

Abstract Submitted  
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**Hyperfine interaction mediated electric-dipole spin resonance: The role of the frequency modulation**<sup>1</sup> RUI LI, Beijing Computational Science Research Center — The electron spin in semiconductor quantum dot can be coherently controlled by an external electric field, an effect called electric-dipole spin resonance (EDSR). There are several mechanisms underlie the EDSR, among which there is a hyperfine mechanism, where the spin-electric coupling is mediated by the electron-nucleus hyperfine interaction. Here, we investigate the influence of the frequency modulation (FM) to the driving electric field on the spin-flip efficiency. Our results reveal that FM plays an important role in the hyperfine mechanism. Without FM, the electric field almost cannot flip the electron spin, the spin-flip probability is only about 20%. While under the FM, the spin-flip probability can be improved approximately to 70%. Especially, we find there is a lower bound on the modulation amplitude, which is related to the width of the hyperfine field fluctuation of the nuclear spins.

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