Abstract Submitted
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Tunneling-driven nanoscale clustering of trapped charge in diamond under ambient conditions.[1] S. DHOMKAR, P.R. ZANGARA, CUNY-City College of New York, NY, USA, M.W. DOHERTY, N.B. MANSON, Australian National University, ACT, Australia, A. ALKAUSKAS, Center for Physical Sciences and Technology, Vilnius, Lithuania, J. HENSHAW, C.A. MERILES, CUNY-City College of New York and CUNY-Graduate Center, NY, USA — Negatively charged nitrogen-vacancy (NV) centers in diamond are emerging as versatile resources for applications in quantum information processing and high-resolution metrology. In the case of samples with relatively high defect concentration, it is of great interest to understand the physical processes that affect charge and spin dynamics of ensembles of NV centers. Here, we utilize two color confocal microscopy to investigate electron tunneling processes between NV and surrounding nitrogen centers in type 1b diamond. We present the results of various protocols which involve sequential illumination and/or scanning with green (532 nm) and/or red (633 nm) laser beams at various intensities. To explain the experimental data, we develop a model that incorporates the effects of tunneling processes during laser illumination and in the dark. We demonstrate that although tunneling effects modify the charge distribution on a nanometer scale, their consequences can be observed macroscopically, giving rise to unique patterns in the fluorescence images.

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