Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Environment assisted diamond magnetometry: Environment-assisted precision measurements using solid-state spin GARRY GOLDSTEIN, PAOLA CAPPELARO, JERO MAZE, LIANG JIANG, MISHA LUKIN, Physics Department, Harvard University, ITAMP, Harvard-Smithsonian Center for Astrophysics — Isolated electronic spins in the solid-state, such as the Nitrogen-Vacancy (NV) center in diamond, have been recently proposed as sensitive magnetic sensors. We propose a method for enhancing magnetic field sensitivity by using the "dark" spins in NV center environment to amplify the system response to external magnetic fields. We describe a strategy to partially polarize and control the environment spins for maximal response. The signal enhancement is proportional to the number of environment spins coupling "strongly" to the central spin and to their degree of polarization. The method success does not rely on the exact value of the couplings between the bright spin and the environment spins, but on the existence of many nitrogen spins that couple to the central spin more strongly than relevant decoherence rates. For high density of the environment spins the proposed method could improve the sensitivity by a factor of T2 /T2 * .

Garry Goldstein
Harvard

Date submitted: 27 Jan 2009 Electronic form version 1.4