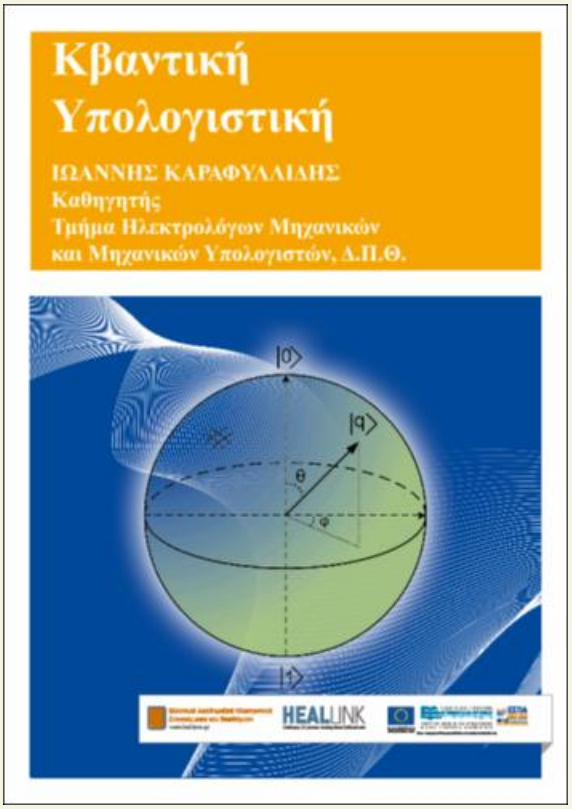

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Abstract

This e-book aims to give readers all the necessary knowledge about Quantum Computing without requiring knowledge of Quantum Mechanics. Undergraduate and postgraduate students will find in this book a guide that will introduce and lead them step by step into this subject. When they finish the book, they will be able to understand research papers on Quantum Computation. The syllabus covers a semester-long course for undergraduate and graduate students in Departments of Computer Science, Computer Engineering, Computer Science or Science. All necessary elements of Quantum Mechanics are given and the unit of quantum information, the qubit, is described. Quantum registers, quantum gates and the circuit model of quantum computation are described. All the basic quantum algorithms are described in detail and in depth. In the book there are many examples of quantum computation and application of quantum algorithms. Maximum interactivity for this subject is ensured as follows: The book is accompanied by the quantum computer simulator, QCS, which has been developed by the Main Author [1]. With this simulator, users will be able to repeat all the quantum calculations and algorithms in the book, as well as develop their own. The QCS includes a graphical interface and is given in the form of source code (Matlab). In this way, users will also be able to develop and evolve the simulator as the science in the area of Quantum Computation evolves. [1] I. Karafyllidis, "Quantum Computer Simulator based on the Circuit Model of Quantum Computation", IEEE Transactions on Circuits and Systems I, vol. 52, pp. 1590-1596, 2005.

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