Abstract Submitted
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Empirical Method for Measuring the Photon Scattering Rate in a Magneto-Optical Trap[1] JAMES BOOTH, British Columbia Institute of Technology, KAIS JOOYA, FUMIEI KOBAYASHI, NAM MUSTERER, KIRK MADISON, University of British Columbia — We have recently demonstrated an empirical technique for determining the photon scattering rate of atoms in a magneto-optical trap (MOT) [1]. This method provides a way to measure the *in-situ* saturation parameter experienced by the atoms in the trap, and, as a result, to more accurately determine the atom number and the excited state fraction in the MOT. To validate the technique, we compared the atom number extracted from fluorescence measurements (which rely on the scattering rate) to an independent atom number measurement based on the absorption of an optical pumping beam. Minor deviations observed from the predictions of the generally accepted two-level atom model of light scattering led us to extend the standard analysis by describing the atoms as four-level systems. This approach incorporates the effects of the repump laser on the scattering rate and provides a better description of the observed fluorescence. The main advantage of the new technique is that it provides a straightforward, empirical method for determining the photon scattering rate of atoms in a MOT, therefore improving the atom number measurement accuracy from the fluorescence readings.

[1] K. Jooya, N. Musterer, K. W. Madison, and J. L. Booth, Phys. Rev. A **88**, 063401 (2013)

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