

Anyone who even casually turns the 1200 and more pages of *Gravitation* cannot fail to be impressed by the incredible amount of effort that must have gone into its preparation. And all the greater pity because in my judgment the attempt to write three books in one is not a complete success. There is needless repetition (indeed, almost everything is stated at least three times) and the style fluctuates from precise mathematical rigor to evangelical rhetoric (which often obscures and confuses the issues). It must also be admitted (even if the distinguished authors wince at this remark) that a discriminating reader can discern where the style of one leaves off and of another takes charge. The internal evidence, in fact, suggests (?) that the burden of compiling this enormous book has been on the shoulders of one of the authors, and perhaps the repetitiveness and the amorphous character of the book could have been avoided if all three had not tried to integrate their separate but noble efforts. This repetitiveness becomes clear if one asks oneself what a student who has mastered the 150 pages devoted to general relativity in the *Classical*.

Fields of Landau and Lifshitz will learn from this book and how large a book will be needed to provide that additional knowledge.

One of the distinguishing marks of the book is the large amount of rhetorical prose, which invades whole sections, and there is appropriate canonization of some of the contributors to general relativity, old and young. (While selecting individuals for canonization is a matter of judgment and attitude, one wonders why neither Karl Schwarzschild nor Roy Kerr find a place in their pantheon.)

There is one overriding impression this book leaves. "It is written with the zeal of a missionary preaching to cannibals" (as J. E. Littlewood, in referring to another book, has said). But I (probably for historical reasons) have always been allergic to missionaries.

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The Quantum Theory of Light

Rodney Loudon

338 pp. Clarendon, Oxford, 1973. £7.50

Quantum optics is a relatively new and rapidly expanding field. As such, many of its more subtle aspects, such as the statistical properties of light, have not yet found their way into beginning graduate-level courses.

The present text is a milestone toward making such material available to students at this level. Rodney Loudon, a recognized authority in the field, succeeds in bringing such advanced topics as the quantum theory of laser behavior, light scattering and the photon statistical aspects of nonlinear optics to these students.

The first six chapters dealing with simple optical processes could be read with profit by senior and first-year graduate students. The next three chapters treat the quantization of the field and various optical experiments that require the quantum theory of light for their interpretation. In the latter effort, as the author points out, "the existence of the quantization leads to the possibility of a new type of experiment in which the distributions of photons in beams of light are measured. Such experiments form the observational basis of *quantum optics*."

In the final third of the book, Loudon develops laser theory, light scattering and nonlinear optics in a pedagogically appealing fashion without sacrificing depth.

The only negative aspects that I came across were minor: The utility of the book as a textbook would perhaps have been enhanced with the inclusion of more problems, and secondly, the student interested in tracking down the original papers will find the bibliography a bit skimpy.

In general Loudon's text is a very fine presentation of the material and deserves a place on the shelf of every student of modern optics. In fact, my copy has already been stolen.

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Across the Frontiers

Werner Heisenberg

229 pp. Harper & Row, New York, 1974. \$7.95

Werner Heisenberg is known throughout the world of science as one of the creators of quantum-mechanics—both of its mathematical formalism and of its conceptual implications, and also as a man who stayed at the forefront of physics during his whole career. A

collection of essays and addresses written or delivered by him during the last 15 years (only one short paper dates from 1948) is therefore certain to command the interest of many readers, and for a variety of reasons. Some may look for an authoritative description of the main lines of development of modern physics, and they will not be disappointed: in several of the chapters and especially in the one "Planck's Discovery and the Philosophical Problems of Atomic Theory," the second one in this collection, such a survey is painted with broad, yet certain strokes.

Other readers, more interested in the history of physicists than in physics and its history, may regard this book as a valuable source of information about Heisenberg himself; they will appreciate his erudition, which embodies the best traditions of German scholarship, and admire the skill with which he adapts his style to the occasion and the subject. (Compare for instance the Festival Oration for the 800th Anniversary Celebrations of the City of Munich, chapter 5, with his lecture on Abstraction in Modern Science, chapter 8.)

But the main interest of this book lies elsewhere. Through nearly all the chapters there runs a consistent philosophical attitude: Quantitative physics became only possible by a severe limitation of the range of phenomena studied. Within this limited field it has been extremely successful and it has also led to the spectacular development of modern technology. But this type of physics cannot deal with other forms of human experience that are equally important or, perhaps, more important. And science-based technology, for all its successes, holds serious threats to human society, human culture and even to human life. How-



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