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Preserving electron spin coherence by dynamical decoupling based on Nitrogen-Vacancy center in diamond JIANGFENG DU, University of Science and Technology of China — To exploit the quantum coherence of electron spins in solids in future technologies such as quantum manipulating, it's first vital to overcome the problem of spin decoherence due to their coupling the noisy environment. Dynamical decoupling is a particularly promising strategy for combating decoherence. I will briefly introduce the roadmap for dynamical decoupling and show our experimental research on the field in detail. We first applied the optimal dynamical decoupling scheme [1] on electron spins of ensemble sample [2]. Based on the technology, the dynamical decoupling sequence was used to observe the anomalous coherence effect and of single electron spin based on nitrogen-vacancy defect center in diamond [3]. For application, combined the dynamical decoupling together with quantum metrology protocol, the phase estimation was enhanced [4]. Instead of pulsed model, continuous dynamical decoupling was realized in our experiment and applied to protect quantum gate [5]. The next step, we will apply multi flip pulses to enhance the magnetic field sensitivity of NV center towards to the micro-scale magnetic resonance and single molecular imaging. [1] G. S. Uhrig, Phys. Rev. Lett. 98, 100504 (2007) [2] J. Du, et al., Nature 461, 1265 (2009) [3] P. Huang, et al., Nature Communications, 2, 570 (2011) [4] X. Rong, et al., Europhys. Lett. 95, 60005 (2011) [5] X. Xu, et al., Phys. Rev. Lett. 109, 070502 (2012)

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