1. Record Nr. UNINA9911047711003321

Autore	LaPierre Ray
Titolo	Introduction to Quantum Computing / / by Ray LaPierre
Pubbl/distr/stampa	Cham : , : Springer Nature Switzerland : , : Imprint : Springer, , 2026
ISBN	9783031907319 9783031907302
Edizione	[2nd ed. 2026.]
Descrizione fisica	1 online resource (438 pages)
Collana	The Materials Research Society Series, , 2730-7379
Disciplina	006.3843
Soggetti	Quantum computers Materials Electronics Quantum computing Quantum communication Computer science Quantum Computing Materials for Devices Electronics and Microelectronics, Instrumentation Quantum Information Quantum Communications and Cryptography Theory of Computation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Chapter 1: Superposition -- Chapter 2: Quantization -- Chapter 3: Spin -- Chapter 4: Qubits -- Chapter 5: Entanglement -- Chapter 6: Quantum Key Distribution -- Chapter 7: Quantum Gates -- Chapter 8: Teleportation -- Chapter 10: Computational Complexity -- Chapter 11: Deutsch Algorithm -- Chapter 12: Grover Algorithm -- Chapter 13: Shor Algorithm -- Chapter 14: Physical Implementation of Single-Qubit Gates -- Chapter 15: Electron Spin Resonance -- Chapter 16: Two-state Dynamics -- Chapter 17: Physical Implementation of Two-qubit Gates -- Chapter 18: DiVincenzo Criteria -- Chapter 19: Nuclear Magnetic Resonance -- Chapter 20: Solid-state Spin Qubits -- Chapter 21: Trapped Ion Quantum Computing -- Chapter 22: Superconducting

Qubits -- Chapter 23: Adiabatic Quantum Computing -- Chapter 24: Optical Quantum Computing -- Chapter 25: Quantum Error Correction -- Chapter 26: Topological Quantum Computing.

Sommario/riassunto

This book, now in an expanded second edition, provides a self-contained undergraduate course on quantum computing based on classroom-tested lecture notes. It reviews the fundamentals of quantum mechanics from the double-slit experiment to entanglement, before progressing to the basics of qubits, quantum gates, quantum circuits, quantum key distribution, and some of the famous quantum algorithms. As well as covering quantum gates in depth, it also describes promising platforms for their physical implementation, along with error correction, and topological quantum computing. With quantum computing expanding rapidly in the private sector, understanding quantum computing has never been so important for graduates entering the workplace or PhD programs. Assuming minimal background knowledge, this book is highly accessible, with rigorous step-by-step explanations of the principles behind quantum computation, further reading, and exercises, ensuring that undergraduate students in physics and engineering emerge well prepared for the future. This edition contains new material on quantum metrology, random circuit sampling, electric dipole spin resonance, dilution refrigeration, photon detection, boson sampling, and continuous variable quantum computing. It also features around 50 new exercises, and lecture slides for course instructors. .