Research has been an extremely enjoyable experience for me, and I had the opportunity to learn many exciting new things. However, none of this would have been possible without the help and support of many people.

First, I would like to thank my supervisor Harry Buhrman for our interesting discussions and for giving me the opportunity to be at CWI which is a truly great place to work. For the freedom to pursue my own interests, I am deeply grateful. My time as a PhD student would have been very different without Andreas Winter, and I would especially like to thank him for our many enjoyable discussions and conversations. I have learned about many interesting things from him, ranging from the beautiful topic of algebras, that I discovered way too late, to his way of taking notes which I have shamelessly adopted. I would also like to thank him for much encouragement, without which I may not have dared to pursue my ideas about uncertainty relations much further. Much of Chapter 4.3 is owed to him. I would also like thank him, as well as Sander Bais, Ronald Cramer, Robbert Dijkgraaf, and Ronald de Wolf for taking part in my PhD committee.

Thanks also to Ronald de Wolf for supervising my Master’s thesis, which was of tremendous help to me during my time as a PhD student. Furthermore, I would like to thank Matthias Christandl for our fun collaborations, a great trip to Copenhagen, and the many enjoyable visits to Cambridge. Thanks also to Artur Ekert for making these visits possible, and for the very nice visit to Singapore. I am very grateful for his persistent encouragement, and his advice on giving talks is still extremely helpful to me. For many interesting discussions and insights I would furthermore like to thank Serge Fehr, Julia Kempe, Jordan Kerenidis, Oded Regev, Renato Renner and Pranab Sen, as well as my collaborators Manuel Ballester, Harry Buhrman, Matthias Christandl, Andrew Doherty, Patrick Hayden, Hoi-Kwong Lo, Christian Schaffner, Graeme Smith, John Smolin, Barbara Terhal, Ben Toner, Falk Unger, Andreas Winter, Ronald de Wolf, and Jürg Wullschleger. Thanks also to Nebošja Gvozdenović, Dennis Hofheinz, Monique Laurent, Serge Massar and Frank Vallentin for useful point-
ers, and to Boris Tsirelson for supplying me with copies of [Tsi80] and [Tsi87].
Many thanks also to Tim van Erven, Peter Grünwald, Peter Harremoes, Steven
de Rooij, and Nitin Saxena for the enjoyable time at CWI, and to Paul Vitányi
who let me keep his comfy armchair on which many problems were solved.

Fortunately, I was able to visit many other places during my time as a PhD
student. I am grateful to Dorit Aharonov, Claude Crépeau, Artur Ekert, Julia
Kempe, Iordanis Kerenidis, Michele Mosca, Michael Nielsen, David Poulin, John
Preskill, Barbara Terhal, Oded Regev, Andreas Winter and Andrew Yao for their
generous invitations. For making my visits to England and Australia so enjoy-
able, I would furthermore like to thank Almut Beige, Agata Branczyk, Matthias
Christandl, Andrew Doherty, Marie Ericsson, Alistair Kay, Jiannis Pachos, Peter
Rohde and Andreas Winter.

Thanks to Manuel Ballester, Cor Bosman, Serge Fehr, Sandor Héman, Oded
Regev, Peter Rohde, and especially Christian Schaffner for many helpful com-
ments on this thesis; any remaining errors are of course my own responsibility.
Thanks also to Frans Bartels for drawing the thesis cover and the illustrations of
Alice and Bob. I am still grateful to Torsten Grust and Peter Honeyman who
encouraged me to go to university in the first place.

Finally, many thanks to my family and friends for being who they are.

Amsterdam
February, 2008.