The experiment as performed verifies the classical truth table of the controlledoperation and, in principle, by preparing superposition input states and measuring output density matrices, the unitary transform could be completely characterized using process tomography (Chapter 8). The controlled- gate requires about 50 microseconds to perform with the optical power used in the experiment. On the other hand, the coherence time was measured to be somewhere Name. The dominant decoherence mechanisms included instabilities in the laser beam power and the RF ion trap drive frequency and voltage amplitude, and fluctuating external magnetic fields. Moreover, the experiment involved only a single ion, and only two qubits, and thus was not useful for computation; to be useful, a controlled- gate should generally be applied between different ions, and not just between a single ion and the motiona The experiment as performed verifies the classical truth table of the controlledoperation and, in principle, by preparing superposition input states and measuring output density matrices, the unitary transform could be completely characterized using process tomography (Chapter 8). The controlled- gate requires about 50 microseconds to perform with the optical power used in the experiment. On the other hand, the coherence time was measured to be somewhere around hundreds to thousands of microseconds. The dominant decoherence mechanisms included instabilities in the laser beam power and the RF ion trap drive frequency and voltage amplitude, and fluctuating external magnetic fields. Moreover, the experiment involved only a single ion, and only two qubits, and thus was not useful for computation; to be useful, a controlled- gate should generally be applied between different ions, and not just between a single ion and the motiona The experiment as performed verifies the classical truth table of the controlledoperation and, in principle, by preparing superposition input states and measuring output density matrices, the unitary transform could be completely characterized using process tomography (Chapter 8). The controlled- gate requires about 50 microseconds to perform with the optical power used in the experiment. On the other hand, the coherence time was measured to be somewhere around hundreds to thousands of microseconds. The dominant decoherence mechanisms included instabilities in the laser beam power and the RF ion trap drive frequency and voltage amplitude, and fluctuating external magnetic fields. Moreover, the experiment involved only a single ion, and only two qubits, and thus was not useful for computation; to be useful, a controlled- gate should generally be applied between different ions, and not just between a single ion and the motiona The experiment as performed verifies the classical truth table of the controlledoperation and, in principle, by preparing superposition input states and measuring output density matrices, the unitary transform could be completely characterized using process tomography (Chapter 8). The controlled- gate requires about 50 microseconds to perform with the optical power used in the experiment. On the other hand, the coherence time was measured to be somewhere around hundreds to thousands of microseconds. The dominant decoherence mechanisms included instabilities in the laser beam power and the RF ion trap drive frequency and voltage amplitude, and fluctuating external magnetic fields. Moreover, the experiment involved only a single ion, and only two qubits, and thus was not useful for computation; to be useful, a controlled- gate should generally be applied between different ions, and not just between a single ion and the motiona The experiment as performed verifies the classical truth table of the controlledoperation and, in principle, by preparing superposition input states and measuring output density matrices, the unitary transform could be completely characterized using process tomography (Chapter 8). The controlled- gate requires about 50 microseconds to perform with the optical power used in the experiment. On the other hand, the coherence time was measured to be somewhere around hundreds to thousands of microseconds. The dominant decoherence mechanisms included instabilities in the laser beam power and the RF ion trap drive frequency and voltage amplitude, and fluctuating external magnetic fields. Moreover, the experiment involved only a single ion, and only two qubits, and thus was not useful for computation; to be