Preface

The purpose of this book is to provide an introductory course in a fundamental and acedemically required subject, as well as fill a gap in the physics education of scientists, many of whom have either never formally studied quantum mechanics or were forced to study the subject on their own later on in their career.

The text represents a condensed compilation of lecture notes covering 3-4 semesters of graduate courses in quantum mechanics, in which the author sets out to explain the physical concepts of quantum mechanics, describe the mathematical formalism, and present illustrative examples of ideas and methods that will amplify points discussed in the text. It is intended that the book serve as a graduate level text as well as a reference text.

Though the book should be comprehensible to advanced undergraduates, it is assumed that the reader is reasonably familiar with atomic structure, classical mechanics, differential equations and some electromagnetic theory. A knowledge of applied mathematical methods would be of invaluable help in this regard. Since the book is written primarily for students new to quantum mechanics or those seeking a refresher course in quantum mechanics, no list of references is given. On the level presented, it is hoped that the description is inclusive enough to be understood without referring to original publications. Readers who demand a level of mathematical rigor and elegance not presented here will have no trouble finding other appropriate textbooks.

The chapters, twenty-seven in all, are not independent; rather they build on one another. Subjects range from the failures of classical theory (Chap. 1) to "second quantization" (Chap. 21), including Dirac theory (Chap. 22) and Feynman diagrams (Chap. 27). The treatment of second quantization draws on the analogy between the problem of the harmonic oscillator (Chap. 8) and that of an aggregation of identical particles. There then follows the introduction of "creation" and "annihilation" operators for particles

(Chap. 25). This approach allows for an intuitive understanding of the physical processes within a formal mathematical framework, and is expanded easily into a relativistically covarient form (Chap. 24) that enables physical understanding of Feynman theory (Chap. 27).