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Sinopsis

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This textbook offers a comprehensive and up-to-date overview of the basic ideas in modern quantum optics, beginning with a review of the whole of optics, and culminating in the quantum description of light. The book emphasizes the phenomenon of interference as the key to understanding the behavior of light, and discusses distinctions between the classical and quantum nature of light. Laser operation is reviewed at great length and many applications are covered, such as laser cooling, Bose condensation and the basics of quantum information and teleportation. Quantum mechanics is introduced in detail using the Dirac notation, which is explained from first principles. In addition, a number of non-standard topics are covered such as the impossibility of a light-based Maxwell's demon, the derivation of the Second Law of thermodynamics from the first-order time-dependent quantum perturbation theory, and the concept of Berry's phase. The book emphasizes the physical basics much more than the formal mathematical side, and is ideal for a first, yet in-depth, introduction to the subject. Five sets of problems with solutions are included to further aid understanding of the subject.

Contents:
From Geometry to the Quantum
Introduction to Lasers
Properties of Light: Blackbody Radiation
Interaction of Light with Matter I
Basic Optical Processes _ Still Classical
More Detailed Principles of Laser
Interactions of Light with Matter II
Two Level Systems
Field Quantization
Interaction of Light with Matter III
Some Recent Applications of Quantum Optics
Closing Lines
Problems and Solutions

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