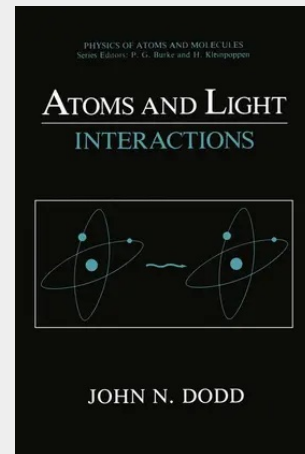


Atoms and Light: Interactions

This book discusses the interaction of light with atoms, concentrating on the semiclassical descriptions of the processes. It begins by discussing the classical theory of electromagnetic radiation and its interaction with a classical charged dipole oscillator. Then, in a pivotal chapter, the interaction with a free charge is described (the Compton effect); it is shown that, in order to give agreement with observation, certain quantum rules must be introduced. The book then proceeds to discuss the interaction from this point of view-light always being described classically, atoms described quantum-mechanically, with quantum rules for the interaction. Subsequent chapters deal with stimulated emission and absorption, spontaneous emission and decay, the general problem of light stimulating and being scattered from the two-state atom, the photoelectric effect, and photoelectric counting statistics. Finally the author gives a personal view on the nature of light and his own way of looking at certain paradoxes. The writing of this book was originally conceived as a collaboration between the present author and a colleague of former years, Alan V. Durrant. Indeed, some preliminary exchange of ideas took place in the mid-1970s. But the problems of joint-authorship from antipodean positions proved too difficult and the project was abandoned. I would like to record my indebtedness to him for the stimulation of this early association. I also acknowledge the encouragement of my colleagues at the University of Otago. Special reference must be made to D. M.

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106,99 €

99,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9781475793338

Medium: Buch

ISBN: 978-1-4757-9333-8

Verlag: Springer

Erscheinungstermin: 25.04.2013

Sprache(n): Englisch

Auflage: Erscheinungsjahr 2013

Serie: Perspectives on Individual Differences

Produktform: Kartoniert

Gewicht: 406 g

Seiten: 219

Format (B x H): 155 x 235 mm

