

BOOKS

which comes from genetics and evolution: It is just geometry."

Reading these two books stimulates reflection and raises questions: What is symmetry? Is a square more symmetric than a pentagon? (We learn that the mathematical answer is no.) Why are natural constructions so symmetric, but nevertheless often depart from exact symmetry? All these questions are good reasons to read with pleasure these two books.

But the repetition of the same points in different parts of the two books is sometimes boring. For example, the affirmation that researchers have determined that the proportions of the human body "can be" related to the golden mean, even if supported by the Leonardo da Vinci drawing, appears several times. Once would have been sufficient, and the statement should have been analyzed in philosophical terms. To be provocative, I am sure that there is to be found among all pigs one that can be inserted in a golden triangle. It is not always clear whether an author is explaining a theory or agreeing with and supporting the theory. This is the case with Jay Kapproff's article on mystic theories on the golden mean. Therefore, these two books, while stimulating, should be read with a critical mind.

Pickover gives a very nice quotation from the English mathematician Godfrey Harold Hardy that emphasizes the spirit of these books: "A mathematician, like a painter or a poet, is a master of pattern."

JEAN-FRANÇOIS SADO
Université de Paris-Sud, France

Introducing Einstein's Relativity

R. A. d'Inverno

Oxford U. P., 1992. 383 pp.

\$39.95 pb ISBN 0-19-859686-3

The author of a textbook is faced with many decisions. Among the most important are how much of the subject to cover and what level and depth of discussion to use. Unconscious constraints generated by the source of the material and by personal attitudes affect these decisions. The important constraints of *Introducing Einstein's Relativity* are its origin in printed notes prepared by Ray d'Inverno for his students in a course on special and general relativity (and applications of the latter) and his view that the material must be acquired by the student rather than taught by the teacher.



Versatile Laboratory Electromagnet Characterization System

- Rapid, uniform magnetic field reversal enhances Hall effect measurement of semiconductors and other materials
- Improved four-quadrant hysteresis loops with shortened integration intervals
- B vs H hysteresis loop characterization of ferromagnetic materials: remanence, saturation magnetization, coercive field, permeability, etc.

LS-4005 Electromagnet – continuously adjustable 0 to 10.7 cm (4") air gap

Model 637 Electromagnet Power Supply – true, four-quadrant output with bidirectional power flow

Model 450 Gaussmeter – measurement range 0.02 mG to 300 kG

Associated Hall probes and sensing coils; software supported – interface with your computer for automated operation

For more information
please call
Lake Shore at
(614) 891-2243



LakeShore
Measurement and Control Technologies
Lake Shore Cryotronics, Inc.
64 East Walnut Street ● Westerville, Ohio 43081-2399
Fax: (614) 891-1392 ● Tel: (614) 891-2243
© Lake Shore Cryotronics, Inc. 6/93 M1

Circle number 30 on Reader Service Card

PHYSICS TODAY

Editors and reporters

The magazine is relocating to the new AIP headquarters in College Park, Maryland. Positions are available:

Reporting and editing Search and Discovery

Reporting and editing Physics Community

Article editing and copyediting

Other news reporting

Advanced training in physics and demonstrable writing skills are required. Send resume, salary requirements and writing samples to:

Theresa Braun, Director of Human Resources
American Institute of Physics
335 East 45th Street
New York, NY 10017

The target audience for the book is the advanced undergraduate or beginning graduate student. The material is presented rather tersely; there are few extended discussions. The structure is that of an expanded outline. For instance, in chapter 4 on relativistic mechanics, the part on special relativity is allotted nine pages. The range of topics is determined by d'Inverno's intent that the student "gain insight into, and confidence in handling, the basic equations of the theory" and acquire the basis for discussions of "black holes, gravitational waves and cosmology." The aim is worthwhile and largely achieved; the foundation is suitable to the intended superstructure.

Chapter 1 is an overview that provides a rationale for the structure of the book and advice to the prospective student; it is a valuable orientation. The first part, *Special Relativity*, presents the usual discussion of the kinematic foundations and the consequent mechanics. In the next part, the purely mathematical armament required for the general theory is presented. In deference to the probable lack of sophisticated background of most of the students, the treatment is the conventional tensor approach. There is only a brief mention of the more modern coordinate-free technique. The third part deals with the basic theory of general relativity. The choice of material is traditional and an incomplete list runs from "the principles of general relativity" through, among other topics, "general relativity from a variational principle" and "the structure of the field equations" to "the Schwarzschild solution" and "experimental tests of general relativity." The next three parts on black holes, gravitational waves and cosmology, respectively, are the ultimate structures for which the first 3 parts are the foundation.

The book has important strengths. There is a large collection of problems (with answers) and an extensive bibliography. The treatment is lucid, well-focused and more complete than one might expect of an introductory text. Many topics that are not usually found in an introductory text are included, if briefly. Among these are Penrose diagrams and conformal treatment of infinity, the Hawking effect, colliding gravitational waves, news and mass loss, Petrov classification, the missing mass problem, and the anthropic principle.

The brevity of the discussion places a heavy burden on both teacher and student. The teacher

will have to be an aggressive, inspiring "resource person." Students will find it necessary to consult other texts with fuller treatment. This is d'Inverno's intent and undoubtedly motivated the bibliography of texts and monographs as well as the collection of problems and answers. Many of the problems are intended to induce the student to complete some of the discussion in the text.

There are several objectionable features. In the table accompanying the section on acceleration in special relativity, the entry for general relativity requires clarification. In the absence of any "absolute" element (in the sense of J. L. Anderson, *Principles of Relativity Physics* (Academic P., New York, 1967)) in the theory of general relativity it is not clear what the term "relative" means. In the section on cosmology, the diagrams for those Friedmann models in which the scale factor R approaches zero do not show properly that R becomes infinite in that limit.

In the hands of a dedicated teacher able to inspire his or her students, the text could be very successful.

ALEX HARVEY
City University of New York

NEW BOOKS

Cosmology and Relativity

An Introduction to Mathematical Cosmology. J. N. Islam. Cambridge U.P., New York, 1992. 190 pp. \$60.00 *hc* ISBN 0-521-37385-9

Nuclear Physics

CEBAF 1992 Summer Workshop. Particles and Fields Series 51. Proc. Conf., Newport News, Va., 1992. AIP, New York, 1993. 609 pp. \$150.00 *hc* ISBN 1-56396-067-2

Algebraic Approaches to Nuclear Structure. R. F. Casten, ed. Harwood, Philadelphia, 1993. 549 pp. \$38.00 *pb* ISBN 3-7186-0538-4

Theoretical Nuclear Physics: Nuclear Reactions. H. Feshbach. Wiley, New York, 1992. 959 pp. \$59.95 *pb* ISBN 0-471-05750-9

Vacuum Structure and QCD Sum Rules, Vol. 10. Current Physics Structure and Comments. M. A. Shifman, ed. North-Holland, New York, 1992. 516 pp. \$85.50 *pb* ISBN 0-444-89746-1

Direct Nuclear Reactions. Proc. Seminar, Bangalore, India, January 1989. N. G. Pottaswamy, ed. Indian Academy of Sciences, Bangalore, India, 1991. 555 pp. \$30.00 *pb* ISBN 81-85324-11-5

Physical Electronics

Electronic Thin Film Science for Electrical Engineers and Materials Scientists. K.-N. Tu, J. W. Mayer, L. C. Feldman. Macmillan, New York, 1992. 428 pp. \$59.00 *hc* ISBN 0-02-421575-9

MOS ICs: From Basics to ASICs. H. J. M. Veendrick. VCH, New York, 1992. 430 pp. \$43.00 *pb* ISBN 1-56081-197-8

Society and Government

Science Funding: Politics and Pork-barrel. J. P. Martino. Transaction, New Brunswick, N. J., 1992. 392 pp. \$100.00 *hc* ISBN 1-56000-033-3

The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford. S. W. Leslie. Columbia U.P., New York, 1993. 332 pp. \$42.00 *hc* ISBN 0-231-07958-3

Space Physics

Solar System Evolution: A New Perspective. S. R. Taylor. Cambridge U.P., New York, 1992. 307 pp. \$49.95 *hc* ISBN 0-521-37212-7

Space Nuclear Power and Propulsion. AIP Conference Proceedings 271. Proc. Symp., Albuquerque, N. M., January 1993. M. S. El-Genk, M. D. Hoover, eds. AIP, New York, 1993. 3-book set: 1752 pp. \$275.00, set (\$220.00 AIP member) *hc* ISBN 1-56396-137-7 (set)

The Navstar Global Positioning System. T. Logsdon. Van Nostrand Reinhold, New York, 1992. 256 pp. \$44.95 *hc* ISBN 0-442-01040-0

The Solar Transition Region. Cambridge Astrophysics Series 23. J. T. Mariska. Cambridge U.P., New York, 1992. 276 pp. \$59.95 *hc* ISBN 0-521-38261-0

Statistical Physics

Recent Progress in Many-Body Theories, Vol. 3. Proc. Conf., Minneapolis, August 1991. T. L. Ainsworth, C. E. Campbell, B. E. Clements, E. Krotscheck, eds. Plenum, New York, 1992. 510 pp. \$125.00 *hc* ISBN 0-306-44246-9

Statistical Thermophysics. H. S. Robertson. Prentice-Hall, Englewood Cliffs, N. J., 1993. 582 pp. \$64.00 *hc* ISBN 0-13-845603-8

Theory and Mathematical Methods

Affine Lie Algebras and Quantum Groups. Cambridge Monograph on Mathematical Physics. J. Fuchs. Cambridge U.P., New York, 1992. 433 pp. \$89.95 *hc* ISBN 0-521-41593-4

Finite Elements for Solids, Fluids and Optimization. G. A. Mohr. Oxford U.P., New York, 1992. 604 pp. \$53.00 *pb* ISBN 0-19-856368-X

Hyperbolic Geometry. London Mathematical Society Student Texts 25.