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Precise quantum control on solid-state spins JIANPEI GENG, University of Science and Technology of China — Precise quantum control is of great importance for quantum information processing, high resolution spectroscopy, and quantum metrology. One of the key obstacles to realizing precise quantum control on solid-state spins is the noises arising from both environment and control field. Here, we design a composite pulse to realize precise quantum control on a single electron spin in diamond by suppressing the effect of both noises simultaneously. The control is experimentally demonstrated to be with a low error rate of 4.8E-5. We improve quantum optimal control method to realize precise two-qubit quantum control on a system comprised by a single electron spin and ^{14}N nuclear spin. With the improved quantum optimal control method, we design a pulse sequence for CNOT gate to suppress the noises simultaneously. The error rate of CNOT gate is measured to be 8E-3. To the best of our knowledge, the control we have realized stands for the state of art in precise quantum control on solid-state spins.

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