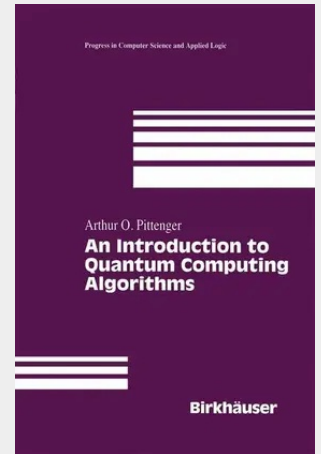


An Introduction to Quantum Computing Algorithms

In 1994 Peter Shor [65] published a factoring algorithm for a quantum computer that finds the prime factors of a composite integer N more efficiently than is possible with the known algorithms for a classical computer. Since the difficulty of the factoring problem is crucial for the security of a public key encryption system, interest (and funding) in quantum computing and quantum computation suddenly blossomed. Quantum computing had arrived. The study of the role of quantum mechanics in the theory of computation seems to have begun in the early 1980s with the publications of Paul Benioff [6] [7] who considered a quantum mechanical model of computers and the computation process. A related question was discussed shortly thereafter by Richard Feynman [35] who began from a different perspective by asking what kind of computer should be used to simulate physics. His analysis led him to the belief that with a suitable class of "quantum machines" one could imitate any quantum system.

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74,89 €

69,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780817641276

Medium: Buch

ISBN: 978-0-8176-4127-6

Verlag: Birkhäuser Boston

Erscheinungstermin: 12.11.1999

Sprache(n): Englisch

Auflage: 2000

Serie: Progress in Computer Science and Applied Logic

Produktform: Gebunden

Gewicht: 410 g

Seiten: 140

Format (B x H): 160 x 241 mm

