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Exact Solutions for Universal Holonomic Quantum Gates

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After a breif review of geometric phases in quantum mechanics and the idea of holonomic quantum gates we show how one can implement any local quantum gate on specific qubits in an array of qubits by carrying adiabatically a Hamiltonian around a closed loop.

We find the exact form of the loop and the Hamiltonian for implementing general one and two qubits gates.