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Raman and Ramsey Spectroscopy in a continuous atom source[1]
MICHAEL P. MANICCHIA, Naval Postgraduate School, AARON MELDRUM, Naval Air Systems Command, JON P. DAVIS, AMPAC, Inc., FRANK A. NARDUCCI, Naval Postgraduate School — We report on a theoretical and experimental study of Raman and Ramsey spectroscopy in a continuous atomic source comprised of atoms emanating from a two-dimensional magneto-optical trap. Our approach builds on previously reported work [1,2] but has the advantage of being continuous, so as to minimize inertial sensing errors and also reduce the apparatus' power budget and complexity. In our apparatus, both the atom source and the Raman fields are continuous so that the "pulses" the atoms experience are due to the transit time of the atoms through the laser beam. We explore the effects of longitudinal and transverse velocity spread, laser beam width, and laser beam spatial separation on the contrast in the resulting spectrum. The impact of stray resonant light will be highlighted [3]. Implications to the fundamental limit for inertial sensing and magnetic field gradient sensing will be discussed.

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[1]Office of the Secretary of Defense

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