Acknowledgments

The completion of this thesis would not have been possible without the steady support of numerous people. First of all, my thanks go to my PhD advisor Prof. Felix von Oppen, who encouraged me all along the sometimes rough and stony road towards the completion of this thesis. He taught me how physical questions, as complicated as they might look initially, can be resolved by taking a step back from the complicated formalism and gaining intuitive understanding through inspection of simplified models. His "pleasure of finding things out" (R. P. Feynman) proves to be highly contagious.

I would like to thank Dr. Jürgen Dietel for his creativity and patience in countless discussions. I benefited greatly from his ideas and insights and also enjoyed our extracurricular activities.

Maybe the most memorable period during my time as a PhD student was the intense collaboration with Prof. Mikhail Raikh, University of Utah. Large parts of Chapter 3 evolved in Salt Lake City during my stay in 2004, powered by seemingly endless supplies of instant tomato soup.

I am especially indebted to Dr. Sven Gnutzmann whose generous support during the last year enabled me to complete this thesis. I would also like to thank Sven for many delicious meals at his place in Kreuzberg and for more than one well-spent evening in bars in Berlin or Israel.

Without Matthias Semmelhack, Jürgen Dietel, Sven Gnutzmann and Jens Koch, the last years would have been so much less fun! I would like to thank them for many interesting discussions, be they physics-related or not. Jens' encouragement and help during the writing-up of this thesis deserves some special credit. Additional thanks go to my colleagues Heiko Appel, Florian Elste, Prof. Ilya Eremin, Konstantin Glaum, Jens Dreger, Holger Flechsig, Kolja Gross, Thomas Lück, Matthias Lüffe, Carsten Paproth, Alexander Pikovski, Enrico Schierle, Maximilian Schultz, Dr. Georgy Skliarenko, Fatih Tekin, Prof. Carsten Timm, Andreas Wagner, and Frederik Zilly (in alphabetical order). I am also indebted to Brigitte Odeh for her help in all administrative issues and for creating a pleasant atmosphere in our research group. I would like to thank Prof. Uzy Smilansky, Yehonatan Elon, Rami Band, and Amit Aronovich for their hospitality during my stays at the Weizmann Institute of Science in Rehovot (Israel). I would also like to thank the Physics Department of the FU Berlin for giving me the opportunity to teach during my years as a PhD student.

Although, during the last months, there has been less and less empirical evidence for the existence of a world outside the physics department, life beyond physics has been a veritable source of delight. I am deeply grateful for Benjamin Marcus' friendship over the last twenty years. He was always there when I

needed him. In addition, Florian and Inken Kautter, Alexander Riemer, Ramon Jadot, Ewa Bienkowska, Agnieszka Kuzminska-Enders and Jens Enders, Tanja Kuchenmüller and Andree Thorwarth, Dr. Florian Weißbach, and Elisabeth Bondarowicz ought to be mentioned. Thanks also go to Caroline Miletzki for her support during the early stages of this thesis. I thank the entire American Football team of the FU Berlin for the good times we spent together.

My parents Heidrun and Hans Joas and my grandmothers Gertrud Joas and Christa Böhme, whose love and caring bolstered me not only during the completion of this thesis but throughout my whole life, could not have been more supportive. Thank you!

I gratefully acknowledge funding by the DFG-Schwerpunktprogramm Quanten-Hall-Systeme, by the FU Berlin, by the NSF-DAAD Collaborative Research Grant No. 0231010, by the Wilhelm und Else Heraeus Stiftung and by the GIF Project "Morphology of nodal sets".