First volume in a course of theoretical physics

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W. Greiner, *Theoretical Physics I. Quantum Mechanics.* Springer-Verlag, Berlin; Heidelberg; New York, 1989. 348 p. (Text and Exercise Books).

This book is the first volume in a course of theoretical physics that was originally published in German, gained wide acceptance among German graduate students, and was subsequently translated into English. The full course consists of five volumes:

1. Quantum mechanics. Introduction.
2. Quantum mechanics. Symmetry.
3. Quantum mechanics. Relativistic wave equations.
4. Quantum electrodynamics.
5. Theory of weak interactions.

Evidently this theoretical physics course covers only the areas of theoretical physics that pertain to quantum mechanics and quantum field theory. The first volume contains the standard exposition of introductory quantum mechanics. It is more detailed than traditional quantum mechanics textbooks, however, because it covers a restricted range of topics, with other material relegated to subsequent volumes in the course. Like the rest of the course, this volume is characterized by certain methodological approaches that improve its value. Moreover, the book succeeds as a textbook because the material is well-chosen and has stood the test of time, having gone through five German editions.

In reading this volume, one notes the careful treatment of the history of quantum mechanics. In addition to the fundamental ideas and experiments, the course provides concise biographical sketches of the scientists involved. These sketches, together with the ideas themselves, make it possible to understand the evolution of quantum mechanics.

Another methodological strength of this volume is the large number of quantum mechanical problems. These problems are not intended for facilitating familiarity with quantum mechanical techniques, but rather follow the main expository thread of the text. They allow for a more detailed examination of certain elements and illustrate particular concepts. Thus the material is implicitly divided into two unequal sections. The smaller section contains the fundamental quantum mechanical concepts and derivations, and covers the central experiments and ideas that determined the direction of quantum mechanics. The second, larger section contains problems and their detailed solutions. They facilitate the understanding of the elements of quantum mechanics. The presence of these problems in the text makes the course useful to students and specialists of varied backgrounds. Those with sufficient preparation could skip the problems, while other students would find the problems to be of great use in assimilating the material.

Another methodological strength of this volume is the thorough and unhurried presentation of the material. This is pedagogically helpful—the course does not require additional textbooks or references.

The book under review contains a classic presentation of the foundations of quantum mechanics. I believe this volume is one of the best modern quantum mechanics textbooks that will be of great value to students entering this field.