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Experimental Adiabatic Quantum Factorization Based on a Single Spin System

I will report on our experimental realization of an adiabatic quantum algorithm on a single solid spin system under ambient conditions. All elements of adiabatic quantum computation, including initial state preparation, adiabatic evolution (simulated by optimal control), and final state readout, are realized experimentally. As an example, we found the ground state of the problem Hamiltonian SzIz on our adiabatic quantum processor, which can be mapped to the factorization of 35 into its prime factors 5 and 7. (Reference: Phys. Rev. Lett. 118, 130504). If time permits, I will also report an experimental realization of factorization of 291311 using 3 qubits. In this demonstration, we made use of the natural Hamiltonian of a realistic quantum system to mimic the Hamiltonian during the adiabatic passage.