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<<量子光学基础>>

图书基本信息

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前言

This book grew out of a 2-semester graduate course in laser physics and quan-tum optics. It requires a solid understanding of elementary electromagnetismas well as at least one, but preferably two, semesters of quantum mechanics.Its present form resulted from many years of teaching and research at theUniversity of Arizona, the Max-Planck-Institut fiir Quantenoptik, and theUniversity of Munich. The contents have evolved significantly over the years,due to the fact that quantum optics is a rapidly changing field. Because theamount of material that can be covered in two semesters is finite, a numberof topics had to be left out or shortened when new material was added. Im-portant omissions include the manipulation of atomic trajectories by light,superradiance, and descriptions of experiments.

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内容概要

This book grew out of a 2-semester graduate course in laser physics and quan-tum optics. It requires a solid understanding of elementary electromagnetismas well as at least one, but preferably two, semesters of quantum mechanics.

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章节摘录

插图：In this book we present the basic ideas needed to understand how laser lightinteracts with various forms of matter. Among the important consequencesis an understanding of the laser itself. The present chapter summarizes clas-sical electromagnetic fields, which describe laser light remarkably well. Thechapter also discusses the interaction of these fields with a medium con-sisting of classical simple harmonic oscillators. It is surprising how well thissimple model describes linear absorption, a point discussed from a quantummechanical point of view in Sect. 3.3. The rest of the book is concernedwith nonlinear interactions of radiation with matter. Chapter 2 generalizesthe classical oscillator to treat simple kinds of nonlinear mechanisms, andshows us a number of phenomena in a relatively simple context. Starting withChap. 3, we treat the medium quantum mechanically. The combination of aclassical description of light and a quantum mechanical description of matteris called the semiclassical approximation. This approximation is not alwaysjustified （Chaps. 13-19）, but there are remarkably few cases in quantum op-tics where we need to quantize the field.

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