

# Contents

Preface	v
Notation	ix
<b>I Finite-Dimensional Hilbert Spaces</b>	<b>1</b>
1 Qubits	3
2 Kronecker Product and Tensor Product	21
3 Matrix Properties	39
4 Density Operators	77
5 Trace and Partial Trace	97
6 Reversible Logic Circuits	107
7 Unitary Transforms and Quantum Gates	115
8 Entropy	147
9 Measurement	159
10 Entanglement	179
11 Bell Inequality	223
12 Teleportation	233
13 Cloning	243
14 Quantum Algorithms	247
15 Quantum Error Correction	265

<b>16 Quantum Cryptography</b>	<b>273</b>
<b>II Infinite-Dimensional Hilbert Spaces</b>	<b>281</b>
<b>17 Harmonic Oscillator and Bose Operators</b>	<b>283</b>
<b>18 Coherent States</b>	<b>313</b>
<b>19 Squeezed States</b>	<b>329</b>
19.1 Single Mode Squeezing	329
19.2 Two Mode Squeezing	340
19.3 Coherent Squeezed States	342
<b>20 Trace and Partial Trace</b>	<b>345</b>
<b>21 Entanglement</b>	<b>351</b>
<b>22 Teleportation</b>	<b>369</b>
<b>23 Swapping and Cloning</b>	<b>373</b>
<b>24 Homodyne Detection</b>	<b>377</b>
<b>25 Hamilton Operators</b>	<b>381</b>
<b>Bibliography</b>	<b>395</b>
<b>Index</b>	<b>407</b>