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A High Bandwidth Optically Pumped Atomic Magnetometer RICARDO JIMENEZ-MARTINEZ, University of Colorado Boulder and NIST, Time and Frequency Division, CLARK W. GRIFFITH, SVENJA KNAPPE, JOHN KITCHING, NIST, Time and Frequency Division — The measurement of magnetic fields has proved to be relevant in many realms of basic and applied science. Among the different techniques to measure magnetic fields, that of optically pumped atomic magnetometers has experienced considerable attention recently. This interest stems from the development of atomic magnetometers that achieve sensitivities in the sub-femto Tesla range, and the development of techniques that enable highly miniaturized, compact, with low-power consumption magnetometers. The sensitivity and bandwidth of atomic magnetometers is set by their spin coherence time, which in most magnetometers is limited by atomic collisions. Better sensitivities are achieved by suppressing the spin decoherence introduced by atomic collisions, but at a cost of lower bandwidth. For certain applications, a magnetometer with a high bandwidth is useful. Here we present a technique to achieve high bandwidth while preserving high sensitivity. We support the technique with table-top measurements showing that a bandwidth of 10 KHz and sensitivity of 10 $\mathrm{pT}_{rms}/(\mathrm{Hz})^{1/2}$ can be achieved in a compact device. We also highlight the current development of a miniature atomic magnetometer based on this technique.

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