

<<高等量子力学简明教程>>

图书基本信息

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## 前言

I have been teaching the course Advanced Quantum Mechanics to graduate students at Huazhong Normal University since 1984. Using various textbooks published inside and/or outside China as references, I was able to assemble together a few topics, such as coherent state, WKB approximation, wave-packet scattering, Lippmann-Schwinger equation, etc for the graduate course that were not already covered by the undergraduate Quantum Mechanics course. The idea of writing a new book first emerged in 2003 under the encouragement of my students, especially Ms. Xiaoyan Lin. A first version of this book appeared in 2004 and was printed for the graduate course use. From then on the book was revised and printed every year for the course. After several teaching-revision cycles, it is now ready for publication. Advanced quantum mechanics is a basic course for the graduate students who plan to specialize in various fields of physics, e.g. theoretical physics, high energy physics, nuclear physics, condensed matter physics, atomic and molecular physics, optics, astrophysics, etc. Taking this diversity of specialities into account, in addition to constructing a strict scientific framework for quantum mechanics, the present manuscript covers a comparatively wide range of topics. Starting from the experimentally observed wave-particle duality of microscopic system, the Hilbert space is introduced naturally. With the exception of the basic principles of quantum mechanics, no other assumption or "principle" is represented directly and simply by writing. In particular, the physical quantities, such as momentum, angular momentum, are not given through writing out manually their operators in some special representation, e.g. coordinate representation, but are defined through their commutators, starting from their fundamental property of being generators of continuous space transformation. The "uncertainty principle", "Pauli incompatibility principle" are no longer principles, but are derivable theorems in quantum mechanics. There are already quite a number of textbooks for advanced quantum mechanics available. What is the peculiarity of this book that makes it worthy of publication? We have the following considerations.

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### 内容概要

This book covers the main topics of modern advanced quantum mechanics in a concise way. It meets the requirement of the graduate students who plan to specialize in various fields of physics, e.g. theoretical physics, high energy physics, nuclear physics, condensed matter physics, atomic and molecular physics, optics, astrophysics and etc. It is for use in a one-semester graduate course. The main concepts, theorems and applications of quantum mechanics are written in the text, while most of the derivations are put in the exercises. Hints are given for selected exercises.

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