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Atom Interferometer Gradient Magnetometer ARVIND SRINIVASAN, St. Mary's College of Maryland, SARA DESAVAGE, Naval Air Warfare Center - Aircraft Division, CHARLES ADLER, St. Mary's College of Maryland, JON DAVIS, FRANCESCO NARDUCCI, Naval Air Warfare Center - Aircraft Division — We have used cold ^{85}Rb atoms in a fountain experiment to measure magnetic fields and magnetic field gradients in our apparatus. Optically prepared atoms are tossed up a 10 cm tall tower and a pulse of light stimulating a Raman transition is applied at times variable with respect to the time of the toss. Knowledge of the magnetic field is extracted from the Raman spectrum, which is measured at various heights in the tower. From these measurements, we can map out the magnetic field within the tower. We describe methods for phase locking the Raman laser to the cooling laser in order to control fluctuations in the AC stark shifts caused by the free running Raman laser. We also describe a method for probing magnetic field gradients at two locations simultaneously.

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