

obscure the discussion of the problem of a moving rod being carried through a barn. In all fairness, however, their use is not pervasive. Sartori also intersperses a bit of history—a welcome addition. The citations to literature are in the form of footnotes, a slight inconvenience, but are adequate, as is the index. The problems are unexciting but okay. The illustrations are all right; in general, the format is clear and helpful.

I have two main dislikes: I feel the style is overly wordy, perhaps in an attempt at the “simplified approach.” I don’t think it succeeds in that respect, but it is in many places refreshingly personal and interesting. I also don’t like the overemphasis on Galilean and Newtonian views of nature. In my view, students at whom this book is aimed don’t have a thorough enough intuition for nonrelativistic physics to make this approach more comfortable than a relativistic treatment from the start.

Taylor and Wheeler’s book is wonderful. Its content is just at the right level for a freshman or sophomore course on relativity, where the students have some knowledge of but are not comfortable with calculus (although Sartori’s math level is fine). Taylor

and Wheeler take a four-dimensional, geometric approach from the beginning, and as I said, I much prefer this technique. The personalities of Taylor and Wheeler shine through the text, making it exciting reading. The format of their book—large margins, clear type, eminently readable equations—is superb; its problems are interesting and provocative; its illustrations are well-captioned and striking; its index is formidable; citations to the literature are adequate (although I would prefer an end-of-book listing of suggested readings).

Oh yes, one thing more: For some time now the definition of the meter has been the distance light travels in $1/299\,792\,458$ second. This definition makes the speed of light unmeasurable; its definition is in fact a perfect integer, the same in any reference frame. Sartori and many other writers on relativity give lip service to this definition but do not incorporate it into their discussions. Taylor and Wheeler’s treatment adequately reflects the thinking behind the adoption of this definition of the meter.

I hope I have been clear: I am not inspired by Sartori’s book; I don’t think students will be, either, but it is a

pretty good, fairly standard treatment with a few quirks. I prefer Taylor and Wheeler by a long shot.

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Advanced University Physics

▶ S. B. Palmer and M. S. Rogalski
Gordon and Breach, New York,
1996. 876 pp. \$124.00 hc
(\$39.00 pb) ISBN 2-88449-065-5
hc (2-88449-066-3 pb)

Stuart Palmer of the University of Warwick in England and Mircea Rogalski of the Institute of Atomic Physics in Bucharest have set themselves the ambitious goal of producing a single volume that contains a unified approach to all of undergraduate physics. In particular, they seek to emphasize the connection between microscopic and macroscopic physics and to bridge the gap between what they regard as an overly descriptive approach to undergraduate physics and the more formal and mathematical approach that characterizes graduate courses.

The result is a work that can be described as unique and idiosyncratic: unique in the sense that I know of no other work as ambitious or as comprehensive; idiosyncratic in that it must by its nature represent the authors’ opinions on what is important or fundamental in the undergraduate curriculum. Overall, the work is very formal and mathematical. While the examples are well chosen, they are few in number, and there are no exercises for the student. It is also a formulaic work in that the lengths of the 53 chapters are very uniform (14–18 pages each), and each chapter includes precisely three references to textbooks offering presentations in greater depth (most of which are published in Europe and may not be readily available to students in the US). The distribution of topics by chapter gives some idea of what the authors consider significant: mechanics (four chapters), relativity (two), electromagnetism (four), thermodynamics (four), statistical mechanics (four), waves (four), optics (nine), quantum mechanics (eleven), solids (eight) and nuclei (two).

This is not a book that one can read cover to cover. Although I think the authors have succeeded admirably at their goals, they have produced a work that will be more useful to students and faculty as a reference book than as a textbook. It is neither an encyclopedia nor a mere tabulation of formulas. Each chapter is a more or less self-contained exposition on a single

Department-Head Standards in Undergraduate Texts

This list was compiled from the “Graduate Programs in Physics, Astronomy and Related Fields”, an annual publication of AIP. In the 1994–95 edition, over 100 heads of PhD-granting physics departments cited specific texts as the undergraduate preparation they assumed of students applying to their programs. The following are those texts cited most often. The list was compiled by Christine Cassagnau of the AIP Education and Employment Statistics Division.

Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles. 2nd edition. R. Eisberg, R. Resnick. Wiley, New York, 1985. ISBN 0-471-87373-X

Analytical Mechanics. 4th edition. G. R. Fowles. Saunders College Publishers (Harcourt Brace), Philadelphia, 1986. ISBN 0-03-004124-4

Quantum Physics. 2nd edition. S. Gasiorowicz. Wiley, New York, 1995. ISBN 0-471-85737-8

Introduction to Electrodynamics. 2nd edition. D. F. Griffiths. Prentice Hall (Simon & Schuster), Englewood Cliffs, N.J., 1989. ISBN 0-13-481367-7

Introductory Quantum Mechanics. 2nd edition. R. L. Liboff. Addison-Wesley, Reading, Mass., 1992. ISBN 0-201-54715-5

Electromagnetic Fields & Waves. 3rd edition. P. Lorrain. W. H. Freeman, New York, 1995. ISBN 0-7167-1823-5

Classical Dynamics of Particles and Systems. 4th edition. J. B. Marion, S. T. Thornton. Saunders College Publishers (Harcourt Brace), Philadelphia, 1995. ISBN 0-03-097-3023

Introduction to the Quantum Theory. 3rd edition. D. A. Park. A. W. McGraw, Whitehall, Ohio, 1992. ISBN 0-07-048554-2

Fundamentals of Statistical & Thermal Physics. *Fundamentals of Physics Series.* F. Reif. A. W. McGraw, Whitehall, Ohio, 1965. ISBN 0-201-55737-1

Foundations of Electromagnetic Theory. 4th edition. J. R. Reitz. Addison-Wesley, Reading, Mass., 1993. ISBN 0-201-52624-7 (0-201-55737 answer bk.)

Elementary Quantum Mechanics. D. P. Saxon. A. W. McGraw, Whitehall, Ohio, 1968. ISBN 0-07-054980-X

Mechanics. *Physics & Physical Science Series.* 3rd edition. K. R. Symon. Addison-Wesley, Reading, Mass., 1971. ISBN 0-201-07392-7

Electromagnetic Fields. 2nd edition. R. K. Wangsness. Wiley, New York, 1986. ISBN 0-471-81186-6

Heat & Thermodynamics. 6th edition. R. Dittman, M. W. Zemansky. A. W. McGraw, Whitehall, Ohio, 1981. ISBN 0-07-072808-9

topic. Given the usual compartmentalization of the advanced undergraduate curriculum in most US colleges and universities, this work is unlikely to find a role as a textbook—the four chapters on mechanics and four on electromagnetism are insufficient to span the topics covered in the usual undergraduate course, and the mathematical rigor is occasionally on the high end of the undergraduate range.

It is tempting to assess the book by comparing the authors' idiosyncrasies with my own and then producing a list of omitted topics that I consider absolutely essential to the undergraduate curriculum. To avoid personal prejudices, I compared the book's selection of topics instead with the contents of the texts we use in our undergraduate physics curriculum at Oregon State University. By that yardstick, many topics seem to be missing or at least hard to find: mechanical oscillations, dipole radiation, multipole expansions, kinetic theory. The eight chapters on solids constitute an exceedingly fine coverage of the topic, in my opinion, but, measured against our curriculum, the book overemphasizes solids. Further, it underemphasizes molecules, nuclei (no discussion of the nuclear force or fusion) and particles (no mention at all, despite the lovely cover illustration of quarks in a nucleon). The index, which is of critical importance in a book of this type, is inadequate. For example, although there is an entire section of the book on the Maxwell-Boltzmann distribution, it is not mentioned in the index. Nor is the canonical ensemble, even though it is the subject of an entire chapter.

All in all, *Advanced University Physics* is a book that students and instructors may find to be a valuable resource, but it is not apparent where it will fit into the standard US undergraduate curriculum. Nonetheless, I intend to keep my office copy within arm's reach.

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NEW BOOKS

Popularizations

Hubble: A New Window to the Universe. D. Fischer, H. Duerbeck (translated from the German by H. Jenkner, D. Duncan). Copernicus (Springer-Verlag), New York, 1996. 175 pp. \$35.00 *hc* ISBN 0-387-94672-1

The Monthly Sky Guide. 4th edition. I. Ridpath, W. Tirion. Cambridge U. P., New York, 1996 [1987]. 64 pp. \$14.95 *pb* ISBN 0-521-56839-0

Nano: The Emerging Science of Nanotechnology. E. Regis. Back Bay Books (Little, Brown), 1995. 325 pp.

\$14.95 *pb* ISBN 0-316-73852-2

Paradox Lost: Images of the Quantum. P. R. Wallace. Springer-Verlag, New York, 1996. 166 pp. \$29.95 *hc* ISBN 0-387-94659-4

Polyominoes: Puzzles, Patterns, Problems, and Packings. Princeton Science Library. 2nd edition. S. W. Golomb. Princeton U. P., Princeton, N.J., 1994 [1965]. 184 pp. \$12.95 *pb* ISBN 0-691-02444-8

The Simple Science of Flight: From Insects to Jumbo Jets. H. Tennekes. MIT Press, Cambridge, Mass., 1996. 137 pp. \$20.00 *hc* ISBN 0-262-20105-4

Society and Government

Frontiers of Illusion: Science, Technology, and the Politics of Progress. D. Sarewitz. Temple U. P., Philadelphia, 1996. 235 pp. \$54.95 *hc* (\$19.95 *pb*) ISBN 1-56639-415-5 *hc* (1-56639-416-3 *pb*)

Patent Strategy for Researchers and Research Managers. H. J. Knight. Wiley, New York, 1996. 166 pp. \$49.95 *hc* ISBN 0-471-96095-0

The Responsible Conduct of Research. D. Beach. VCH, New York, 1996. 161 pp. \$35.00 *pb* ISBN 3-527-29333-7

Statistical Physics

Ion-Transfer Kinetics: Principles and Applications. J. R. Sandifer, ed. VCH, New York, 1995. 142 pp. \$95.00 *hc* ISBN 1-56081-508-6

Schrödinger Diffusion Processes. *Probability and Its Applications.* R. Aebi. Birkhäuser, Boston, 1996. 186 pp. \$79.50 *hc* ISBN 0-8176-5386-4

Statistical Mechanics of Phases, Interfaces, and Thin Films. H. T. Davis. VCH, New York, 1996. 712 pp. \$89.95 *hc* ISBN 1-56081-513-2

Theory and Mathematical Methods

Advanced Analysis on the Real Line. *Universitext.* R. Kannan, C. K. Krueger. Springer-Verlag, New York, 1996. 259 pp. \$45.00 *pb* ISBN 0-387-94642-X

Analytic Number Theory: Vol. 1. *Progress in Mathematics* 138. Proc. Conf., Urbana, Ill., May 1995. B. C. Berndt, H. G. Diamond, A. J. Hildebrand, eds. Birkhäuser, Boston, 1996. 449 pp. \$96.00 *hc* ISBN 0-8176-3824-5

Analytic Number Theory: Vol. 2. *Progress in Mathematics* 139. Proc. Conf., Urbana, Ill., May 1995. B. C. Berndt, H. G. Diamond, A. J. Hildebrand, eds. Birkhäuser, Boston, 1996. 885 pp. \$95.00 *hc* ISBN 0-8176-3933-0

Calculus of Variations II. A Series of Comprehensive Studies in Mathematics 311. M. Giaquinta, S. Hildebrandt. Springer-Verlag, New York, 1996. 652 pp. \$159.00 *hc* ISBN 3-540-57961-3

Cardinal Invariants on Boolean Algebras. *Progress in Mathematics* 142. J. D. Monk. Birkhäuser, Boston, 1996. 298 pp. \$64.95 *hc* ISBN 0-8176-5402-X

Clifford Algebras with Numeric and Symbolic Computations. R. Ablam-

owicz, P. Lounesto, J. M. Parra, eds. Birkhäuser, Boston, 1996. 322 pp. \$64.50 *hc* ISBN 0-8176-3907-1

Co-Groups, Commutator Methods and Spectral Theory of N-Body Hamiltonians. *Progress in Mathematics* 135. W. O. Amrein, A. B. de Monvel, V. Georgescu. Birkhäuser, Boston, 1996. 460 pp. \$98.00 *hc* ISBN 0-8176-5365-1

Dynamics Reported: Expositions in Dynamical Systems. *New Series* 5. C. K. R. T. Jones, U. Kirchgraber, H. O. Walthers, eds. Springer-Verlag, New York, 1996. 287 pp. \$135.00 *hc* ISBN 0-387-60165-1

Geometry of Harmonic Maps. *Progress in Nonlinear Differential Equations and Their Applications* 23. Y. Xin. Birkhäuser, Boston, 1996. 241 pp. \$79.50 *hc* ISBN 0-8176-3820-2

Group Theoretical Foundations of Quantum Mechanics. R. Mirman. Nova Science Publishers, Commack, N.Y., 1995. 263 pp. \$47.00 *hc* ISBN 1-56072-248-7

Knot Theory & Its Applications. K. Murasugi. Birkhäuser, Boston, 1996. 341 pp. \$69.50 *hc* ISBN 0-8176-3817-2

Lightlike Submanifolds of Semi-Riemannian Manifolds and Applications. *Mathematics and Its Applications.* K. L. Duggal, A. Bejancu. Kluwer, Norwell, Mass., 1996. 300 pp. \$225.00 *hc* ISBN 0-7923-3957-6

Markov Processes and Differential Equations: Asymptotic Problems. *Lectures in Mathematics.* M. Freidlin. Birkhäuser, Boston, 1996. 153 pp. \$34.95 *pb* ISBN 0-8176-5392-9

Massless Representations of the Poincaré Group: Electromagnetism, Gravitation, Quantum Mechanics, Geometry. R. Mirman. Nova Science Publishers, Commack, N.Y., 1995. 213 pp. \$44.85 *hc* ISBN 1-56072-259-2

Mathematical Methods for Physicists. 4th edition. G. B. Arfken, H. J. Weber. Academic, San Diego, Calif., 1996 [1966]. 1029 pp. \$59.95 *hc* ISBN 0-12-059815-9

Measures and Probabilities. *Universitext.* M. Simonnet. Springer-Verlag, New York, 1996. 510 pp. \$44.00 *pb* ISBN 0-387-94644-6

Modules and Group Algebras. *Lectures in Mathematics.* J. F. Carlson. Birkhäuser, Boston, 1996. 91 pp. \$26.50 *pb* ISBN 0-8176-5389-9

Multibody Dynamics with Unilateral Contacts. *Wiley Series in Nonlinear Science.* F. Pfeiffer, C. Glocker. Wiley, New York, 1996. 317 pp. \$74.95 *hc* ISBN 0-471-15565-9

Multiple Scale and Singular Perturbation Methods. *Applied Mathematical Sciences* 114. J. Keivorkian, J. D. Cole. Springer-Verlag, New York, 1996. 632 pp. \$59.00 *hc* ISBN 0-387-94202-5

Numerical Methods for Singularly Perturbed Differential Equations: Convection-Diffusion and Flow Problems. *Springer Series in Computational Mathematics* 24. H.-G. Roos, M. Stynes, L. Tobiska. Springer-Verlag, New York, 1996. 348 pp. \$98.00 *hc* ISBN 3-540-60718-8

Partial Differential Equations and