

Preface

This book is the outgrowth of an NSF/CBMS Regional Conference in the Mathematical Sciences, May 18–22, 2009, organized by Robert Doran and Greg Friedman at Texas Christian University. I am highly indebted to Bob and Greg for their tireless work in getting together funding for the conference, making all the logistical arrangements, recruiting participants and other speakers, and for keeping me on track during this entire process.

The subject of this book, identical to the subject of the conference, is interdisciplinary. Thus it involves a more-or-less equal mixture of topology, operator algebras, and physics. There is also a bit of algebraic geometry, especially in the last chapter. While I assume most readers of this book are probably somewhat familiar with at least one of these subjects, they may not necessarily be knowledgeable about all or even most of them. So I have tried to include some basics on each one. The expert reader can skip over these sections. Roughly speaking, each chapter of this book corresponds to a single lecture from the conference, but “fleshed out” a little more. I have also included some sections, marked with a star, that I didn’t go into in detail in the lectures. These are more advanced, and someone just wanting an overview of the subject can skip these, though they might interest the more advanced reader. Since the book covers a lot of ground, it differs from most conventional mathematics books which follow the methodical “theorem-proof” style. There are of course plenty of theorems and proofs, but my main objective has been to show how several seemingly disparate subjects are closely linked with one another, and to give readers an overview of some areas of current research. In some places this happens at the expense of trying to cover everything systematically.

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