

Single-spin magnetometry with multi-pulse dynamical decoupling sequences

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Author(s):

G. de Lange, D. Ristè, V. V. Dobrovitski, R. Hanson

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We experimentally demonstrate single-spin magnetometry with multipulse sensing sequences. The use of multipulse sequences can greatly increase the sensing time per measurement shot, resulting in enhanced ac magnetic field sensitivity. We theoretically derive and experimentally verify the optimal number of sensing cycles, for which the effects of decoherence and increased sensing time are balanced. We perform these experiments for oscillating magnetic fields with fixed phase as well as for fields with random phase. Finally, by varying the phase and frequency of the ac magnetic field, we measure the full frequency-filtering characteristics of different multipulse schemes and discuss their use in magnetometry applications.

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