

Waveform Reconstruction with a Cs Based Free-Induction-Decay Magnetometer

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We report the frequency response of an optically pumped magnetometer (OPM) under different experimental conditions with a microfabricated Cs cell [1]. Free-induction-decay (FID) of the precessing spins is detected in a bias field of $50 \mu\text{T}$ [2]. The sensor bandwidth is characterized by observing how the system reacts to various stimuli; this is primarily dictated by spin relaxation comprising of numerous contributions that are intrinsic to the vapor cell, and induced externally through operational factors such as magnetic gradients and optical power broadening. The design simplicity, scalability, and all-optical nature of this OPM is attractive in numerous applications, including MCG that requires a flat response in the low frequency range. It also benefits from minimal cross-talk, which is essential in applications that demand magnetic source localisation with sensor networks.

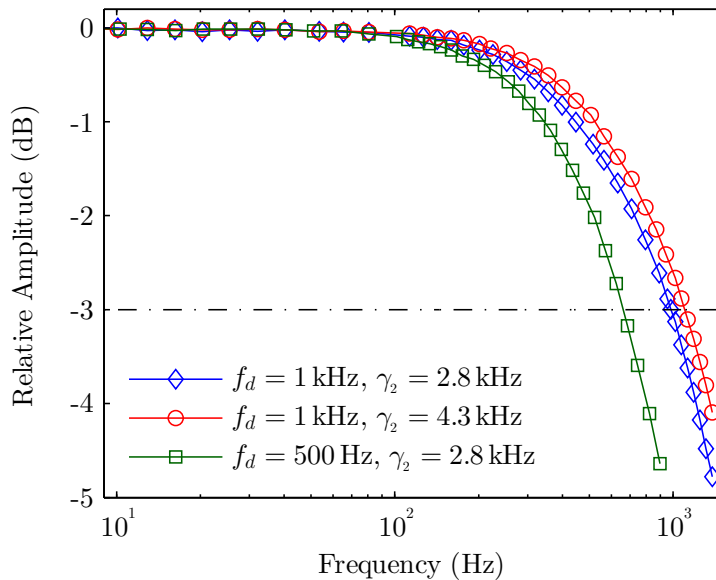


Figure 1. Frequency response curves at different relaxation rates γ_2 , and pump-probe repetition rates f_d . The test signal amplitude was set to 7 nT.

[1] D. Hunter, R. Jiménez-Martínez, J. Herbsommer, S. Ramaswamy, W. Li, and E. Riis, Opt. Express **26**, no. 23, 30523-30531 (2018).

[2] D. Hunter, S. Piccolomo, J. D. Pritchard, N. L. Brockie, T. E. Dyer, and E. Riis, Phys. Rev. Appl. **10**, 014002 (2018).