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Atom-Photon Interactions: Basic Processes And Applications



Synopsis

Atom-Photon Interactions: Basic Processes and Applications allows the reader to master various aspects of the physics of the interaction between light and matter. It is devoted to the study of the interactions between photons and atoms in atomic and molecular physics, quantum optics, and laser physics. The elementary processes in which photons are emitted, absorbed, scattered, or exchanged between atoms are treated in detail and described using diagrammatic representation. The book presents different theoretical approaches, including: * Perturbative methods * The resolvent method * Use of the master equation * The Langevin equation * The optical Bloch equations * The dressed-atom approach Each method is presented in a self-contained manner so that it may be studied independently. Many applications of these approaches to simple and important physical phenomena are given to illustrate the potential and limitations of each method.

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Customer Reviews

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This analysis of the physical phenomena resulting from the interactions between atoms and photons brings together and discusses different theoretical approaches which have up to now been dispersed in more specialized works. Each of these approaches is presented in a self-contained way and can be studied independently. Covers perturbative methods, resolvent method, master equations Langevin equation, optical Bloch equations and dressed atom method.

I really like this book and the prequel. However, some pages are really badly printed. In some equations you cannot tell whether there is supposed to be a "+", a "-" or an equal "=" sign as there is not enough ink to read it. Given the price of that book this shouldn't happen. This is Wiley's fault.

book is in good condition, better than I expected, I satisfied with this purchase

Haven't used the book much yet, but it came highly recommended by Wolfgang Ketterle (Nobel Prize for BEC), the instructor for the Atomic, Molecular & Optical graduate course at MIT.

Atom Photon Interactions is an excellent text for atomic and optical physics. I refer back to the review material---transition amplitudes, quantum electrodynamic fundamentals, etc--- over and over again. Naturally, these sections are very brief, and the book works best along side Cohen-Tannoudji's more elementary texts Quantum Mechanics and Photons and Atoms, or their equivalents. The later chapters are rich in techniques and intuition applicable to atom-trapping, spectroscopy, laser theory, etc. Cohen-Tannoudji covers a lot of material, and manages to link it all to a few basic fundamental principles. The book is extremely well-organized, with bite-sized sections and appendices to each chapter. An excellent collection of exercises with solutions is included in the back. Unfortunately, the text does not prompt the reader to try working these problems at appropriate times (sadly, I didn't realize the exercises were there until I'd been using the book for some time). Like Photons and Atoms, this is primarily a book for theorists; its one weakness, I feel, is that the principles, however clear, never seem connected to the actual numbers that an experimentalist or system designer can relate to.

This is one of the best books in the field of QED. I used it for self-study. Only downside (also upside) about it is that everything is explained so completely that the reader might become a bit lazy at times to spend some intellectual effort. An excellent book for self-study.

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