

# Contents

<b>Introduction</b>	<b>1</b>
<b>I Quantum Source Coding</b>	<b>3</b>
Models of quantum data compression . . . . .	3
Typical subspaces and shadows . . . . .	7
SCHUMACHER's quantum coding . . . . .	12
Strong converse . . . . .	13
Relation to classical source coding . . . . .	16
Open questions . . . . .	16
<b>II Quantum Channel Coding</b>	<b>18</b>
Quantum channels and codes . . . . .	18
Maximal code construction . . . . .	19
Strong converse . . . . .	21
Refined analysis for stationary channels . . . . .	23
HOLEVO bound . . . . .	31
Open questions . . . . .	32
<b>III Quantum Multiple Access Channels</b>	<b>35</b>
Quantum multiway channels and capacity region . . . . .	35
Outer bounds . . . . .	36
Coding theorem for multiple access channels . . . . .	37
Open questions . . . . .	39
<b>IV Quantum Multiple Source Coding</b>	<b>40</b>
Correlated quantum sources . . . . .	40
Classical source with quantum side information . . . . .	47
Quantum source with classical side information . . . . .	51
The $c^0q^2$ -source: coding vs. side information . . . . .	52
Extreme points of rate regions . . . . .	52
Open questions . . . . .	53

<b>A Quantum Probability and Information</b>	<b>55</b>
Quantum systems . . . . .	55
Entropy and divergence . . . . .	59
Observable language . . . . .	59
Subalgebra language . . . . .	60
Common tongue . . . . .	63
Inequalities . . . . .	65
<b>References</b>	<b>72</b>