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Gradient Magnetometry in an Atomic Fountain[1] FRANK A. NARDUCCI, Naval Air Systems Command, ARVIND K. SRINIVASAN, St. Mary's College of Maryland, JON P. DAVIS, SARA A. DESAVAGE, Naval Air Systems Command, DANIELLE A. BRAJE, MIT/Lincoln Labs — We present measurements of gradient magnetic fields using cold atoms in an atomic fountain. We collect the spectrum of driven Raman transitions at various points during the atoms' flight. For arbitrarily oriented magnetic fields, the spectrum consists of 11 peaks, whose separation is a measure of the magnetic field experienced by the atoms at the location of the Raman pulse. Ramsey interferometry ($\frac{\pi}{2} - \frac{\pi}{2}$) can be a more sensitive measure of the location of the resonances and therefore a more sensitive method to measure the fields and field gradients. However, the changing resonance frequency requires that the Raman pulses be chirped in frequency to maintain maximum contrast. Furthermore, we investigate pulse sequences involving one or more π pulses ($\frac{\pi}{2} - \pi^N - \frac{\pi}{2}$, where N is the number of π pulses).

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