

Abstract Submitted  
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**Dual-Channel Lock-in Magnetometry with a Single Spin in Diamond**<sup>1</sup> N.M. NUSRAN, M.V. GURUDEV DUTT, University of Pittsburgh — Diamond spin probes are promising candidates for nanoscale magnetometry and magnetic imaging. Although dynamic decoupling (DD) technique with the spin can lead to high sensitivity ( $\sim nT/\sqrt{Hz}$ ), certain limitations exist in the standard sensing approach for AC magnetic fields: i) a trade-off between the sensitivity and the dynamic range and ii) constraints on the AC magnetic field phase. We present an experimental scheme that incorporates DD and phase estimation algorithms to address these problems. We achieve nearly decoherence-limited sensitivity over a wide dynamic range, and we also demonstrate unambiguous reconstruction of the amplitude and phase of the magnetic field.

<sup>1</sup>N. M. Nusran and M.V. Gurudev Dutt, arXiv:1309.1911

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