Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

Suppression of spin bath dynamics for improved coherence of multi-spin-qubit systems NIR BAR-GILL, MY LINH PHAM, Harvard University, CHINMAY BELTHANGADY, DAVID LE SAGE, Harvard-Smithsonian Center for Astrophysics, PAOLA CAPPELLARO, MIT, JERONIMO MAZE, Pontificia Universidad Catolica, MIKHAIL LUKIN, AMIR YACOBY, Harvard University, RONALD WALSWORTH, Harvard-Smithsonian Center for Astrophysics — Scalability of multi-qubit systems is crucial for the advancement and application of quantum science. Such scalability requires maintaining long coherence times while increasing the number of qubits in the system. For solid-state spin systems, qubit coherence is closely related to fundamental questions of many-body spin dynamics. Here we apply a coherent spectroscopic technique to characterize the dynamics of the composite solid-state spin environment of Nitrogen-Vacancy (NV) color centers in room temperature diamond. We identify a new mechanism for suppression of electronic spin bath dynamics in the presence of a nuclear spin bath of sufficient concentration. This suppression enhances the efficacy of dynamical decoupling techniques, resulting in increased coherence times for multi-spin-qubit systems, thus paving the way for scalable applications in quantum information, sensing and metrology.

Nir Bar-Gill
Harvard University

Date submitted: 27 Jan 2012 Electronic form version 1.4