the simple harmonic oscillator, coupled oscillations, waves on strings, transmission lines, electromagnetic waves and Maxwell's equations and diffraction. Two added chapters deal with Fourier methods and nonlinear oscillations. The typical chapter has 15 problems at the end, and Pain correctly describes the complete book as a compact text, as much for working as for reading.

Both the choice of topics and their treatment are commendable. The author manages to cover an immense amount of material with a neatness, economy and style that pleasantly reflect the natural properties of the waves he describes. The mixture of mathematical and physical discussion is judicious, and an occasional vivid remark entertains, as well as instructs, the reader. For example, he mentions that the roar of a large football crowd is just about enough to heat a cup of coffee. Such a remark has also the merit of conveying subliminally to the aspiring scientist the valuable philosophical message that the utilitarian value of hot air is remarkably small.

In addition to the standard material, Pain brings in many interesting topics, including Schrödinger's equation, the tunnel effect, Brownian motion and shock waves, but not lasers. Overall the book is recommended as a most useful addition to the field.

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The reviewer is an associate professor at American University and has been active in the field of waves and vibrations for a generation. He is currently on a sabbatical leave as visiting scholar at the University of California, Berkeley, division of applied mechanics.

Ready-to-wear lectures

OPTICAL INTERACTIONS IN SOLIDS. By Baldassare Di Bartolo. 541 pp. Wiley, New York, 1968. $19.95

by ROBERT SUMMITT

Physicists interested in the optical properties of solids have long suffered the absence of an adequate text, therefore having to make do with superficial monographs, marginally useful conference proceedings and those single-topic reviews that never say quite enough. (It is amazing how thoroughly and how often the cubic lattice is explained.) A forbiddingly wide range of relevant topics has probably been the most important factor in dissuading potential authors, although in recent years we have had such works as Max Garbuny's simpler and unpretentious *Optical Physics* and, of course, J. C. Slater's serial.

Now we have the effort of Baldassare Di Bartolo, a senior scientist of MITHRAS Division of Sanders Associates, who has worked extensively in electronics, microwave engineering and more recently in laser physics. Di Bartolo modestly states that the present work represents "the different subjects . . . that at one time or another have been part of my experience." His experience is impressive.

Di Bartolo says he did not mean to write a text on quantum mechanics or group theory, assuming that the reader has had one-year preparation in the former and none in group theory. The first 11 chapters, nevertheless, present a well detailed and simultaneous development of both subjects and give special attention to the properties of magnetic ions in crystalline environments; the author's objective is to provide a theoretical foundation for lasers and absorption-fluorescence spectroscopy. Using these tools, the last eight chapters treat molecular vibrations, lattice vibrations, various modes of interaction (ion–photon, ion-phonon, and phonon–electron), fluorescence phenomena and laser theory.

I do not think anyone will say the treatment is either superficial or that it is restricted to simple problems. Nor should it be said that Di Bartolo has lost sight of the purpose for a textbook treatment of many related topics, namely presentation in a consistent terminology together with cross referencing of results. In summary, the author's coverage is consistent, coherent and excellent, and the book should serve nicely in a graduate course on the optical properties of solids. It is not quite encyclopedic, however, because not discussed are the classical treatment of lattice-mode polarization waves, specimen boundary-condition effects and scattering theory.

His presentation has a lecture quality, containing many short, one-sentence paragraphs, occasionally even approaching one-equation paragraphs. One suspects that Di Bartolo's econo-

my of prose is proportional to his familiarity with the material, a suspicion confirmed by an occasional imprecision in the wordier sections. For example, in the general discussion of molecular vibrations on page 282 I found "fundamental transitions may be of two different types: *infrared* (ir) and *Raman*," although the example discussed later on page 287 does contain an inactive mode. This and other minor infelicities in Di Bartolo's book will not disturb a mature reader, but they will detract from the book's luster as a textbook.

A text should fill in the gaps between a student's cryptic lecture notes and equations, providing details, explanations and concepts missed in the rush of note taking. Di Bartolo's book does not do this and leaves such niceties to the reader's imagination, inventiveness or experience. Anyway, the volume probably would be double its present size if it did. A textbook is rarely selected, though, because students will like it, but usually because the professor likes it. And professors should be delighted with Di Bartolo's book—it is a treasure of ready-to-wear lecture material and provides for many hours of expansive comment.

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Detailed experimental technique

PROGRESS IN NUCLEAR TECHNIQUES AND INSTRUMENTATION, VOL. 3. F. J. M. Farley, ed. 255 pp. North-Holland, Amsterdam (Interscience, New York), 1968. $13.50

by ROBERT R. BORCHERS

Volume 3 of the series *Progress in Nuclear Techniques and Instrumentation* appears to fulfill a definite need in present day research. The need is caused by the hesitancy of many authors to include technical details about experimental technique in their journal publications. Many of the important things that make experiments possible are never described outside the internal and progress reports that are not cataloged or generally available. Semiconductor detectors are a good example.

I am very often approached by students and asked for a good reference on the present state of semiconductor-detector technology. Until the present volume appeared, I generally referred them to literature published by various manufacturers.

George Ewans's article on the subject of semiconductor detectors is complete and is very timely, now that the technology seems to have stabilized after the introduction of lithium-drifted germanium detectors. I have already found it very useful on several occasions, not as a reference for fabricating detectors but rather for information on obtainable performance. A somewhat more specialized article, dealing mainly with Ge(Li) gamma-ray detectors, by A. J. Tavendale appeared in volume 17 of *Annual Reviews of Nuclear Science*.

The other two articles in this volume by B. W. Montague on rf particle separation at high energies and by T. Alvager and J. Uhler on electromagnetic isotope separators are both well done. They are long enough to con-