118 Effect of electric fields on color centers in diamond

J. Minguzzi[1], J. Maze[1]
[1]*Instituto de Física, Pontificia Universidad Católica de Chile, Casilla 306, Santiago, Chile*
email address corresponding author: jnminguz@gmail.com

Recently color centers in diamond have been proven useful for quantum information processing, nanoscale magnetic sensing and nanometre-scale thermometry [1,2,3]. The way to carry out this task is to control and manipulate the spin of such centers in a solid-state environment even at room temperature. In doing so, it is necessary a better understanding of electronic structure of the centers [1,4] and the response of such centers under applied external fields. We develop a model, based on group theory, for an applied electric field over two centers in diamond: the negatively charged Silicon Vacancy center and the negatively charged Nitrogen Vacancy center. Specifically, we study the twofold effect due to an external electric field: the effect on the electronic cloud and the effect on the ions on the electronic ground state, electronic first excited state, and optical transition between them for each color center. Our work may help to clarify the electronic structure and the effect of external fields on such centers, and so, improve capability of manipulation of these quantum systems.

The authors acknowledge support from Fondecyt Regular No. 1141185.

References

[1] J. Maze, A. Gali et al, New Journal of Physics **13**, 025025 (2011).
[2] J. Maze et al, Nature **455**, 644-48 (2008).
[3] G. Kucsko et al, Nature **500**, 54-58 (2013).
[4] C. Hepp et al, Phys. Rev. Lett. **11212**, 036405 (2014).

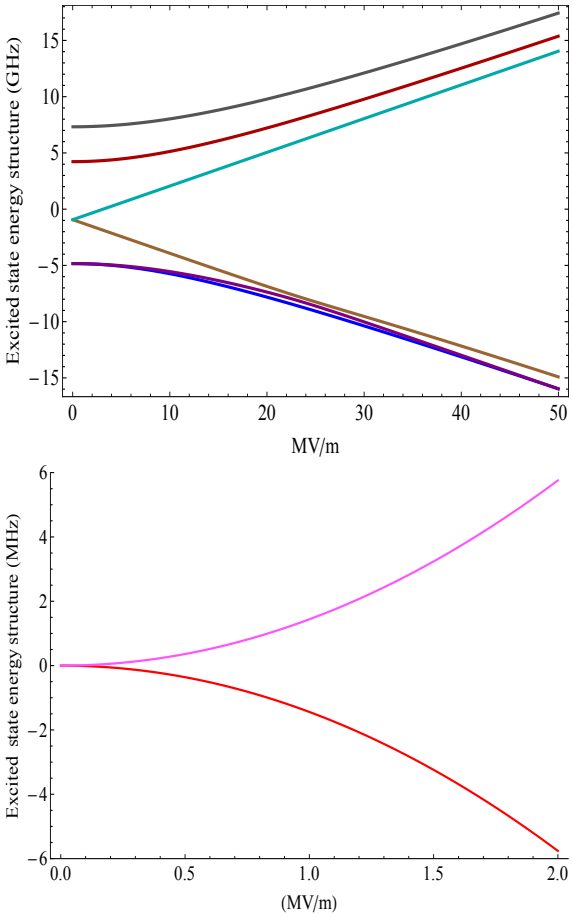

Fig. 1 *The upper (lower) graph shows the spectral structure splitting of the electronic first excited state of the NV (SiV) center versus the applied electric field. In the case of the SiV center we only observe second order contribution due to an external electric field in the order of few MHz, meanwhile for the NV center we observe linear and second order contributions to the energies in the order of few GHz for the same applied electric field.*