

# Preface

The purpose of this book is to supply a collection of problems in quantum computing and quantum information together with their detailed solutions which will prove to be valuable to graduate students as well as to research workers in these fields. All the important concepts and topics such as quantum gates and quantum circuits, entanglement, teleportation, Bell states, Bell inequality, Schmidt decomposition, quantum Fourier transform, magic gate, von Neumann entropy, quantum cryptography, quantum error correction, coherent states, squeezed states, POVM measurement, beam splitter, homodyne detection and Kerr Hamilton operator are included. The topics range in difficulty from elementary to advanced. Almost all problems are solved in detail and most of the problems are self-contained. All relevant definitions are given. Students can learn important principles and strategies required for problem solving. Teachers will also find this text useful as a supplement, since important concepts and techniques are developed in the problems. The book can also be used as a text or a supplement for linear and multilinear algebra or matrix theory. The material was tested in our lectures given around the world.

Any useful suggestions and comments are welcome.

The International School for Scientific Computing (ISSC) provides certificate courses for this subject. Please contact the authors if you want to do this course. More quantum computing exercises can be found on the web page given below.

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