Quantum Memory on Color Centers in Nanodiamonds

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Recently, the possibility of implementing a cavity-enhanced off-resonant Raman quantum memory in an ensemble of silicon-vacancy centers in diamond has been studied [1]. It was shown that the signal-to-noise ratio can significantly exceed unity for short single-photon input pulses if the orbital level splitting in the ground state of the color centers is significantly enhanced by strain. However, the coherence time between the two available orbital branches of the ground state should be decreased in this case, while the spin coherence increases up to about 250 ns [2]. In the present work, we consider the possibility of increasing the storage time due to the use of nanodiamonds [3]. It is shown that suppression of direct electron-phonon transitions in the diamond nanocrystals makes it possible to increase the coherence time of both orbital and spin qubits by orders of magnitude.

References

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