

measurements of rotation of spiral nebulae by the astronomer Adrian van Maanen at the Mount Wilson Observatory were later disproved by Edwin Hubble, working at the same institution. The administration at Mount Wilson attempted to dissuade Hubble from publishing his work on the grounds that such disagreements should be settled "in-house." Evidently van Maanen had read his expectations into the data. Similarly, George Ellery Hale's observations of Zeeman splitting in solar spectra seemed to confirm the presence of a solar magnetic field. Further examination of Hale's plates by others established that the data did not indicate the presence of any measurable magnetic field in the Sun.

The book presents a fairly comprehensive discussion of numerous scientific discoveries that were later disproved as being due to error, self-deception, confirmation of governmental policy, poor judgment or outright cheating. Some issues remain question marks. For example, it is still unclear how much recognition Harvey Fletcher (father of James Fletcher, NASA's current administrator), a graduate student working with Robert Millikan, deserves for his role in the oil-drop experiment, which measured the charge of the electron and for which Millikan received the Nobel Prize. Kohn also raises questions about Isaac Newton's treatment of his data, how well Gregor Mendel counted his peas, the information Margaret Mead obtained from Samoan girls and ethical problems in science popularization. He also covers several famous cases of wrong science: N rays, the Allison effect and polywater.

Perhaps the saddest instance of science gone wrong is the Lysenko era (1929-65) in the USSR, when Marxist ideology supported the political program of a pseudoscientist. Much harm was inflicted on agronomy and plant physiology in particular, adversely affecting Soviet agricultural progress. Some of the most prominent scientific experts were dismissed from their jobs, jailed or worse as a result of the authorities' interpreting Lysenko's brand of science as suitably supporting the class struggle.

Kohn's chapters on documented cheating and forgery include discussions of the Piltdown hoax and several biomedical projects using fictitious data. Toward the end of the book, he attempts to "digest" the earlier information in his chapters dealing with the pursuit of honesty and how to handle fraud in science. These discussions, along with occasional moraliz-

ing in the earlier chapters, are not strong points; however, the book is distinctly worth reading. Kohn has a fine writing style and he has carefully researched the factual data. The work illustrates what many scientists are still unwilling to admit, namely that the "ivory tower" of scientific research is not fully insulated from the questions of ethics and integrity that plague most human endeavors in the "real" world.

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Explorers of the Nucleus: Cyclotron Experiment 190

Audio-Visual Center, Indiana Univ., Bloomington, Ind., 1987.
60 min. color.
\$700.00 16-mm film; \$180.00
3/4" U-matic; \$180.00 1/2" VHS
(rental \$35.00 each)

Physics is the world view espoused by the community of people called physicists. Some of them use a common facility with many other physicists to increase the cost-effectiveness of the facility. The life style of such physicists shares many features with a wide variety of professions that use very expensive equipment. For example, personal time schedules are forced to serve the efficient schedule of the equipment as much for television producers as for cyclotron physicists.

Explorers of the Nucleus is a leisurely look at a team of physicists studying deuteron scattering with the cyclotron facility at the University of Indiana. The film illustrates the advanced planning required, the cooperative scheduling, the typical delays for particle-beam difficulties and vacuum leaks, the successful collection of the data, and the creative element of data analysis and explanation. The main characters are interesting, kindly white men with traditional life-styles who share a strong interest in physics. They and their wives are introduced and allowed to tell us a bit about themselves and the physics they do. For students planning a career in physics, this film can serve as a visual introduction to the life style of large-facility users.

But some aspects of the film bother me. It seems to me like a 1950s film in the 1980s. The film implies that physics is harder than other forms of human intellectual activity. I doubt if that's really true, although we physicists like to believe it, and I object to physicists allowing it to be claimed for them. The film shows

physicists claiming both constructivist and mechanistic views of physics. One physicist sees doing physics as being like composing music or exploring a foreign country; another one stopped writing poetry when he became a physicist. These two opposing views would make a good classroom discussion, but they pass through the film with no comment. Finally, for a variety of reasons the culture of the US has turned women and some minorities away from physics as a career. Ought we to have yet another film showing only white men doing physics? We certainly cannot hide the racial and the sexual demography of the physics community, but in an era of pluralism we probably should not advertise them.

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BOOK NOTE

Darkness at Night: A Riddle of the Universe

Edward Harrison
Harvard U. P., Cambridge, Mass., 1987. 293 pp.
\$25.00 hc ISBN 0-674-19270-2

"Darkness at Night," chapter 12 of Edward Harrison's *Cosmology: The Science of the Universe* (Cambridge U. P., New York, 1981), a remarkably lucid semitechnical text, contains historically and philosophically flavored reflections on the question, why is the sky dark at night?—still often called Olbers's paradox. Now Harrison has written a book with the same title. *Darkness at Night* informs lay readers about the groping attempts over the centuries to answer that seemingly trivial inquiry.

Before the 19th century, when Heinrich Wilhelm Olbers proposed an (incorrect) answer, Johannes Kepler, Edmond Halley and Jean-Philippe Loys de Chéseaux all had pondered the question and its implications for a model of the universe. Just as in a dense forest any line of sight will intersect a tree, so in the infinite Newtonian universe any line of sight eventually would intersect the surface of a star. Neither absorption of light by interstellar—or intergalactic—smog nor the cosmological redshift from the expansion of the universe can sufficiently account for the night sky's dimness.

Harrison has suggested that darkness at night results largely from a universe that is finite in time: The universe is too young for the starlight

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to have filled the space between the stars. (See Harrison's articles in *PHYSICS TODAY*, February 1974, page 30, and February 1986, page 24.)

—PER H. ANDERSEN

NEW BOOKS

Astrophysics

Astrophysical Concepts. Second edition. *Astronomy and Astrophysics Library.* M. Harwit. Springer-Verlag, New York, 1988. 626 pp. \$54.00 hc ISBN 0-387-96683-8. *Text*

Cauldrons in the Cosmos: Nuclear Astrophysics. *Theoretical Astrophysics Series.* C. E. Rolfs, W. S. Rodney. U. of Chicago P., Chicago, 1988. 561 pp. \$74.95 hc ISBN 0-226-72456-5; \$34.95 pb ISBN 0-226-72457-3. *Monograph text*

Comets to Cosmology. *Lecture Notes in Physics 297.* Proc. Third IRAS Conf., London, July 1987. A. Lawrence, ed. Springer-Verlag, New York, 1988. 415 pp. \$44.20 hc ISBN 0-387-19052-X

The Early Universe: Reprints. *Frontiers in Physics 70.* E. W. Kolb, M. S. Turner. Addison-Wesley, Redwood City, Calif., 1988. 719 pp. \$56.95 hc ISBN 0-201-11604-X

The Facts on File Dictionary of Astronomy. Second edition. V. Illingworth, ed. Facts on File, New York, 1988[1985]. 437 pp. \$12.95 pb ISBN 0-8160-1892-8. *Reference*

The Few Body Problem. *Astrophysics and Space Science Library 140.* Proc. IAU Colloq. 96, Turku, Finland, June 1987. M. J. Valtonen, ed. Kluwer, Boston, 1988. 432 pp. Dfl 220.00 (\$119.00) hc ISBN 90-277-2680-9

Galactic and Extragalactic Radio Astronomy. Second edition. *Astronomy and Astrophysics Library.* G. L. Verschuur, K. I. Kellermann, eds. Springer-Verlag, New York, 1988. 694 pp. \$79.95 hc ISBN 0-387-96575-0. *Monograph text*

Atomic Physics

Advances in Atomic and Molecular Physics, Vol. 23. D. Bates, B. Bederson, eds. Academic, San Diego, Calif., 1988. 293 pp. \$84.50 hc ISBN 0-12-003823-4. *Monograph compilation*

A Bibliography of Matrix Isolation Spectroscopy 1954-1985. D. W. Ball, Z. H. Kafafi, L. Fredin, R. H. Hauge, J. L. Margrave, eds. Rice U. P., Houston, Tex., 1988. 643 pp. \$90.00 hc ISBN 0-89263-266-6. *Reference*

Digital Simulation in Electrochemistry. Second edition. D. Britz. Springer-Verlag, New York, 1988. 229 pp. \$41.20 hc ISBN 0-387-18979-3. *Mathematical reference text*

Excited States, Vol. 7. E. C. Lim, K. K. Innes, eds. Academic, San Diego, Calif., 1988. 247 pp. \$110.00 hc ISBN 0-12-227207-2. *Monograph compilation*

Future Directions in Polymer Colloids. NATO ASI Series E: Applied Sciences 138.

Proc. Wksp., Racine, Wis., June 1986. M. S. El-Aasser, R. M. Fitch, eds. Nijhoff, Boston, 1987. 402 pp. \$110.00 hc ISBN 90-247-3625-0

Kinetics of Electrochemical Metal Dissolution. *Studies in Physical and Theoretical Chemistry 47.* L. Kiss (translated from Hungarian by I. Egyed). Elsevier, New York, 1988. 260 pp. Dfl 200.00 (\$97.50) hc ISBN 0-444-98964-1. *Monograph*

Physical Chemistry Source Book. *Science Reference Series.* S. P. Parker, ed. McGraw-Hill, New York, 1988. 406 pp. \$45.00 hc ISBN 0-07-045504-X

Thermotropic Liquid Crystals: Fundamentals. *Springer Series in Chemical Physics 45.* G. Vertogen, W. H. de Jeu, eds. Springer-Verlag, New York, 1988. 324 pp. \$76.50 hc ISBN 0-387-17946-1. *Monograph*

Biophysics

Biophysical Chemistry of Membrane Functions. A. Kotyk, K. Janáček, J. Koryta. Wiley, New York, 1988. 377 pp. \$97.00 hc ISBN 0-471-91657-9. *Reference text*

Dynamics of Proteins and Nucleic Acids. J. A. McCammon, S. C. Harvey. Cambridge U. P., New York, 1988[1987]. 234 pp. \$19.95 pb ISBN 0-521-35654-0. *Monograph*

Encyclopedia of Medical Devices and Instrumentation, Vols. 1-4. J. G. Webster, ed. Wiley, New York, 1988. 3022 pp. \$450.00 hc ISBN 0-471-82936-6. *Reference*

Intermediate Physics for Medicine and Biology. Second edition. R. K. Hobbie. Wiley, New York, 1988. 623 pp. \$54.60 hc ISBN 0-471-82851-3. *Text*

Oxygen Transport to Tissue X. *Advances in Experimental Medicine and Biology 222.* Proc. Mtg., Sapporo, Japan, July 1987. M. Mochizuki, C. R. Honig, T. Koyama, T. K. Goldstick, D. F. Bruley, eds. Plenum, New York, 1988. 766 pp. \$125.00 hc ISBN 0-306-42795-8

Principles of Computerized Tomographic Imaging. A. C. Kak, M. Slaney. IEEE P., New York, 1988. 329 pp. Price not stated hc ISBN 0-87942-198-3. *Text*

The State of Water in the Cell. W. Negen-dank, L. Edelmann. Scanning Microscopy International, Chicago, 1988. 114 pp. \$19.00 US (\$22.00 elsewhere) pb ISBN 0-931288-40-1. *Compilation; reprinted from J. Scanning Microscopy 1-2*

Elementary-Particle Physics

The Elementary Structure of Matter. *Springer Proceedings in Physics 26.* Proc. Wksp., Les Houches, France, March 1987. J.-M. Richard, E. Aslanides, N. Boccarda, eds. Springer-Verlag, New York, 1988. 467 pp. \$66.70 hc ISBN 0-387-19013-9

Few-Body Problems in Particle, Nuclear, Atomic and Molecular Physics. *Few-Body Systems Supplementum 2.* Proc. Conf., Fontevraud, France, August 1987. J.-L. Ballot, M. Fabre de la Ripelle, eds. Springer-Verlag, New York, 1987. 583 pp. DM 154.00 hc ISBN 0-387-82035-3