

Abstract Submitted
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Efficient control of the NV center spin in diamond¹ ZHI-HUI WANG, Ames Laboratory US DOE, DOMENICO D’ALESSANDRO, Iowa State University, Dept. of Mathematics, VIATCHESLAV DOBROVITSKI, Ames Laboratory, US DOE — Fast and accurate control of the spin of a nitrogen-vacancy (NV) center in diamond is a key for realization of diamond-based quantum information processing. We investigate time-optimal rotation [1] of a qubit implemented with the spin of a NV center. We examine performance of the control, and show that one can achieve a gain of 25% in rotation time compared to the broadly used rotating wave approximation. At certain values of the bias field, noticeable population accumulates on the third energy level and the fidelity of the control is degraded. We show that this is due to the transitions induced by the higher-order harmonics in the control field, which can be suppressed by frequency filtering of the control field at the expense of increased rotation time.

[1] U. Boscain, P. Mason, *J. Math. Phys.* 47, 062101 (2006).

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