

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Quantum dynamics of electric-dipole coupled nitrogen-vacancy centers in diamond and possible applications LEI-MING ZHOU, FANG-WEN SUN, Univ of Sci & Tech of China, NAN ZHAO, Beijing Computational Science Research Center, GUANG-CAN GUO, Univ of Sci & Tech of China — Nitrogen-Vacancy (NV) center in diamond is a popular platform for quantum information, quantum metrology and quantum physics research. Single NV centers and their quantum dynamics were well-studied in the past decade. Magnetic-dipole coupling between NV center pairs was also implemented, very recently, to realize spin entanglement. Here, we theoretically investigate the quantum dynamics of electric-dipole coupled NV centers in low temperature. With quantum electrodynamics method, we establish master equations to describe the quantum dynamics of the coupled NV center pairs. The collective behaviors induced by the common photon bath, including super-radiance, coherent coupling and cross-relaxation are discussed. We also predict several experimentally observable effects, such as photon polarization transfer, which have potential application in nano-photonics.

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Date submitted: 06 Nov 2014

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