Abstract Submitted
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Strongly excited electric dipole spin resonance with field gradient[1] YASUHIRO TOKURA, Univ of Tsukuba — Coherent manipulation of the qubit is the essential part of the quantum information processing. Traditionally, spin manipulation is realized by electron spin resonance, where time-dependent transverse magnetic field of frequency close to the Zeeman energy by the external static magnetic field. The idea of electric dipole spin resonance, which uses oscillating electric field, instead of magnetic field, had been proposed. Electron spin dipole itself is independent of the electric field, while the charge (orbital) degree of freedom in a quantum dot (QD) is efficiently coupled to it. With the gradient of the static magnetic field coupling the orbital degree with the spin, the spin can be manipulated. Rabi frequency characterizes the driving speed of the spin, which is usually regarded as linearly proportional to the electric field amplitude. We had studied the Rabi frequency in two models. One is that the orbital state is also two-level system [1], which may be corresponding to the lowest levels in the coupled QDs. The other is that the electron is in anharmonic potential. In both cases, we predict a clear deviation of the Rabi frequency from the linear dependence for large electric field.

[1] Y. Tokura T. Kubo, and W. J. Munro, to appear in J. Phys. Soc. Jpn. (arXiv: 1308.0071).

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