<<近代物理学(改编版)>>

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前言

Knowledge of the revolutions of 20th-century physics is an indispensable part of the training of any engineer and phYsical scientist. That is because viffually all of today a tecnology is based, at least in part, on this knowledge. The basic subject material of what is called mod- ern physics is very nearly 100 years old, so that it is hardly mOdem at at all. Yet just as Newton'slaws, today 300 years old, Maxwell's equations, today nearly 150 yeats old, and the laws of clasica！
sta- tistical physics, more than 100 years old, remain applicable and essential in their respective domains of physical law, so too do the two major developments of the first half of this century: relativity and quantum mechanics. These fundamental subjects underlie a vast scope of application that contin- ues its inventive course today Moreover, research on fundamental physics has not stopped with rela- tivity and quantum mechanics, and working scientists still face questions as interesting as any that have been answered in the past.Both relativity and quantum mechanics require the studert to make difficult changes inhow he or she thinks the physical world works. The subjects violate prejudices that have been built up by everyday experience. For this reason, precision and clarity of explanation are, for us, the first and most important part of the material. We have made every effor to avoid the "it can be shown" approach and to present modern physics in a way that makes its interconnectedness, as well as its connection to classical physics, evident.Throughout this text, we have built in a historical approach——a discussion of how a Subject developed and the thinking that led to its maturation. Often this historical perspective is inter- woven with the material; at other times it would interrupt an efficient and compact presentation, and then we present it on the side, asit were. We feel that t~ approach is useful that it stress- es that the roots of the revolutionary advances lie in experiment; it also makes the text ore fun to read.

内容概要

本书是Jeremy Bernstein等编著的Modern Physics（Pearson出版集团，2001年出版）的改编版。
本书的原版本内容丰富，资料详实，涉及了物理学领域的最新成果和研究课题，在国外被许多外院校指定或推荐作为学生作为近代物理学的主要参考书，具有比较大的影响。
本书根据国内教学实际，删去了原版第一篇“狭义相对论”部分，保留了“量子力学”、“物理应用”和“物理前沿”的大部分内容。
　　本书详细阐述了量子力学发展的历程和取得的成就，涉及复杂原子与分子、统计物理、原子辐射与激光、导体、半导体与超导体、原子核等内容，以及基本粒子物理等一些前沿科研领域。
 本书可供普通高等学校理科物理类专业作为双语教学教材使用，也可供其他专业和社会读者参考。
作者简介：Jeremy Bernstein， Jeremy Bernstein has had a dual career in physics and writing. He was on the staff of the New Yorker from 1963 to 1993 and was a Professor of Physics at the Stevens Institute of Technology from 1968 until his retirement in 1993, when he became Professor emeritus. He has won several awards for his writing about science and mountain travel. He has also published widely in both technical and non-techni-cal journals. Some of his recent books are: An Introduction to Cosmology, Albert Einstein and the Frontiers of Physics, A Theory for Everything, In the Himalayas, and Dawning of the Raj. He has held visiting appointments at The Rockefeller University,The University of Islamabad, The Ecole Polytechnique, CERN laboratory Princeton University, and Oxford. This photograph of Jeremy was taken on a bicycle trip in northern California. The thumb, which is on the grounds of the Clos Pegase art gallery and winery in Calistoga, was the work of the French artist Cesar Baldachini.Bernstein has bicycled in many countries including Bali and Crete. He makes his home in New York City and Aspen, Colorado.

作者简介

Jeremy Bernstein，Jeremy Bernstein has had a dual career in physics and writing. He was on the staff of the New Yorker from 1963 to 1993 and was a Professor of Physics at the Stevens Institute of Technology from 1968 until his retirement in 1993, when he

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章节摘录

插图：What is true for hydrogen is in fact true for all radiation emitted or absorbed by individual atoms or molecules. This radiation comes in discrete frequencies that are so thoroughly charac- teristic of the atoms or molecules in question that they in effect form a fingerprint. Accordingl~ there is an important application in: which the measurement of the frequencies emitted or absorbed by a material allows us to identify components that are present in the material, even in very small amounts. Let us turn now from questions of discrete frequencies to questions of atomic structure. InSection 1——6, we described Rutherford's classical experiments. These experiments established theexistence of an atom that resembles a miniature .solar system. But just how close is this resem-blance？

Several observations reveal that the atom behaves very differently from an electric equiv-alent of a mechanical solar system and that Newtonian physics is very far from providing anexplanation of atomic structure. We expand on two such observations that we briefly mentionedin Section 1-6.When classical electric charges accelerate, they radiate, losing energy in the process. A classical electron in orbit about a nucleus undergoes acceleration, and as it radiates and loses energy, it will spiral into the nucleus. A classical calculation shows that the electron should be absorbed into the nucleus in only 10-10 s！

A classical picture cannot explain why all atoms of an element are the same, since, in the classi- cal planetary picture, orbital energies, for example, depend on the initial conditions and can vary by arbitrarily small amounts. This classical variability is contradicted by empirical fits like those described by Eq. （3-1）, which were interpreted by Ritz as being due.to differencesin what he called terms, but which we shall see are associated with energies that can have only distinct, discrete values.

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