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Nota di contenuto	Elements of Quantum Information; Contents; Preface to the Book Edition; Preface to the Journal Edition; List of Contributors; 1 The Deterministic Generation of Photons by Cavity Quantum Electrodynamics; 1.1 Introduction; 1.2 Oscillatory Exchange of Photons Between an Atom and a Cavity Field (Strong Coupling) - the One-atom Maser or Micromaser; 1.2.1 Experimental Set-up of the One-atom Maser; 1.2.2 One-atom Maser as a Source of Non-classical Light; 1.2.3 Review of Experiments on Basic Properties of the One-atom Maser; 1.2.4 Statistics of Detector Clicks; 1.2.5 Trapping States 1.2.6 Trapping State Stabilization1.2.7 Fock States on Demand; 1.2.8 Dynamical Preparation of n-photon States in a Cavity; 1.2.9 The One-atom Maser Spectrum; 1.3 Other Microwave Cavity Experiments; 1.3.1 Collapse-and-revival of the Rabi Oscillations in an Injected Coherent Field; 1.3.2 Atom-photon and Atom-atom Entanglement; 1.3.3 Atom-

photon Phase Gate; 1.3.4 Quantum Nondestructive-measurement of a Photon; 1.3.5 Wigner-function of a One-photon State; 1.3.6 Multiparticle Entanglement; 1.3.7 Schrodinger Cats and Decoherence; 1.4 Cavity QED Experiments in the Visible Spectral Region 1.4.1 The One-atom Laser1.4.2 Atoms Pushed by a Few Photons; 1.4.3 Single-photon Sources; 1.4.4 Single-atom Laser Using an Ion Trap; 1.5 Conclusions and Outlook; References; 2 Optimization of Segmented Linear Paul Traps and Transport of Stored Particles; 2.1 Introduction; 2.2 Optimization of a Two-layer Microstructured Ion Trap; 2.2.1 Design Objectives; 2.2.2 Operating Mode and Modeling of the Segmented Linear Paul Trap; 2.2.3 Optimization of the Radial Potential; 2.2.4 Optimization of the Axial Potential; 2.3 Open Loop Control of Ion Transport; 2.3.1 Non-adiabatic Heating Sources 2.3.2 Overview of the Applied Optimization Strategies2.3.3 The Optimal Control Method; 2.3.4 Optimization Results; 2.3.5 Ion Heating due to Anharmonic Dispersion; 2.3.6 Quantum Mechanical Estimate of Non-adiabatic Parametric Heating; 2.3.7 Improved Initial Guess Function and Ultra-fast Transport; 2.3.8 Discussion of the Open-loop Result; 2.4 Outlook; A Comparison of our Boundary-element-package with Commercial Software; References; 3 Transport Dynamics of Single Ions in Segmented Microstructured Paul Trap Arrays; 3.1 Introduction; 3.2 Classical Equations of Motion 3.3 Classical Dynamics of Ion Transport3.3.1 Homogeneous Solution; 3.3.2 Green's Function and General Solution; 3.3.3 Adiabatic Limit; 3.4 Quantum and Classical, Dragged Harmonic Oscillators with Constant Frequency; 3.5 The Dragged Quantum Harmonic Oscillator; 3.6 Transport Dynamics in a Well-controlled Regime; 3.6.1 Two Analytical Examples; 3.6.2 Near-optimum Transport Functions; 3.6.3 High-frequency Limit, Adiabatic Transport, and Approximate Trajectories; 3.7 Regularized Trap-electrode Waveforms, Potential Fluctuations and Aspect-ratio Rule; 3.7.1 Determination of Waveforms 3.7.2 Potential Fluctuations and Aspect-ratio Rule

Sommario/riassunto

'Elements of Quantum Information' introduces the reader to the fascinating field of quantum information processing, which lives on the interface between computer science, physics, mathematics, and engineering. This interdisciplinary branch of science thrives on the use of quantum mechanics as a resource for high potential modern applications. With its wide coverage of experiments, applications, and specialized topics - all written by renowned experts - 'Elements of Quantum Information' provides an indispensable up-to-date account of the state of the art of this rapidly advancing field and take
