

Abstract Submitted  
for the DAMOP15 Meeting of  
The American Physical Society

**Nanoscale NMR and MRI with NV centers in diamond** EMMA ROSENFELD, Harvard University, LINH PHAM, CHINMAY BELTHANGADY, Harvard-Smithsonian Center for Astrophysics, STEPHEN DEVIENCE, University of Maryland, PAOLA CAPPELLARO, Massachusetts Institute of Technology, MIKHAIL LUKIN, RONALD WALSWORTH, Harvard University — We investigate a new technique for detecting nanoscale volumes of nuclear spins using shallow nitrogen-vacancy (NV) centers in diamond and dark electronic spins at the diamond-air interface. We apply dressed-state schemes to resonantly couple these dark electronic spins with optically accessible NV spins, thus taking advantage of the close proximity of the dark electronic spins to nuclear spins at the diamond surface in order to significantly enhance the sensitivity and reduce the detection volume of diamond-based nanoscale nuclear magnetic resonance (NMR) measurements. The improvements in detection afforded by this technique may enable sensing of single nuclear spins and NMR spectroscopy of single molecules.

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Date submitted: 30 Jan 2015

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