

includes a review of elementary optics and a chapter on radiometry, both of which are easy to follow. The ray-tracing part is another matter: Here one has to make some effort to follow the precepts of the author.

O'Shea shows once more that geometric optics and optical design can be subjected to a reasonably simple analytical treatment. This is probably what he is referring to when he says that "one of the delights of optics is the ease with which most systems can be under-

stood." This does not mean, however, that one has an easy time learning optical design. As in every specialty, one has to follow all the details scrupulously, beginning with the sign convention (which is not very conventional for anyone who learned optics from an undergraduate textbook) and then going through the $y-u$, $y-nu$ and $Q-U$ traces. O'Shea presents all this systematically and understandably. The reader can test his accumulated knowledge with the two examples given at the end

of the book: the design of a laser printer and of a projector.

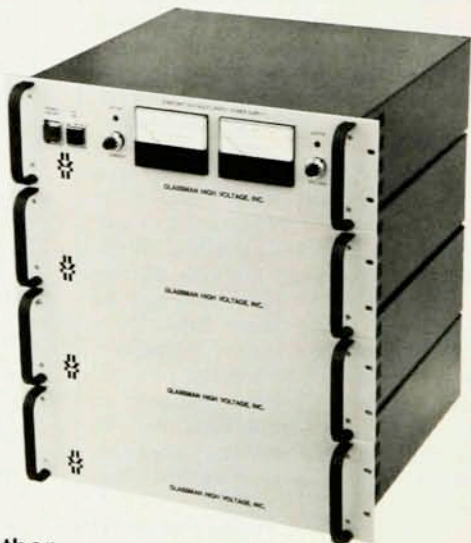
"No design is ever finished," O'Shea says; "it is stopped." Here he implies that all the detailed prescriptions aptly furnished in his book and those that one would find in more specialized references still do not guarantee an ideally designed product. His book, however, guarantees a good start.

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Differential Geometry for Physicists

Andrzej Trautman
145 pp. Bibliopolis, Naples, Italy, 1984.
\$19.50

Applied Differential Geometry

William L. Burke
414 pp. Cambridge U.P., New York, 1985.
\$54.50 hardcover; \$19.95 paper

The number of expository books on differential geometry and topology written for physicists is increasing rapidly. Whereas in 1963 there was just one (Harley Flanders's *Differential Forms*, Academic, New York) there have been at least four new publications in this area in 1985. Both books reviewed here require no more mathematics than is known by a first-year physics graduate student; however, they presume quite different degrees of mathematical maturity on the part of the reader.

Andrzej Trautman's book resulted from a series of lectures he gave in the academic year 1976-77 at the State University of New York at Stony Brook. The book is brief and tightly organized. It develops concepts in algebra, differential manifolds, Lie groups, fiber-bundle connections and gauge fields, topological invariants and characteristics classes, all in 135 pages. In spite of its rapid pace it manages to give a large number of very useful examples, exercises and heuristic arguments. Nevertheless it requires very close reading to follow and supply the details of some sketchy arguments. Because it discusses only a very limited number of applications to physics— included, in brief treatments, are applications to magnetic monopoles and instantons—the motivation must come from the outside.

William Burke dedicates his book "to all those who, like me, have wondered how in hell you can change q without changing q ." *Applied Differential Geometry* discusses some of the same topics as Trautman's book, in a much more informal, picturesque way. It contains many down-to-earth examples. Its discursive, lecture-type format is useful for an introductory text.

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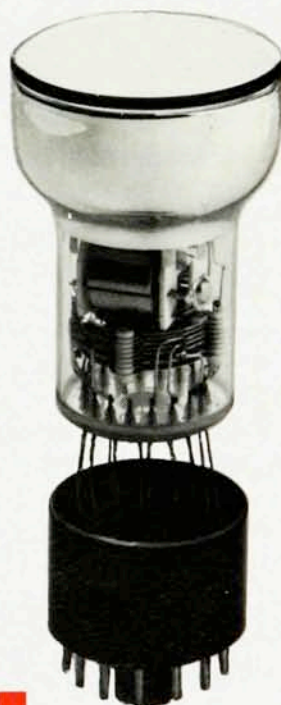
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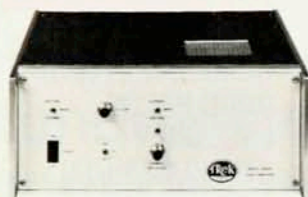
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Numerous line drawings supplement the discussions. However, in contrast to Trautman's book, it does not isolate definitions sufficiently well from the discussion and the examples; therefore it lacks somewhat in precision. Because Burke gives a large number of applications to physics, the two books complement each other quite well.

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Geophysics and planetary science

Recent Advances in Planetary Meteorology. Proc. Symp., Hamburg, August 1983. G. E. Hunt, ed. 161 pp. Cambridge U.P., New York, 1985. \$39.50

Student texts and popularizations

Energy: A Conceptual Approach. T. E. Van Koeveering, N. J. Sell. 271 pp. Prentice-Hall, Englewood Cliffs, N.J., 1986. \$15.95 paper. *Introductory text*

Fun with Maths and Physics. Y. I. Perelman. 373 pp. Mir, Moscow (US dist. Imported Publications, Chicago), 1985. \$9.95. *Young readers*

Physical Science, A Dynamic Approach. Second edition. R. T. Dixon. 474 pp. Prentice-Hall, Englewood Cliffs, N.J., 1986. \$29.95

Physics for Scientists & Engineers. Second edition. R. A. Serway. 942 pp. Saunders, Philadelphia, 1986. \$41.95

Physics for Scientists and Engineers with Modern Physics. Second edition. R. A. Serway. 1108 pp. Saunders, Philadelphia, 1986. \$44.95

Practical Physics. Third edition. G. L. Squires. 206 pp. Cambridge U.P., New York, 1985. \$44.50 hardcover; \$17.95 paper

Practical Physics. J. D. Wilson. 540 pp. Saunders, Philadelphia, 1986. \$30.95

The Living Sonars of the Ocean. B. F. Sergeev. 215 pp. Mir, Moscow (US dist. Imported Publications, Chicago), 1985. \$6.95. *Lay readers*

The Quantum World. J. C. Polkinghorne. 100 pp. Princeton U.P., Princeton, 1985. \$6.95 paper. *Lay readers*

The Special Theory of Relativity. J. Aharoni. 331 pp. Dover, New York, 1985. \$8.00. *Reprint*

Seven Ideas That Shook the Universe. N. Spielberg, B. D. Anderson. Wiley, New York, 1985. \$22.95. *Nonmathematical introduction to physics*

Theory and mathematical physics

Analytical Mechanics. Fourth edition. G. R. Fowles. 342 pp. Saunders, Philadelphia, 1986. \$39.95. *Undergraduate text*

Exactly Solvable Problems in Condensed Matter and Relativistic Field Theory. *Lecture Notes in Physics* 242. Proc. Int. Colloq., Panchgani, India. B. S. Shastri, S. S. Jha, V. Singh, eds. 315 pp. Springer-Verlag, New York, 1985. \$20.50

Maximum-Entropy and Bayesian Methods in Inverse Problems. Proc. Wksp., Laramie, Wyo., June and August 1982. C. R. Smith, W. T. Grandy Jr, eds. 492 pp. Reidel, Boston, 1985. \$44.50

Memory Function Approaches to Stochastic Problems in Condensed Matter. M. W. Evans, P. Grigolini, G. Pastori Parravicini, eds. 556 pp. Wiley, New York, 1985. \$84.95. *Compendium*

Number Theory in Science and Communication: With Applications in Cryptography, Physics, Digital Information, Computing, and Self-Similarity. *Springer Series in Information Sciences* 7. M. R. Schroeder. 374 pp. Springer-Verlag, New York, 1986. \$24.50. *Monograph*

Numerical Methods in Fluid Dynamics: Advances in Science and Technology in the USSR. N. N. Yanenko, Y. I. Shokin, eds. Mir, Moscow (US dist. Imported Publications, Chicago), 1984. \$8.95. *Compendium*

Quantum Mechanics. A. A. Sokolov, I. M. Ternov, V. Ch. Zhukovskii. 496 pp. Mir, Moscow (US dist. Imported Publications, Chicago), 1984. \$10.95. *Text*

Quantum Theory of Many-Variable Systems and Fields. *World Scientific Lecture Notes in Physics* 1. B. Sakita. 220 pp. World Scientific, Singapore (US dist. Taylor and Francis, Philadelphia), 1985. \$33.00 hardcover; \$19.00 paper

Supercomputers in Theoretical and Experimental Science. Proc. Int. Wksp., Antwerp, July-August 1984. J. T. Devreese, P. Van Camp, eds. 225 pp. Plenum, New York, 1985. \$59.50

Trends and Developments in the Eighties. *Bielefeld Encounters in Mathematics and Physics IV and V.* Proc. Mtgs., Bielefeld, FRG, July 1982 and September 1983. S. Alberverio, P. Blanchard, eds. 424 pp. World Scientific, Singapore (US dist. Taylor and Francis, Philadelphia), 1985. \$44.00

Multiple Time Scales. J. U. Brackbill, B. I. Cohen, eds. 442 pp. Academic, New York, 1985. \$75.00. *Compendium*

On Relativity Theory, Vol. 2. Proc. Sir Arthur Eddington Centenary Symp., Nagpur, India, January 1984. Y. Choquet-Bruhat, T. M. Karade, eds. 274 pp. World Scientific, Singapore (US dist. Taylor and Francis, Philadelphia), 1985. \$41.00

Quantum Field Theory. L. H. Ryder. 443 pp. Cambridge U.P., New York, 1985. \$74.50. *Text*

Quantum Mechanics. V. K. Thankappan. 516 pp. Wiley, New York, 1985. \$44.95. *Text*

Quantum Mechanics: A Modern Introduction. A. Das, A. C. Melissinos. 640 pp. Gordon and Breach, New York, 1986. \$65.00 hardcover; \$29.50 paper

Rotating Fields in General Relativity. J. N. Islam. 122 pp. Cambridge U.P., New York, 1985. \$34.50. *Text*