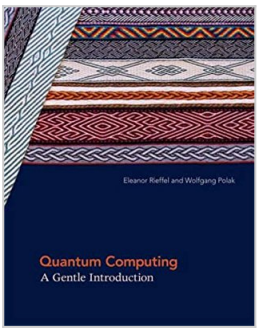

Quantum Computing: A Gentle Introduction (Scientific and Engineering Computation)

By Eleanor G. Rieffel, Wolfgang H. Polak

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The combination of two of the twentieth century's most influential and revolutionary scientific theories, information theory and quantum mechanics, gave rise to a radically new view of computing and information. Quantum information processing explores the implications of using quantum mechanics instead of classical mechanics to model information and its processing. Quantum computing is not about changing the physical substrate on which computation is done from classical to quantum but about changing the notion of computation itself, at the most basic level. The fundamental unit of computation is no longer the bit but the quantum bit or qubit.

This comprehensive introduction to the field offers a thorough exposition of quantum computing and the underlying concepts of quantum physics, explaining all the relevant mathematics and offering numerous examples. With its careful development of concepts and thorough explanations, the book makes quantum computing accessible to students and professionals in mathematics, computer science, and engineering. A reader with no prior knowledge of quantum physics (but with sufficient knowledge of linear algebra) will be able to gain a fluent understanding by working through the book.

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Editorial Review

Review

The collection of exercises is a treasure… I could open any chapter and follow its content without having to turn to previous chapters for notions and notation… precious for the beginner... [a] masterpiece. I need not say more.

(*Physics Today*)

Rieffel and Polak have produced a pedagogical triumph. While reviewing this book, I designed and delivered a first-year undergraduate computing lecture and workshop drawing on its content, with excellent impact… A masterpiece that should be read by all who are interested in quantum computing.

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[*Quantum Computing*] offers one of the best introductions to the themes and concepts of quantum measurement that I have ever read...The authors have the rare capacity of offering us a steady quality of educational throughput, regardless of the inherent difficulty of the theme presented...It is a significant education oeuvre.

(*Computing Reviews*)

The authors have given us an introduction to the new field of quantum information, accessible to anyone familiar with college-level mathematics. It will be the easiest way for anyone to go from knowing no quantum mechanics to understanding cutting-edge problems in quantum computing. It will also be the most comprehensive and current book on the subject."

(**Michael B. Heaney**, Applied Quantum Technology Solar, Inc.)

The authors' aim is to make quantum computation accessible to a broad audience, and they have done a very good job in breaking down its elements -- mathematics, physics, computer science -- into comprehensible pieces. The book should be a good addition to the educational literature on the subject.

(**Karoline Wiesner**, School of Mathematics and Center for Complexity Science, University of Bristol)

About the Author

Eleanor Rieffel is Research Scientist at NASA Ames Research Center. Wolfgang Polak is a computer science consultant.

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