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**Zeno Quantum Gates in Semiconductor Quantum Dots** KAIJIE XU, YUPING HUANG, MICHAEL MOORE, CARLO PIERMAROCCHI — Quantum Zeno effect (QZE) is one of the most intriguing quantum phenomena. In the recent literature, there is a series of strongly linked ideas on entanglement generation or computation using the QZE, which have mainly been discussed and explored experimentally in pure quantum optics and superconductors. We propose a scheme for a two-qubit conditional phase gate by QZE with three parallel semiconductor quantum dots [1]. Two of them are charged dots with one additional electron. The spin of these electrons are the logical qubits on which the phase-gate acts. The other dot is an ancillary neutral dot that can perform Rabi oscillations under a resonant laser pulse. With our system setup, we can make use of QZE to gain a $\pi$ phase shift after a $2\pi$ laser pulse depending on the spin configuration in the logical qubits. This phase shift can realize a conditional phase gate. We solve analytically and numerically the master equation with a realistic set of parameters. The result shows that, despite the widely-held belief that decoherence must always be minimized in quantum information processing, in our scheme decoherence can in principle be harnessed to generate high-fidelity gate operation using the QZE. [1] K.J. Xu, Y.P. Huang, M.G. Moore, and C. Piermarocchi, arXiv: 0810.4489 (2008).

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