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Review
of
A Guide to Experiments in Quantum Optics, Second Edition

by
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I obtained this book because its title suggested that it might discuss important experiments in a more expository way than the original papers. I was disappointed that the book did not fulfill this expectation.

The first four chapters, entitled

1. Introduction
2. Classical models of light
3. Photons—the motivation to go beyond classical optics
4. Quantum models of light ,

seem intended as a kind of mini-text in basic quantum optics. However, they are written in such a sketchy way that I think they would be virtually incomprehensible to someone who was not already familiar with quantum optics.

The titles of the next four chapters,

5. Basic optical components
6. Lasers and amplifiers
7. Photodetection techniques
8. Quantum noise: basic measurement techniques ,

hold the promise of introducing the reader to the kind of equipment necessary to do experiments in this field. But again, the descriptions are so sketchy that I doubt they will be meaningful to anyone not already professionally engaged in the field. I, a non-professional who has studied quantum optics, was not able to learn anything from these chapters.

For example, the following quotes the very first sentences of Section 8.4.1, entitled “How to mount a mirror”.

“Where the control is done using with a PZT mounted mirror and the bandwidth of the feedback control system will be severely limited. The mirror, PZT and mirror mount effectively form a system with mechanical resonances $\Omega_{res, j}$ and since this system is inside the feedback loop we can expect stable operation only at frequencies below the lowest resonance $\Omega_{res, 1}$.”

The reader may wonder if I have mistyped the first sentence, but it is exactly as in the book. This is not atypical of the quality of the exposition. It seems as if no one fluent in English has proofread the book.

The reader may also wonder if additional context in preceding sections might make this passage meaningful, but there is no previous context. This section starts from scratch as above. The $\Omega_{res, j}$ symbol is not defined, and this is typical of the exposition of the rest of the book. The “PZT” acronym is unexplained and does not appear in the list of abbreviations in Appendix E.

The remaining chapters contain some discussions of experiments, but most of these were too sketchy to be comprehensible to me. I was familiar with the original papers presenting some of them, and the original papers were clearer.

Moreover, the experiments which are discussed do not include all important experiments in quantum optics. For example, I could find no mention of any experiments in “quantum erasure”, which happen to be of greatest interest to me.

The only feature of the book which I found potentially useful is the extensive chapter bibliographies. It is particularly helpful that the bibliographies include the titles of the referenced papers (many physics books and papers do not). The bibliographies would be even more useful if references to papers in the arXiv were given along with the references to the printed versions. It is easier to download a paper from the arXiv than to copy it from a paper journal in a library.

It is hard for me to identify a class of readers which might find this book useful. But since this is a second edition, presumably the first edition sold well enough that there must be some audience for it. The only audience I can imagine would be physicists whose primary research is in experimental quantum optics.

I suggest that potential purchasers first try to look over a copy to be sure that it is what they want. For this purpose, the “look inside” feature of Amazon.com is very useful. It was from reading samples of the first chapter that I suspected that the exposition might be something like the above quote from “How to mount a mirror”.

Though I still hoped to learn something from the book, I took the precaution of obtaining a copy from interlibrary loan before purchasing it. I’m glad I did because it seems unlikely that this book would repay my detailed study.