ductory text for superconducting electronics. It fills a void that needed to be filled.

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The Physics–Astronomy Frontier

F. Hoyle, J. Narlikar
483 pp. Freeman, San Francisco, 1980.
$19.95

It is always enjoyable to come upon a book that offers a new approach to familiar material, which is exactly what we find in *The Physics-Astronomy Frontier*. Fred Hoyle and Jayant Narlikar show how physicists and astronomers have relied on each other as they seek greater understanding of the universe from atoms to galaxies. Students who are more familiar with physics than with astronomy will enjoy discovering that astronomers trying to understand the structure and dimensions of the entire universe have had to make use of the physics of atoms and atomic nuclei.

Hoyle and Narlikar have organized their material around the four forces or interactions: electrical, strong, weak and gravitational. They discuss radiation at wavelengths from x rays to radio waves in the first section along with the astronomical results and in the second strong and weak interactions, with which astronomers attempt to understand the source of energy in the sun and the stars. The final section, devoted to the gravitational interaction, takes the reader from orbital motion to the expansion of the universe.

One portion of the book that deserves particular mention is the chapter on stellar evolution. Here Hoyle and Narlikar discuss first the structure of atomic nuclei and the conditions under which nuclear reactions can occur to produce energy. They then show why we are confident that nuclear reactions can occur in the interiors of stars. It is fascinating to see how the discovery of radioactivity eventually led to the modern comprehensive theory of the evolution of stars. Finally they show how the outward characteristics of a star must change as progressively heavier elements are synthesized within the interior of the star.

The authors are again at their very best in the final chapters of the book, on cosmology, for which the authors (Hoyle in particular) are well known. For years Hoyle sought in the steady-state theory an alternative to the conventional big bang theory; here he presents another possible explanation of the redshifts of distant galaxies: If the masses of particles were to increase with time, the observable universe would appear to be expanding.

It is difficult to know what audience will find this work most useful and interesting. A college student could probably use this book to great advantage in a one-semester course, provided that the instructor in the course were willing to expand upon the material wherever necessary. It would, however, be difficult to fit such a course into a normal curriculum for physics majors, and the book is probably too advanced to be used in courses of the type now know as "physics for poets." Readers who already have good foundations in physics and astronomy will enjoy *The Physics-Astronomy Frontier* even though the presentation sometimes seems to be a bit elementary. It will bring them up to date on all the important areas of modern astronomy and will supply interesting background on all of the underlying physics.

For all readers Hoyle's recollection of his own role in the development of modern astronomy will add an interesting, personal flavor to the book and

give the reader some insight into the historical processes by which astronomy has reached its present level.

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new books

Optics and Acoustics

Current Trends in Optics. Invited Papers from ICO Meeting, Graz, 1981. F. Arecchi, F. Aussenegg, eds. 190 pp. Taylor & Francis, New York, 1981. $34.95

Diffraction Physics: Second Edition. J. Cowley. 430 pp. North-Holland, New York, 1981. $65.75. *second-level text*

Volume Holography and Volume Gratings. L. Solymar, D. Cooke. 466 pp. Academic, New York, 1981. $95.50. *second-level text*

The Making and Evaluation of Holograms. N. Abramson. 326 pp. Academic, New York, 1981. $48.00. *introductory text*

Theory and Mathematical Physics

Numerical Methods in the Study of Critical Phenomena. Proceedings of a Colloquium, Carry-le-Rouet, 1980. J. Della Dora, J. Demongeot, B. Lacolle, eds. 267 pp. Springer, New York, 1981. $27.50

Gauge Field Theories: An Introduction. J. Leite Lopes. 484 pp. Pergamon, New York, 1981. $37.00. *second-level text*

Developments in the Theory of Fundamental Interactions: Studies in High Energy Physics. Vol. 3. Winter School, Karpacz, 1980. L. Turko, A. Pekalski, eds. 588 pp. Harwood, New York, 1981. $52.00

Structure and Approximation in Physical Theories. Colloquium, Osnabrück, 1980. A. Hartkämper, H. Schmidt, eds. Plenum, New York, 1981. $39.50

Point Group Symmetry Applications: Methods and Tables. P. Butler. 566 pp. Plenum, New York, 1981. $55.00

Quantum Mechanics in Mathematics, Chemistry, and Physics. Session at American Mathematical Society, Boulder, 1980. K. Gustafson, W. Reinhardt, eds. 506 pp. Plenum, New York, 1981. $59.50

Mathematical Methods in Engineering and Physics. D. Johnson, J. Johnson. 273 pp. Prentice-Hall, Englewood Cliffs, N. J., 1982. $28.50. *second-level text*

Numerical Analysis of Semiconductor Devices and Integrated Circuits. Proceedings, NASECODE 11 Conference, Dublin, 1981. B. Browne, J. Miller, eds. 288 pp. Boole, Dublin, 1981. $60.00

An Introduction to the Numerical Analysis of Semiconductor Devices and Integrated Circuits. Lecture Notes on Short Course, Dublin, 1981. J. Miller, ed. 75 pp. Boole, Dublin, 1981. $32.00

Entropy Minimax Sourcebook. Vol. 1. General Description. R. Christensen, 692 pp. Entropy Limited, Lincoln, Mass., 1981. $39.50

The Science of Space-Time. D. Raine, M. Heller. 244 pp. Pachart, Tucson, Ariz., 1981. $24.00. *undergraduate text*

Semi-Classical Approximation in Quantum Mechanics. V. Maslov, M. Fedoriuk. 301 pp. Reidel, Hingham, Mass., 1981. $125.00. *second-level text*

Basic Quantum Mechanics. J. Martin. 241 pp. Oxford, New York, 1981. $39.50 cloth, $17.95 paper. *undergraduate text*

Non-Relativistic Quantum Dynamics. W. Amrein, 237 pp. Reidel, Hingham, Mass., 1981. $70.00. *second-level text*

Materials Science and Condensed Matter

IEEE Transactions on Magnetics. Conference, Grenoble, 1981. Vol. MAG-17, 1010 pp. IEEE Magnetics Society, 1981. no price stated

Recent Developments in Condensed-Matter Physics. Vol. 2. Metals, Disordered Systems, Surfaces and Interfaces. J. Devreese, L. Lemmens, V.Van Doren, J. Van Royen, eds. 477 pp. Plenum, New York, 1981. $59.50