Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Progress towards magnetometry with nitrogen-vacancy ensembles in diamond VICTOR ACOSTA, UC Berkeley, ERIK BAUCH, TU Munich, MICAH LEDBETTER, DMITRY BUDKER, UC Berkeley — Optical magnetometers based on spin-precession in alkali-vapor cells can measure magnetic felds with great precision and without cryogenics, however spin-altering collisions limit the sensitivity of small sensors [1]. Paramagnetic impurities in diamond, on the other hand, are a promising system for mm- and μm-scale magnetometers, because diamond has a high Debye temperature (T_D =2230 K) and ^{12}C has zero nuclear spin, which translates into long spin coherence times (approaching 1 ms [2]) at room temperature. Diamond is also optically transparent over a wide range of wavelengths and is chemically inert. Nitrogen-Vacancy (NV) centers have a spin-triplet ground state and convenient optical transitions, allowing for efficient optical pumping and magnetic detection. Recently, single NV-centers were used for nm-scale magnetometry. Here we discuss progress towards the development of a high-density NV-ensemble magnetometer. The spin-projection noise-limited sensitivity is estimated to be at or below the fT/$\sqrt{\text{Hz}}$ level for mm-scale devices [3]. [1] D. Budker and M. Romalis, Nat. Phys. **3**, 227 (2007). [2] T. Gaebel et. al., Nat. Phys. **2**, 408 (2006). [3] J. M. Taylor et. al., Nat. Phys. **4**, 810 (2008).

Victor Acosta
UC Berkeley

Date submitted: 13 Jan 2009 Electronic form version 1.4