

# electrodynamics textbooks

**electrodynamics textbooks** are essential resources for students and professionals aiming to deepen their understanding of the principles governing electric and magnetic fields and their interactions. These textbooks provide a comprehensive foundation in classical electrodynamics, covering fundamental theories, mathematical formulations, and practical applications. In this article, we will explore the different types of electrodynamics textbooks available, their key features, and recommendations for specific audiences such as undergraduate students, graduate students, and researchers. Additionally, we will discuss the role of problem-solving and conceptual understanding in mastering electrodynamics. This comprehensive guide aims to equip readers with the knowledge needed to select the most suitable textbooks for their educational or research needs.

- Types of Electrodynamics Textbooks
- Key Features of Electrodynamics Textbooks
- Recommended Electrodynamics Textbooks for Undergraduates
- Recommended Electrodynamics Textbooks for Graduates
- Electrodynamics Textbooks for Researchers
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- Conclusion

## Types of Electrodynamics Textbooks

Electrodynamics textbooks can be categorized into several types based on their target audience and the depth of content they provide. Understanding these categories can help students and professionals choose the right book for their specific needs.

### Fundamental Textbooks

Fundamental textbooks typically introduce the core principles of electrodynamics. They are designed for undergraduate students and provide a solid grounding in the subject. These books focus on classical theories and often include discussions on vector calculus and the mathematical tools necessary for understanding electrodynamics.

### Advanced Textbooks

Advanced textbooks cater to graduate students and researchers. They cover more complex topics such as electromagnetic theory, quantum electrodynamics, and field theory. These books often

require a strong background in mathematics and physics, as they delve into rigorous derivations and advanced applications.

## **Supplementary Textbooks**

Supplementary textbooks may include problem sets, solutions manuals, or guides to numerical methods. These resources are invaluable for students looking to reinforce their understanding through practice and application of the theories learned.

## **Key Features of Electrodynamics Textbooks**

When selecting an electrodynamics textbook, several key features should be considered to ensure it meets the educational needs of the reader.

### **Clear Explanations and Derivations**

High-quality electrodynamics textbooks provide clear explanations of concepts and thorough derivations of equations. This clarity is crucial for students to grasp complex topics effectively.

### **Illustrative Examples and Applications**

Textbooks that include numerous examples and real-world applications help students relate theoretical concepts to practical situations. This feature enhances comprehension and retention of material.

### **Problem Sets and Solutions**

A good textbook should have extensive problem sets at the end of each chapter, allowing students to test their understanding. Availability of solutions or hints can further aid the learning process.

### **Supplementary Materials**

Some textbooks come with additional resources such as online lectures, interactive simulations, or companion websites. These materials can significantly enhance the learning experience.

## **Recommended Electrodynamics Textbooks for Undergraduates**

Undergraduate students seeking to understand the basics of electrodynamics can benefit from several well-regarded textbooks that strike a balance between rigor and accessibility.

## **“Introduction to Electrodynamics” by David J. Griffiths**

This textbook is widely praised for its clear writing and logical structure. It covers essential topics in electrodynamics with a focus on physical intuition and problem-solving techniques.

## **“Electromagnetism” by Edward M. Purcell and David J. Morin**

Purcell's text is a classic in the field, combining theoretical foundations with practical applications. It is accessible for undergraduate physics students and emphasizes a conceptual approach.

## **“Electricity and Magnetism” by Edward M. Purcell**

This book is an excellent introduction for students new to the subject, providing a solid base in fundamental concepts and problem-solving strategies.

## **Recommended Electrodynamics Textbooks for Graduates**

Graduate students looking for in-depth coverage of electrodynamics will find the following textbooks particularly useful.

## **“Classical Electrodynamics” by John D. Jackson**

Jackson's textbook is considered the gold standard for advanced studies in electrodynamics. It covers a wide range of topics with mathematical rigor and depth, suitable for graduate students.

## **“Introduction to Electrodynamics” by David J. Griffiths (Graduate Edition)**

This graduate edition builds on Griffiths' undergraduate text and includes more challenging problems and deeper theoretical insights, making it suitable for advanced study.

## **“The Classical Theory of Fields” by L.D. Landau and E.M. Lifshitz**

This book is part of the renowned Course of Theoretical Physics series, offering a comprehensive look at classical field theory, including electrodynamics, from a theoretical perspective.

# Electrodynamics Textbooks for Researchers

Researchers in the field of electrodynamics may require specialized texts that address advanced theories and contemporary applications.

## **“Electrodynamics: A Concise Introduction” by R. G. Sachs**

This book provides a succinct overview of modern electrodynamics, incorporating discussions on both classical and relativistic frameworks, ideal for researchers seeking a quick reference.

## **“Quantum Electrodynamics” by Walter Greiner**

Focusing on the quantum aspects of electrodynamics, this text is essential for researchers interested in the intersection of quantum mechanics and electromagnetic theory.

## **Importance of Problem-Solving in Electrodynamics**

Problem-solving is a fundamental aspect of learning electrodynamics. Engaging with a variety of problems allows students to apply theoretical knowledge practically, fostering a deeper understanding of the material.

## **Developing Analytical Skills**

Working through problems enhances analytical skills, enabling students to tackle complex situations in both academic and real-world settings. This skill is crucial for success in advanced studies and research.

## **Encouraging Conceptual Understanding**

Solving problems encourages students to think critically about the concepts involved and their interconnections. This conceptual understanding is vital for mastering electrodynamics and applying it to other areas of physics.

## **Conclusion**

Electrodynamics textbooks are invaluable resources for anyone looking to deepen their understanding of electric and magnetic fields. With a variety of options tailored to different levels of study, it is crucial to choose the right textbook that aligns with one's educational requirements. Whether you are an undergraduate, graduate, or researcher, the recommended textbooks outlined in this article will provide a solid foundation in electrodynamics. Emphasizing problem-solving and conceptual understanding, these resources will help you excel in your studies and research endeavors.

## **Q: What are the best electrodynamics textbooks for beginners?**

A: The best electrodynamics textbooks for beginners include “Introduction to Electrodynamics” by David J. Griffiths and “Electricity and Magnetism” by Edward M. Purcell. These texts provide clear explanations and are accessible for those new to the subject.

## **Q: Are there any textbooks that focus specifically on problem-solving in electrodynamics?**

A: Yes, many textbooks include problem sets at the end of each chapter, such as “Introduction to Electrodynamics” by Griffiths, which emphasizes problem-solving techniques throughout the text.

## **Q: How do advanced textbooks differ from undergraduate textbooks in electrodynamics?**

A: Advanced textbooks, such as “Classical Electrodynamics” by John D. Jackson, delve deeper into the mathematical foundations and complex theories of electrodynamics, while undergraduate textbooks focus on core principles and introductory concepts.

## **Q: Can electrodynamics textbooks help with understanding real-world applications?**

A: Yes, many electrodynamics textbooks include examples and case studies related to real-world applications, helping students connect theoretical knowledge to practical use.

## **Q: What should I consider when choosing an electrodynamics textbook?**

A: Consider factors such as the depth of coverage, clarity of explanations, inclusion of problem sets, and whether the textbook aligns with your current level of knowledge and learning goals.

## **Q: Are there any notable authors in the field of electrodynamics textbooks?**

A: Notable authors include David J. Griffiths, John D. Jackson, and Edward M. Purcell, who are well-respected for their contributions to the field through their widely used textbooks.

## **Q: How important is mathematical background for studying electrodynamics?**

A: A strong mathematical background is essential for studying electrodynamics, especially for advanced topics. Familiarity with calculus, linear algebra, and differential equations is highly beneficial.

## Q: What role does conceptual understanding play in mastering electrodynamics?

A: Conceptual understanding is crucial in mastering electrodynamics as it allows students to grasp the underlying principles and apply them effectively in various contexts, enhancing problem-solving abilities.

## Q: Are there textbooks that integrate quantum aspects of electrodynamics?

A: Yes, "Quantum Electrodynamics" by Walter Greiner is an example of a textbook that integrates quantum mechanics with electrodynamics, providing a comprehensive view of the subject.

## Electrodynamics Textbooks

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**electrodynamics textbooks:** Introduction to Electrodynamics David J. Griffiths, 2017-06-29 This well-known undergraduate electrodynamics textbook is now available in a more affordable printing from Cambridge University Press. The Fourth Edition provides a rigorous, yet clear and accessible treatment of the fundamentals of electromagnetic theory and offers a sound platform for explorations of related applications (AC circuits, antennas, transmission lines, plasmas, optics and more). Written keeping in mind the conceptual hurdles typically faced by undergraduate students, this textbook illustrates the theoretical steps with well-chosen examples and careful illustrations. It balances text and equations, allowing the physics to shine through without compromising the rigour of the math, and includes numerous problems, varying from straightforward to elaborate, so that students can be assigned some problems to build their confidence and others to stretch their minds. A Solutions Manual is available to instructors teaching from the book; access can be requested from the resources section at [www.cambridge.org/electrodynamics](http://www.cambridge.org/electrodynamics).

**electrodynamics textbooks:** Classical Electrodynamics Tung Tsang, 1998-02-10 This is a comprehensive and "user-friendly" textbook for a two-semester graduate level course in physics and electrical engineering. Many applications are given in the text. Over two hundred problems are also given. Problem solving by simple and direct approaches (with detailed calculations) are included, and hints are provided to solve the more difficult problems. Approaches to choosing suitable diagrams, coordinating systems and to symmetry requirements are discussed. Mathematical reviews are also given, with emphasis on intuition and fundamentals.

**electrodynamics textbooks:** Classical Electrodynamics John David Jackson, 2021 The third edition of the defining text for the graduate-level course in Electricity and Magnetism has finally arrived! It has been 37 years since the first edition and 24 since the second. The new edition addresses the changes in emphasis and applications that have occurred in the field, without any significant increase in length.

**electrodynamics textbooks:** Modern Electrodynamics Andrew Zangwill, 2013 An engaging

writing style and a strong focus on the physics make this graduate-level textbook a must-have for electromagnetism students.

**electrodynamics textbooks: Classical Electromagnetic Theory** Jack Vanderlinde, 2006-01-17 In questions of science, the authority of a thousand is not worth the humble reasoning of a single individual. Galileo Galilei, physicist and astronomer (1564-1642) This book is a second edition of "Classical Electromagnetic Theory" which derived from a set of lecture notes compiled over a number of years of teaching elect- magnetic theory to fourth year physics and electrical engineering students. These students had a previous exposure to electricity and magnetism, and the material from the first four and a half chapters was presented as a review. I believe that the book makes a reasonable transition between the many excellent elementary books such as Griffith's Introduction to Electrodynamics and the obviously graduate level books such as Jackson's Classical Electrodynamics or Landau and Lifshitz' Elect- dynamics of Continuous Media. If the students have had a previous exposure to Electromagnetic theory, all the material can be reasonably covered in two semesters. Neophytes should probably spend a semester on the first four or five chapters as well as, depending on their mathematical background, the Appendices B to F. For a shorter or more elementary course, the material on spherical waves, waveguides, and waves in anisotropic media may be omitted without loss of continuity.

**electrodynamics textbooks: Introduction to Electrodynamics** David Jeffery Griffiths, 1999 For junior/senior-level electricity and magnetism courses. This book is known for its clear, concise and accessible coverage of standard topics in a logical and pedagogically sound order. The Third Edition features a clear, accessible treatment of the fundamentals of electromagnetic theory, providing a sound platform for the exploration of related applications (ac circuits, antennas, transmission lines, plasmas, optics, etc.). Its lean and focused approach employs numerous examples and problems.

**electrodynamics textbooks: Theoretical Physics 3** Wolfgang Nolting, 2016-06-28 This textbook offers a clear and comprehensive introduction to electrodynamics, one of the core components of undergraduate physics courses. The first part of the book describes the interaction of electric charges and magnetic moments by introducing electro- and magnetostatics. The second part of the book establishes deeper understanding of electrodynamics with the Maxwell equations, quasistationary fields and electromagnetic fields. All sections are accompanied by a detailed introduction to the math needed. Ideally suited to undergraduate students with some grounding in classical and analytical mechanics, the book is enhanced throughout with learning features such as boxed inserts and chapter summaries, with key mathematical derivations highlighted to aid understanding. The text is supported by numerous worked examples and end of chapter problem sets. About the Theoretical Physics series Translated from the renowned and highly successful German editions, the eight volumes of this series cover the complete core curriculum of theoretical physics at undergraduate level. Each volume is self-contained and provides all the material necessary for the individual course topic. Numerous problems with detailed solutions support a deeper understanding. Wolfgang Nolting is famous for his refined didactical style and has been referred to as the German Feynman in reviews.

**electrodynamics textbooks: Electrodynamics and Classical Theory of Fields & Particles** Asim Orhan Barut, 1980-01-01 The first comprehensive treatment of relativistic electrodynamics, this volume remains essential reading. This graduate-level text was written by a distinguished theoretical physicist. It deftly reveals the classical underpinnings of modern quantum field theory with explorations of space-time, Lorentz transformations, conservation laws, equations of motion, Green's functions, and action-at-a-distance electrodynamics. 1964 edition.

**electrodynamics textbooks: Electrodynamics** Carolina C. Ilie, Zachariah S. Schrecengost, 2018-05-29 This book of problems and solutions is a natural continuation of Ilie and Schrecengost's first book Electromagnetism: Problems and Solutions. As with the first book, this book is written for junior or senior undergraduate students, and for graduate students who may have not studied electrodynamics yet and who may want to work on more problems and have an immediate feedback while studying. This book of problems and solutions is a companion for the student who would like to

work independently on more electrodynamics problems in order to deepen their understanding and problem solving skills and perhaps prepare for graduate school. This book discusses main concepts and techniques related to Maxwell's equations, conservation laws, electromagnetic waves, potentials and fields, and radiation.

**electrodynamics textbooks: Directed Quantities in Electrodynamics** Bernard Jancewicz, 2022-02-14 This monograph explores classical electrodynamics from a geometrical perspective with a clear visual presentation throughout. Featuring over 200 figures, readers will delve into the definitions, properties, and uses of directed quantities in classical field theory. With an emphasis on both mathematical and electrodynamic concepts, the author's illustrative approach will help readers understand the critical role directed quantities play in physics and mathematics. Chapters are organized so that they gradually scale in complexity, and carefully guide readers through important topics. The first three chapters introduce directed quantities in three dimensions with and without the metric, as well as the development of the algebra and analysis of directed quantities. Chapters four through seven then focus on electrodynamics without the metric, such as the premetric case, waves, and fully covariant four-dimensional electrodynamics. Complementing the book's careful structure, exercises are included throughout for readers seeking further opportunities to practice the material. *Directed Quantities in Electrodynamics* will appeal to students, lecturers, and researchers of electromagnetism. It is particularly suitable as a supplement to standard textbooks on electrodynamics.

**electrodynamics textbooks: Classical Electromagnetic Radiation** Mark A. Heald, Jerry B. Marion, 2012-12-19 Newly corrected, this highly acclaimed text is suitable for advanced physics courses. The authors present a very accessible macroscopic view of classical electromagnetics that emphasizes integrating electromagnetic theory with physical optics. The survey follows the historical development of physics, culminating in the use of four-vector relativity to fully integrate electricity with magnetism. Corrected and emended reprint of the Brooks/Cole Thomson Learning, 1994, third edition.

**electrodynamics textbooks: No-Nonsense Electrodynamics** Jakob Schwichtenberg, 2018-12-06 Learning Electrodynamics doesn't have to be boring. What if there was a way to learn Electrodynamics without all the usual fluff? What if there were a book that allowed you to see the whole picture and not just tiny parts of it? Thoughts like this are the reason that No-Nonsense Electrodynamics now exists. What will you learn from this book? Get to know all fundamental electrodynamic concepts — Grasp why we can describe electromagnetism using the electric and magnetic field, the electromagnetic field tensor and the electromagnetic potential and how these concepts are connected. Learn to describe Electrodynamics mathematically — Understand the meaning and origin of the most important equations: Maxwell's equations & the Lorentz force law. Master the most important electrodynamic systems — read step-by-step calculations and understand the general algorithm we use to describe them. Get an understanding you can be proud of — Learn why Special Relativity owes its origins to Electrodynamics and how we can understand it as a gauge theory. No-Nonsense Electrodynamics is the most student-friendly book on Electrodynamics ever written. Here's why. First of all, it's nothing like a formal university lecture. Instead, it's like a casual conversation with a more experienced student. This also means that nothing is assumed to be "obvious" or "easy to see". Each chapter, each section, and each page focusses solely on the goal to help you understand. Nothing is introduced without a thorough motivation and it is always clear where each formula comes from. The book contains no fluff since unnecessary content quickly leads to confusion. Instead, it ruthlessly focusses on the fundamentals and makes sure you'll understand them in detail. The primary focus on the readers' needs is also visible in dozens of small features that you won't find in any other textbook. In total, the book contains more than 100 illustrations that help you understand the most important concepts visually. In each chapter, you'll find fully annotated equations and calculations are done carefully step-by-step. This makes it much easier to understand what's going on in. Whenever a concept is used which was already introduced previously, there is a short sidenote that reminds you where it



was first introduced and often recites the main points. In addition, there are summaries at the beginning of each chapter that make sure you won't get lost.

**electrodynamics textbooks: Macroscopic Electrodynamics: An Introductory Graduate Treatment (Second Edition)** Walter Mark Wilcox, Christopher P Thron, 2024-02-08 'Macroscopic Electrodynamics' (ME) is a comprehensive two-semester introductory graduate level textbook on classical electrodynamics for use in physics and engineering programs. The word 'macroscopic' is intended to indicate both the large-scale nature of the theory, as well as the emphasis placed upon applications of the so-called macroscopic Maxwell equations to idealized media. ME emphasizes principles and practical methods of analysis, which are often presented in fresh and original ways. Illustrative examples are carefully chosen to promote the students' physical intuition, and are worked out in detail to give students a thorough grounding in solution techniques. The style is informal yet mathematically sound, and presumes only a basic familiarity with electrodynamics such as that obtained in a one-semester junior-level undergraduate class. At the end of each chapter, many original problems are provided with illustrations or expanded upon specific sections of the text. The problems are at the heart of the text and are meant to encourage students, develop confidence, and emphasize ideas while avoiding both oversimplification and inordinate calculational difficulties.

**electrodynamics textbooks: Electrodynamics** Masud Chaichian, Ioan Merches, Daniel Radu, Anca Tureanu, 2016-10-31 This book is devoted to the fundamentals of classical electrodynamics, one of the most beautiful and productive theories in physics. A general survey on the applicability of physical theories shows that only few theories can be compared to electrodynamics. Essentially, all electric and electronic devices used around the world are based on the theory of electromagnetism. It was Maxwell who created, for the first time, a unified description of the electric and magnetic phenomena in his electromagnetic field theory. Remarkably, Maxwell's theory contained in itself also the relativistic invariance of the special relativity, a fact which was discovered only a few decades later. The present book is an outcome of the authors' teaching experience over many years in different countries and for different students studying diverse fields of physics. The book is intended for students at the level of undergraduate and graduate studies in physics, astronomy, engineering, applied mathematics and for researchers working in related subjects. We hope that the reader will not only acquire knowledge, but will also grasp the beauty of theoretical physics. A set of about 130 solved and proposed problems shall help to attain this aim.

**electrodynamics textbooks: Classical Electromagnetic Radiation** Jerry Marion, 2012-12-02 Classical Electromagnetic Radiation, Second Edition focuses on the classical electrodynamics with emphasis on radiation problems and the wave attributes of the electromagnetic field. This book aims to provide a modern and practically sophisticated mathematical treatment of classical electrodynamics at the undergraduate level. Organized into 13 chapters, this edition starts with an overview of the basic principles of electromagnetism. This text then presents a detailed discussion of Laplace's equation and a treatment of multiple effects, since such material is of considerable significance in the development of radiation theory. Other chapters consider the electromagnetic field equations, which are developed in the time-dependent form. This book discusses as well the subjects of wave propagation in space as well as in material media. The final chapter presents an introduction to relativistic electrodynamics. This book is a valuable resource for physicists, engineers, and readers who are interested in the applications of electrodynamics in modern physics.

**electrodynamics textbooks: Electrodynamics: The Field-Free Approach** Kjell Prytz, 2015-03-19 This book is intended as an undergraduate textbook in electrodynamics at basic or advanced level. The objective is to attain a general understanding of the electrodynamic theory and its basic experiments and phenomena in order to form a foundation for further studies in the engineering sciences as well as in modern quantum physics. The outline of the book is obtained from the following principles: • Base the theory on the concept of force and mutual interaction • Connect the theory to experiments and observations accessible to the student • Treat the electric, magnetic and inductive phenomena cohesively with respect to force, energy, dipoles and material • Present electrodynamics using the same principles as in the preceding mechanics course • Aim at explaining

that theory of relativity is based on the magnetic effect • Introduce field theory after the basic phenomena have been explored in terms of force Although electrodynamics is described in this book from its 1st principles, prior knowledge of about one semester of university studies in mathematics and physics is required, including vector algebra, integral and differential calculus as well as a course in mechanics, treating Newton's laws and the energy principle. The target groups are physics and engineering students, as well as professionals in the field, such as high school teachers and employees in the telecom industry. Chemistry and computer science students may also benefit from the book.

**electrodynamics textbooks:** *Electrodynamics of Magnetoactive Media* Israel D. Vagner, B.I. Lembrikov, Peter Rudolf Wyder, 2013-03-09 Our objective was primarily to consider in a separate treatise from the general point of view a theory of as many electrodynamic phenomena in a magnetic field as possible. The choice of material was determined by both the absence of such a book and the scientific interests of the authors. From the very beginning, however, we felt it necessary to include the fundamentals of electrodynamics that are required for the thorough analysis of particular processes. We believe that it is convenient for a reader to find in the same book a consistent review of some special fields in physics and a complete set of theoretical instruments that are necessary for the clear understanding of more advanced parts of the book. There exists a number of excellent textbooks and monographs describing the problems of classical electrodynamics in general and its applications to continuous media. We have to acknowledge, for example, the following fundamental books: Electrodynamics by A. Sommerfeld [1], The Classical Theory of Fields by L.D. Landau and E.M. Lifshitz [2], Electromagnetic Theory by J.A. Stratton [3], and Electrodynamics of Continuous Media by L.D. Landau and E.M. Lifshitz [4]. This list is certainly not exhaustive. However, to our knowledge, a book specifically covering the theory of electrodynamic phenomena in a magnetic field has not yet been written.

**electrodynamics textbooks:** *Electrodynamics* H. J. W. Müller-Kirsten, 2004 This is a comprehensive text on electrodynamics with detailed explanations and calculations. One hundred worked examples have been incorporated, making this book also suitable for self-instruction. Apart from all traditional topics of the Maxwell's theory, this book includes the special theory of relativity and the Lagrangian formalism and applications; the text also contains introductions to quantum effects related to electrodynamics, such as the Aharonov-Bohm and the Casimir effects. Numerous modern applications in diverse directions are treated in the examples.

**electrodynamics textbooks:** Advanced Classical Electromagnetism Robert Wald, 2022-03-22 This is a concise, beginning graduate-level textbook on classical electromagnetism, the branch of physics that describes the interaction of electric currents or fields and magnetic fields. Electromagnetism (also called electrodynamics) is one of the pillars of modern physics and, as such, of the modern physics curriculum, with courses on electromagnetism required at the undergraduate and graduate levels. These courses traditionally proceed in a quasi-historical fashion, starting from equations and laws that were first formulated in the eighteenth and nineteenth centuries and still form the foundations of our understanding of electromagnetism. However, as Robert Wald argues, teaching in this way can be imprecise and tends to promote outdated ways of thinking about the subject. This book rethinks how electromagnetism is presented at the graduate level, offering a corrective that aims to bring teaching up to date with our more modern understanding of the topic. The book begins by debunking four common misconceptions, or myths, that can hinder a deep conceptual understanding of electromagnetism. Wald then proceeds through the major topics first-year grad courses (and textbooks) in electromagnetism typically cover, including electrostatics, dielectrics, magnetostatics, electrodynamics, geometric optics, special relativity, gauge theory, and point charge. Wald's aim throughout is to explain to students how to think about electromagnetism from a modern and mathematically precise perspective, formulating all the key conceptual ideas and results in the field clearly and concisely, while forgoing extensive collections of examples and applications. The book could be used as the basis for or as a supplement to a course, or for self-study by students seeking a deeper understanding than traditional courses and books offer--

**electrodynamics textbooks: Quantum Electrodynamics** Walter Greiner, Joachim Reinhardt, 2008-11-26 We are pleased by the positive resonance of our book which now necessitates a fourth edition. We have used this opportunity to implement corrections of misprints and amendments at several places, and to extend and improve the discussion of many of the exercises and examples. We hope that our presentation of the method of equivalent photons (Example 3. 17), the form factor of the electron (Example 5. 7), the infrared catastrophe (Example 5. 8) and the energy shift of atomic levels (Example 5. 9) are now even better to understand. The new Exercise 5. 10 shows in detail how to arrive at the non-relativistic limit for the calculation of form factors. Moreover, we have brought up-to-date the Biographical Notes about physicists who have contributed to the development of quantum electrodynamics, and references to experimental tests of the theory. For example, there has been recent progress in the determination of the electric and magnetic form factors of the proton (discussed in Exercise 3. 5 on the Rosenbluth formula) and the Lamb shift of high-Z atoms (discussed in Example 5. 9 on the energy shift of atomic levels), while the experimental verification of the birefringence of the QED vacuum in a strong magnetic field (Example 7. 8) remains unsettled and is a topic of active ongoing research.

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