

of computational fluid mechanics. Thus it discusses finite-difference, finite-element and spectral techniques—the first of these in by far the greatest detail. After an introductory section Peyret and Taylor show how these techniques may be applied to solve problems in incompressible and compressible flows, both inviscid and viscous, slow and fast, and laminar and turbulent. Mathematical details are not emphasized, the concern being the solution of real flows. Whenever possible or useful Peyret and Taylor consider simpler model equations to give insight into the behavior of the numerical methods. They also examine the relationship among the various numerical methods and how they stack up against one another.

For a scientist or engineer interested in applying numerical methods to solve fluid-flow problems it would be hard to think of a better book with which to begin, and to have nearby as a resource.

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Physics of Planetary Interiors

G. H. A. Cole

208 pp. Adam Hilger, Bristol, 1984. \$16.00

Planetary physics deals with systems that are so complex that an exposition of the physics requires a full-year course. For a one-semester course it is necessary to concentrate on results that are not dependent on the details of the approximation chosen. G. H. A. Cole's book provides a good text for such a course. In general it tries to give the reader a feeling for the type of physics encountered in a planetary body, using the simplest models feasible. It contains a good review of the observational data and many useful tables and figures, although some of the material for Uranus and Neptune is out of date even for a pre-Voyager book. I liked the general discussion of the physics of bodies of planetary size: It gives an excellent feel for the range of physical parameters one can expect to encounter. The equation of state is presented in a parametric form without much reference to quantum-mechanical and thermodynamic arguments. The result is adequate for appreciating conditions inside the planets, but not sufficient if one wishes to follow current research papers.

The chapters on the shape of a rotating body, heat transfer and magnetic fields follow the same trend. One comes away with a good feeling for the basic physical principles but without having seen the techniques used in current research. The chapters on the planets themselves continue in this vein. The basic structures discussed

give a fair representation of the results of current research but are based on very simplified models. In short, if the aim of the course is to give astronomy or geology students a context for appreciating results in planetary physics, this book is a useful text. Preparing students for research in the field, however, requires a more detailed text such as *Planetary Interiors* by V. N. Zharkov and V. P. Trubitsyn, edited by William B. Hubbard (Pachart, Tucson, Ariz., 1978), or *Interiors of the Planets* by

Allan F. Cook (Cambridge U. P., New York, 1981).

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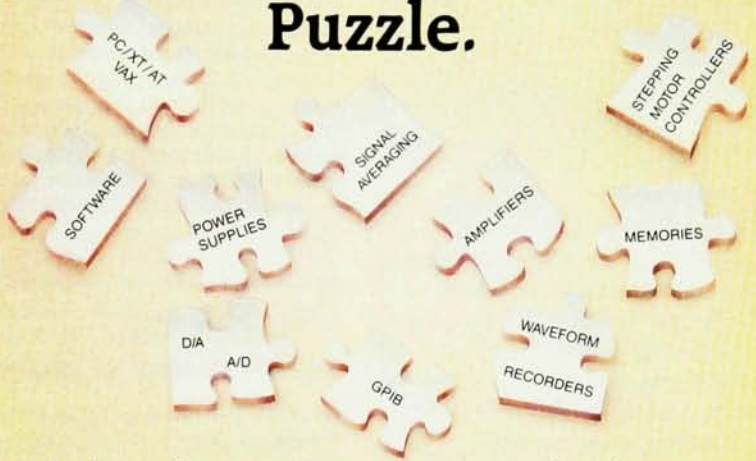
Gamma Ray Astronomy

Rodney Hiller

202 pp. Clarendon Press, Oxford, 1985.
\$29.95

Though x-ray astronomy has blossomed in the two decades since its origin, gamma-ray astronomy has proved

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harder to get moving. Fewer data are available in the gamma-ray region of the spectrum, in large part as a result of the low sensitivity of the instruments.

Gamma Ray Astronomy, by Rodney Hiller of the University of Bristol, is a careful treatment of the entire field. He begins by discussing the processes by which gamma rays are generated, including synchrotron radiation, Compton scattering and bremsstrahlung, and goes on to discuss how the gamma-ray background limits observations. Because so much of the limitation on our knowledge is due to low instrumental sensitivity, he discusses telescopes based on Compton scattering, the workings of spark chambers and detection of atmospheric Cherenkov radiation in air showers caused by gamma rays.

The second half of the book is devoted to a survey of gamma rays from a wide variety of celestial sources. Gamma rays from solar flares merit their own chapter. Another chapter deals with gamma rays from the Galactic disk. Topics covered in the chapter on discrete Galactic gamma-ray sources include pulsars, supernova remnants and molecular clouds. Hiller discusses the

results of the COS-B satellite, including the 20-odd Galactic sources it found. He considers the gamma-ray spectral lines from electron-positron annihilation in the Galactic-center region. Further, he analyzes the gamma-ray bursts, which have been observed at the rate of a few per year. A final chapter considers extragalactic gamma-ray sources and the diffuse background radiation. All Hiller's treatments deal both with the underlying physics and with the observational data. He freely uses physics at the level of a graduate student in astronomy.

Graphs and diagrams are provided as appropriate. Each chapter contains journal references. The index is briefer and less complete than it should be: For example, the COS-B entry refers only to passages about the telescope, not to discussions of the scientific results.

Gamma-ray astronomy is still at a stage where it can be covered in a single volume, and Hiller has done a thorough job. All graduate students considering doing high-energy astrophysics and all researchers in the field should become familiar with this excellent book.

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new books

Astronomy, cosmology and space physics

Dynamics of Comets: Their Origin and Evolution. *Astrophysics and Space Science Library 115.* Proc. IAU Colloq., Rome, June 1984. 439 pp. A. Carusi, G. B. Valsecchi, eds. Reidel, Boston, 1985. \$59.50

Ices in the Solar System. Proc. Wksp., Nice, France, January 1984. J. Klinger, D. Benest, A. Dollfus, R. Smoluchowski, eds. 954 pp. Reidel, Boston, 1985. \$99.00

Molecular Astrophysics: State of the Art and Future Directions. Proc. Wksp., Bad Windsheim, FRG, July 1984. G. H. F. Dierksen, W. F. Huebner, P. W. Langhoff, eds. 744 pp. Reidel, Boston, 1985. \$89.00

Radio Stars. *Astrophysics and Space Science Library 116.* Proc. Wksp., Boulder, Colo., August 1984. R. M. Hjellming, D. M. Gibson, eds. 411 pp. Reidel, Boston, 1985. \$59.00

Seismology of the Sun and the Distant Stars. Proc. NATO Adv. Wksp., Cambridge, England, June 1985. D. O. Gough, ed. 479 pp. Reidel, Boston, 1986. \$79.00

Space Remote Sensing Systems: An Introduction. H. S. Chen. 257 pp. Academic, New York, 1985. \$65.00 hardcover; \$39.95 paper. Text

Stability of the Solar System and Its Minor Natural and Artificial Bodies. Proc. NATO Adv. Study Inst., Cortina d'Ampezzo, Italy, August 1984. V. G. Szebehely, ed. 424 pp. Reidel, Boston, 1985. \$54.00

Star-Forming Dwarf Galaxies and Relat-

ed Objects. D. Kunth, T. X. Thuan, J. Tran Thanh Van, eds. 517 pp. Editions Frontières, Gif-sur-Yvette, France, 1986. Price not stated

The Sun and the Heliosphere in Three Dimensions. *Astrophysics and Space Science Library Proceedings 123.* Proc. Symp., Diablerets, Switzerland, June 1985. R. G. Marsden, ed. 525 pp. Reidel, Boston, 1986. \$79.00

Atomic, molecular and chemical physics

Fundamental Processes in Atomic Collision Physics. Proc. NATO Adv. Study Inst., Santa Flavia, Italy. H. Kleinpoppen, J. S. Briggs, H. O. Lutz, eds. 793 pp. Plenum, New York, 1985. \$79.50

Phenomena Induced by Intermolecular Interactions. G. Birnbaum, ed. 792 pp. Plenum, New York, 1985. \$125.00. *Compendium*

Biological and medical physics

Antennas and Reaction Centers of Photosynthetic Bacteria. *Springer Series in Chemical Physics 42.* Proc. Int. Wksp., Feldafing, FRG, March 1985. M. E. Michel-Beyerle, ed. 367 pp. Springer-Verlag, New York, 1985. \$39.00

Evolution as Entropy: Towards a Unified Theory of Biology. D. R. Brooks, E. O. Wiley. 335 pp. U. of Chicago P., Chicago, 1986. \$25.00. *Monograph*