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Nanoscale magnetometry with nitogen-vacancy color centers in diamond JONATHAN HODGES, SUNGKUN HONG, JERONIMO MAZE, Department of Physics, Harvard University, PAUL STANWIX, Harvard-Smithsonian Center for Astrophysics, PAOLA CAPPELLARO, ITAMP, Harvard University, LIANG JIANG, Department of Physics, Harvard University, M.V. GURUDEV DUTT, Department of Physics, University of Pittsburgh, EMRE TOGAN, School of Engineering and Applied Science, Harvard University, AMIR YACOBY, Department of Physics, Harvard University, PHILIP R. HEMMER, Department of Electrical and Computer Engineering, Texas A&M University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics, MIKHAIL D. LUKIN, Department of Physics, Harvard University — The ability to sense and spatially resolve magnetic fields at nanometer dimensions is key to understanding many fundamental physical processes and has a wide range of applications in materials science, biology, and medicine. Our novel approach to nanoscale sensing is based on coherent control of individual electronic spins associated with the nitrogen-vacany (NV) center in diamond. In this work, we describe proof-of-principle experimental measurements of time-varying magnetic fields using single NV^- centers in bulk crystalline diamond and sub-100 nm diamond nanocrystals. Using spin echo spectroscopy techniques on the spin triplet electronic ground state, we sense magnetic fields with frequencies from 3kHz to 15 kHz to a resolution approaching 100 μGauss.

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