A quantum computer demonstrator with ultracold Sr atoms

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Quantum computing promises efficient solutions to problems that are prohibitively hard to solve on classical computers. However, to gain an advantage over classical computers, quantum computers must be able to work with a large number of qubits — currently one of the biggest challenges for any quantum computing platform. Ultracold atoms trapped in optical lattices provide a scalable platform for quantum computing that enables quantum algorithms with thousands of qubits. I will present our plans and the current status of a new experimental effort aimed at using Rydberg excitations of strontium atoms to realize a quantum computer demonstrator with gate fidelities exceeding 99%.