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Analytical Solution of Electron Spin Decoherence Through Hyperfine Interaction in a Quantum Dot CHANGXUE DENG, XUEDONG HU, State University of New York at Buffalo — We analytically solve the *Non-Markovian* single electron spin dynamics due to hyperfine interaction with surrounding nuclei in a quantum dot. We use the equation-of-motion method assisted with a large field expansion, and find that virtual nuclear spin flip-flops mediated by the electron contribute significantly to a complete decoherence of transverse electron spin correlation function. Our results show that a 90% nuclear polarization can enhance the electron spin T_2 time by almost two orders of magnitude. In the long time limit, the electron spin correlation function has a non-exponential $1/t^2$ decay in the presence of both polarized and unpolarized nuclei.

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