

query. First, the ideal text has yet to appear, and the challenge stands for every teacher in the field to mold his lecture notes into book form. Second, the field is surely evolving at a tremendous pace, and the new concepts need to be joined in careful expository style to what has come before. The pair of books under review here follow these principles, each succeeding in its own way.

S. R. Seshadri's *Fundamentals of Plasma Physics* is at a level appropriate for bright undergraduate seniors with introductory mechanics and electromagnetic theory behind them or for introductory graduate use. Six chapters cover particle motions and collisions, linearized waves in unbounded plasmas, Vlasov theory for waves, and some transport theory. The two introductory chapters cover the rudiments of kinetic theory and plasma notions. Seshadri's style is quite readable, and the text is generally attractive if a bit bulky. My strongest criticism is that no single experimental result is cited to confirm or challenge the theoretical material. But there are about 150 problems (with solutions appended) and useful mathematical appendices. This book carries itself; it could be used by many of my undergraduates in a reading course.

*Principles of Plasma Physics* by N. A. Krall and A. W. Trivelpiece stems from their two-semester graduate course at Maryland. The scope here is rather broader than the Seshadri text, and a number of more advanced topics is treated, such as bounded plasmas, plasma stability, applications to CTR, Fokker-Planck theory, plasma kinetic theory, nonlinear Vlasov theory of waves, and correlations and radiation. The material is quite meaty and is of sufficient depth to prove useful to researchers, as well as students. Problems are provided, and a very useful bibliography is included. The material alternates nicely between theory and experiment, and the variation in style between the two authors provides a welcome change-of-pace. This book is an impressive addition to the distinguished McGraw-Hill International Series in Pure and Applied Physics.

J. L. HIRSHFIELD  
Yale University  
New Haven, Connecticut

## Relativistic Quantum Mechanics

I. J. R. Aitchison  
260 pp. Barnes and Noble, New York,  
1973. \$18.50

In the early 1960's the slender volume by F. Mandl met the requirements of a

text in quantum field theory at an introductory level. *Relativistic Quantum Mechanics*, written by a particle theorist experienced in two- and three-body scattering and resonances, is based on the propagator approach and is likewise intended to be an introduction to relativistic quantum mechanics.

The book uniquely opens with a review of non-relativistic quantum mechanics, including time-dependent perturbation theory. A brief discussion of special relativity precedes the Klein-Gordon equation. The electromagnetic scattering of pions and kaons serves as an application of the K-G equation and concepts such as Feynman graphs, crossing symmetry and current operators are introduced fairly early. There are exclusive chapters on relativistic kinematics and propagators before the quantum mechanics of spin 1/2 and spin 1 particles is taken up. After going over some of the well known problems in quantum electrodynamics, the author discusses PCT invariances. The book concludes with chapters on strong and weak interactions. Significant omissions from the topics discussed are solutions of the Dirac equation for the hydrogen atom and the Foldy-Wouthuysen Transformation, both of which legitimately belong to relativistic quantum mechanics. Fock's equation for the Coulomb field could, by way of illustration, have helped remove the ambiguity in the author's momentum space Schrödinger equation. The Dalitz plot could have been incorporated into the chapter on kinematics instead of being relegated as a homework problem.

The presentation of the material is lucid and helpful to the student. However, the frequency with which the author refers the student to the book by J. D. Bjorken and S. D. Drell for further details or a fuller discussion deprives some of the topics of a physical motivation. Explaining the possible physical processes first and following them up with appropriate Feynman graphs, as is done for instance by S. S. Schweber, H. A. Bethe and F. Hoffmann in their introduction of Compton scattering, is not always done. This may be one of the advantages of conventional field theory and its systematic perturbation expansions. It would have been better if the Feynman diagrams were written in pictorial agreement with those found in other texts; there are places where the beginning student can misinterpret the diagrams, especially in regard to anti-particles or negative energy states. The section on vacuum polarization is rather sketchy, and no attempt has been made to introduce the Lamb shift—at least in terms of the degeneracy of the relativistic energy levels of the hydrogen atom. Although the author has



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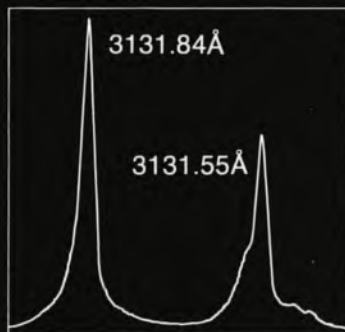
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taken pains to touch on almost everything worth mentioning, a discussion of isotopic spin systems and their bearing on comparative cross sections would have been useful in the last two chapters.

These are perhaps minor inadequacies compared to the way the various Feynman graphs and associated amplitudes have been treated, and this book would serve as a fair course text. A supplement with hints for solutions of the problems is likely to make the book all the more useful. The author's style and words at times, though, tend to overreach the student!

N. V. V. J. SWAMY  
*Oklahoma State University*  
Stillwater

## Gamma-Ray Spectroscopy

P. Quittner

111 pp. Halsted, New York,  
1973. \$13.95

Only an occasional book is published that is concerned with the treatment of experimental data and the subsequent extraction of information. The ever-increasing use of on- and off-line computers in experimental programs has resulted in a considerable degree of sophistication in the reduction of data. Indeed, the potential of the computer has probably led to excessive data refinement in many instances. It is the application of computer-evaluation techniques that has prompted P. Quittner to write *Gamma-Ray Spectroscopy*.

The book is a condensed treatise of the subject material and should be considered as introductory in nature. There is, however, an extensive list of references that extends through the 1960's which is useful to those requiring more detailed information. The contents are mainly concerned with spectrum smoothing, detector response, peak location and peak-area determination. In addition there are several sections devoted to spectrum stripping, error analysis and miscellaneous applications. Because of their brevity these latter sections are largely descriptive and were most likely introduced for the sake of adding a measure of completeness to the book. Subjects such as coincidence techniques, summing effects and pulse pile-up have been adequately discussed in standard references to which one is directed by the author.

The important contribution of *Gamma-Ray Spectroscopy* is therefore contained in those sections dealing with problems requiring computerized treatment of data. Spectrum smoothing is introduced early because of its