Abstract Submitted
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Decoherence imaging of spin ensembles by a scannable single nitrogen-vacancy center in diamond LAN LUAN, MICHAEL GRINOLDS, SUNGKUN HONG, PATRICK MALETINSKY, RONALD WALSWORTH, MIKHAIL LUKIN, AMIR YACOBY, Harvard University — Measuring the decoherence of the spin state of a single nitrogen-vacancy (NV) center in diamond has been proposed as a sensitive method for detecting ensembles of electron or nuclear spins. Using a scanning NV center magnetometer with a single NV residing about 10 nm from the scanning device surface, we explore the effect of T_2 as the device is brought in close proximity to a sample surface. We observe that the spin coherence of the NV center is strongly reduced when it comes into contact with the sample. We are able to restore the coherence by performing dynamic decoupling schemes on the NV spin, suggesting that the sample-induced decoherence originates from the fluctuating magnetic field of a surface spin ensemble. The decoherence diminishes when we increase the NV to sample surface distance by 10nm either vertically or laterally. These experiments demonstrate the potential for using the coherence of a single NV spin to locally detect and spatially map spin ensembles.

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