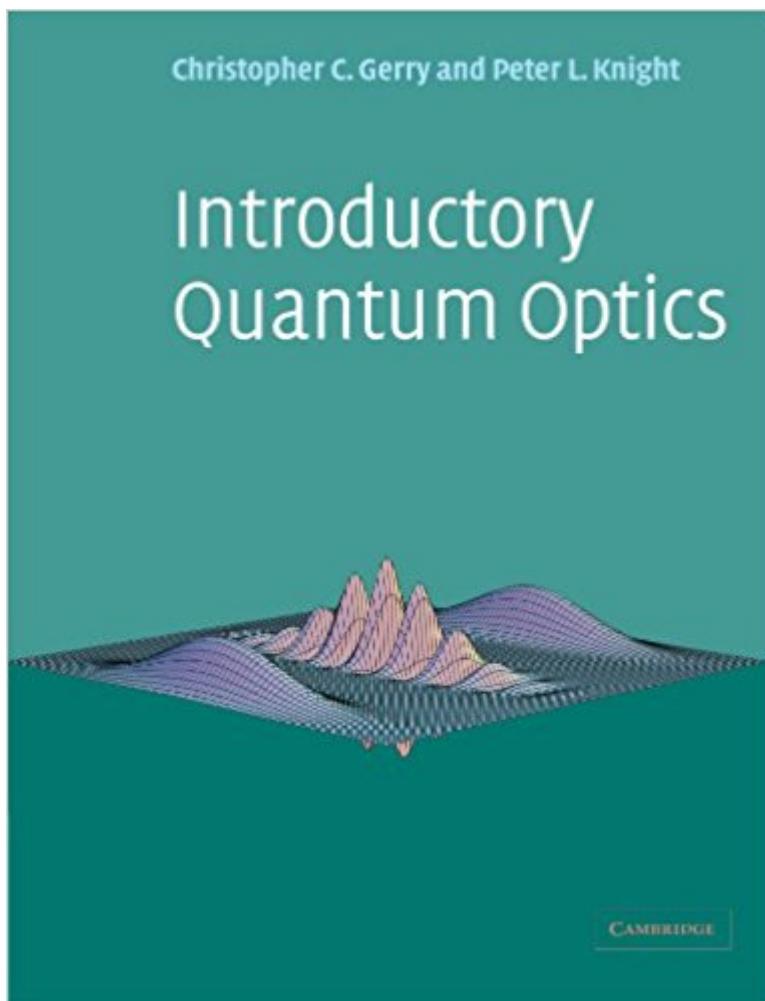


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# Introductory Quantum Optics



## **Synopsis**

This elementary introduction to the subject of quantum optics, the study of the quantum mechanical nature of light and its interaction with matter, is almost entirely concerned with the quantized electromagnetic field. The text is designed for upper-level undergraduates taking courses in quantum optics who have already taken a course in quantum mechanics, and for first- and second-year graduate students.

## **Book Information**

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## **Customer Reviews**

'... the book is well argued throughout and subject applications are explained beautifully.' The Times Higher Education Supplement

This book provides an elementary introduction to the subject of quantum optics, the study of the quantum mechanical nature of light and its interaction with matter. The presentation is almost entirely concerned with the quantized electromagnetic field. This text is designed for upper-level undergraduates taking courses in quantum optics who have already taken a course in quantum mechanics, and for first and second year graduate students.

Very good for my university class

I am a mathematician who is very familiar with electrodynamics and quantum mechanics. I read this book to teach myself quantum optics. Since I read it as a self-study text, I will review it from that

perspective. Some of the weaknesses noted might be less important for a classroom text. The Gerry/Knight text is billed as suitable for "senior undergraduates and beginning postgraduates", but I fear that undergraduates who attempt it as a self-study text are likely to end up frustrated. I can't recall ever encountering an undergraduate with a background in mathematics and quantum mechanics sufficient to read this book in a reasonable time without the guidance of an instructor. If used for self-study, I think that minimal prerequisites would be a graduate level understanding of abstract linear algebra and quantum mechanics. Some familiarity with Fock space and the theory of operators on infinite-dimensional Hilbert spaces would be desirable. Because the book is intended for beginners, the authors take pains to explain many things which a beginner might not know. Most of the explanations were careful and helpful, but I was dissatisfied with some. I read the book cover to cover and was able to follow most of it, but some of it (e.g., much of the chapter on decoherence) is still a mystery to me. Chapter 9 describes recent experiments in quantum optics which demonstrate amazing properties of light unimaginable from a classical perspective. The presentations of the physical setups give just the right amount of detail for clear understanding. The diagrams are good. However, I felt that the mathematical analyses would be easier for those with good backgrounds if done on a higher level, and some of the physical discussions seemed obscure. Given the authors' intended audience, it may be unreasonable to quarrel with their choice of mathematical level. However, it is truly unfortunate that some of their calculational details seem actually wrong. For example, in Section 9.3's discussion of a "quantum eraser", several terms appear to be omitted from equation (9.21), which invalidates some of the subsequent discussion. Moreover, the discussion is obscure and seems of questionable validity even were the text's (9.21) correct. More details can be found on my website. I noticed only a few errors which would affect the physics, but there are too many mathematical errors and an unusually large number of typos. Most of the typos are relatively insignificant, but nevertheless distracting. Readers should be prepared to check everything. My copy is by now riddled with underlined statements with marginal notes like "Why?", or "What does this mean?" As I progressed through the book and my understanding deepened, many of these "Why's" were erased, but quite a few remain. The reader who wants to learn quantum optics and has the necessary mathematical background may wish that parts of the book were more carefully written, but he will not be fundamentally disappointed. This is a good book from which I learned a lot. It seems much clearer than Scully and Zubairy's *Quantum Optics*, which I read previously. My brand new paperback copy is falling apart after only a few weeks of careful use at home. A book this good deserves a more durable binding.

I am an undergraduate and completely new to the field. I am reading this book as background for some theoretical quantum optics research that I am starting. The text has allowed me to get my foot in the door which is all I wanted it to do. As the previous reviewer noted, there are typographical errors in the book. In an ironic way, spotting and correcting these errors has kept me sharp. If a student is truly curious about the subject then, as in any field, they will be able to get through this book. As soon as one has picked up on the basic themes and equations of quantum optics, I would advise moving on to a more thorough text.

The print quality of the paperback edition ISBN-13: 978-0521527354 is horrible, like an Indian International edition.

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