Dependence of NV-Ensemble T2* on Applied Magnetic Field

CONNOR HART, ERIK BAUCH, Department of Physics, Harvard University, Cambridge, Massachusetts 02138, USA, JOHN BARRY, Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, Massachusetts 02138, USA, JENNIFER SCHLOSS, Department of Physics, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA, MATTHEW TURNER, RONALD WALWORTH, Department of Physics, Harvard University, Cambridge, Massachusetts 02138, USA — In measurements using ensembles of nitrogen vacancy (NV) centers in diamond, the magnetic field sensitivity can be improved by increasing the NV spin dephasing time, T2*. For NV ensembles, T2* is limited by inhomogeneous broadening arising from variations in the local environment sensed by individual NVs, such as magnetic fields and strain. Here, we describe a systematic study of parameters influencing the NV ensemble T2*, and efforts to mitigate sources of inhomogeneity. In particular, we report a non-trivial dependence of T2* on applied external magnetic field. These results suggest new pathways to improving the sensitivity of NV-ensemble magnetometry.