ABSTRACT

ULTRA-FAST OPTICAL CONTROL OF DONOR BOUND ELECTRON SPINS IN SEMICONDUCTORS FOR QUANTUM REPEATERS AND QUANTUM COMPUTERS

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We describe a fast quantum computer based on optically controlled electron spins in charged quantum dots that are coupled to microcavities. This scheme uses broad-band optical pulses to rotate electron spins and provide the clock signal to the system. Non-local two-qubit gates are performed by phase shifts induced by electron spins on laser pulses propagating along a shared waveguide. Numerical simulations of this scheme demonstrate high-fidelity single-qubit and two-qubit gates with operation times comparable to the inverse Zeeman frequency.