1. Record Nr. UNISA996466794603316

Titolo	Principles and Methods of Quantum Information Technologies [[electronic resource] /] / edited by Yoshihisa Yamamoto, Kouichi Semba
Pubbl/distr/stampa	Tokyo : , : Springer Japan : , : Imprint : Springer, , 2016
ISBN	4-431-55756-3
Edizione	[1st ed. 2016.]
Descrizione fisica	1 online resource (XI, 624 p. 258 illus., 226 illus. in color.)
Collana	Lecture Notes in Physics, , 0075-8450 ; ; 911
Disciplina	006.3843
Soggetti	Quantum computers Spintronics Quantum physics Computers Quantum optics Quantum Information Technology, Spintronics Quantum Physics Theory of Computation Quantum Optics Quantum Computing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Bibliographic Level Mode of Issuance: Monograph
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Quantum Information Theory for Quantum Communication -- Quantum Communication for the Ultimate Capacity and Security -- Quantum Communication Experiments Over Optical Fiber -- Spin-photon Entanglement in Semiconductor Quantum Dots: Towards Solid-state-based Quantum Repeaters -- Optical Lattice Clocks for Precision Time and Frequency Metrology -- Cold Atom Magnetometers -- Photonic Quantum Metrologies Using Photons -phase Super-sensitivity and Entanglement-enhanced Imaging -- Counting Statistics of Single-electron Transport -- Some Recent Progress for approximation algorithms -- Coherent Computing with Injection-Locked Laser Network -- A Degenerate Optical Parametric Oscillator Network for Coherent Computation -- Coherent Ising Machines with Quantum

Measurement and Feedback Control -- Bose-Einstein Condensation: A Common Platform for Quantum Simulation Experiments -- Quantum Simulation Using Ultracold Ytterbium Atoms in an Optical Lattice -- Quantum Simulation with Trapped IonsExperimental Realization of the Jaynes-Cummings-Hubbard Model -- Equilibrium to Nonequilibrium Condensation in Driven-dissipative Semiconductor Systems -- High-orbital Exciton-polariton Condensation: Towards Quantum-simulator Applications -- Layered Architectures for Quantum Computers and Quantum Repeaters -- Analysis of an Atom-optical Architecture for Quantum Computation -- Optical Hybrid Quantum Information Processing -- Microwave Photonics on a Chip: Superconducting Circuits as Artificial Atoms for Quantum Information Processing.- Achievements and Outlook of Research on Quantum Information Systems using Superconducting Quantum Circuits -- Parametric amplifier and oscillator based on Josephson junction circuitry -- Superconductor-Diamond Hybrid Quantum System -- Spin Qubits with Semiconductor Quantum Dots -- Silicon Quantum Information Processing -- Quantum Information Processing Experiments using Nuclear and Electron Spins in Molecules -- Molecular Spin Qubits: Molecular Optimization of Synthetic Spin Qubits, Molecular Spin AQC and Ensemble Spin Manipulation Technology.

Sommario/riassunto

This book presents the research and development-related results of the “FIRST” Quantum Information Processing Project, which was conducted from 2010 to 2014 with the support of the Council for Science, Technology and Innovation of the Cabinet Office of the Government of Japan. The project supported 33 research groups and explored five areas: quantum communication, quantum metrology and sensing, coherent computing, quantum simulation, and quantum computing. The book is divided into seven main sections. Parts I through V, which consist of twenty chapters, focus on the system and architectural aspects of quantum information technologies, while Parts VI and VII, which consist of eight chapters, discuss the superconducting quantum circuit, semiconductor spin and molecular spin technologies. Readers will be introduced to new quantum computing schemes such as quantum annealing machines and coherent Ising machines, which have now arisen as alternatives to standard quantum computers and are designed to successfully address NP-hard/NP-complete combinatorial optimization problems, which are ubiquitous and relevant in our modern life. The book offers a balanced mix of theory-based and experimentation-based chapters written by leading researchers. Extensive information is provided on Quantum simulation, which focuses on the implementation of various many-body Hamiltonians in a well-controlled physical system, Quantum key distribution, Quantum repeaters and quantum teleportation, which are indispensable technologies for building quantum networks with various advanced applications and require far more sophisticated experimental techniques to implement.