the linewidth with a polarization dependence that could be an effect of superradiance similar to what was observed by the group of Ketterle in [3]. Additionally, we measure the atom loss from the probe and observe an intensity dependent linewidth broadening which in the limit of low intensity tends towards the same broadening seen with absorption. We attribute the intensity dependence to multi-photon scattering. This intensity dependence was not observed when using photon absorption.

[1] J. Javanainen *Phys. Rev. Lett.* **72** 2375 (1994)

[2] L. You *et al. Phys. Rev. A* **53** 329 (1996)

[3] S. Inouye *et al. Science* **285** 571 (1999)

John Burke
University of Virginia

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