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Quantum Computation and Quantum Metrology based on Single Electron Spin in Diamond JIANGFENG DU, University of Science and Technology of China — It is of great challenge to perform the accurate controlling the electron spin qubits in realistic system, due to the noises aroused from the noisy spin bath and the driving field. Firstly, we adopted dynamically corrected gates to realize robust and high-fidelity quantum gates. In this work, the quantum gate's performance was pushed to T1r limit [PRL 2014, 112, 050503]. Then, a new Rabi Oscillations (ROs) resulting from Landau-Zener (LZ) transitions is observed useful to suppress the fluctuations of the driving field [PRL 2014, 112, 010503]. Besides, quantum error correction is experimentally employed to overcome the noise effect in diamonds [Nature 2014, 506, 204-207]. Precise quantum control and effectively supressing noise of the environment are of great importance for quantum metrology. We succeeded in sensing and atomic-scale analysis of single nuclear spin clusters in diamond at room temperature [Nature Physics 2014, 10, 21-25], and also have succeed to detect a few nuclear spins with single spin sensitivity [Nature Commu., 2014, 4:4703].

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