Online Supplementary Information: Nanoscale magnetic sensing with an individual electronic spin in diamond

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SUPPLEMENTARY FIGURES
Supplementary Figure 1. Sensitivity versus detection volume for various kinds of magnetic sensors: at cryogenic temperatures, SQUID 1-331–33; at room temperature, Hall Probe 1-334,35, BEC36, NV nanocrystal (this work) and NV in ultra-pure diamond (projected from present bulk single-crystal studies); and at 100-200°C, Vapour Cell 1-237,13.

SUPPLEMENTARY DISCUSSION

For the detection of a single spin, either electronic or nuclear, it will be difficult to use the procedure employed in the present demonstration of tuning the revival peaks with an external field, as the Larmor precession of the spin we wish to detect may not coincide with multiples of the $^{13}$C Larmor rate. To this end, it will be advantageous to apply a small bias DC magnetic field ($< 1$ G) and use superpositions of the $m_s = \pm 1$ NV center spin states8 to monitor the AC magnetic field originating from a single electronic spin. Alternatively, at higher DC magnetic fields ($> 200$ G) the time between revivals due to the $^{13}$C spins decreases and the echo signal does not fully collapse21. Thus, we can remove the sharp cut-off in echo signal for frequencies $\nu$ not within the revival peaks. This scenario is ideal for the detection of nuclear spins, with gyromagnetic ratio typically less than 4 kHz/G.

SUPPLEMENTARY NOTES


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