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anything more than the sum of the component parts (as might a book); however, the availability of three well-written and complementary reviews conveniently bound in a single volume makes for a useful general reference covering electronic properties of surfaces.

JAMES L. ERSKINE
University of Texas at Austin

Theory of Neutron Scattering from Condensed Matter, Volumes 1 and 2

Stephen W. Lovesey
344 pp. Clarendon, Oxford, 1984. \$59.00 each

Neutron scattering is a unique and powerful experimental tool for investigating condensed-matter systems. One can study routinely, via the neutron-nucleus interaction, the structural characteristics of liquids and solids from the submicron range to the atomic scale, while the neutron-electron magnetic-dipole interaction permits the determination of magnetic structures. The versatility of the technique allows one to investigate interesting scientific problems not only in condensed-matter physics but also in chemistry, metallurgy, biology and fundamental physics. The beauty and power of neutrons as a probe of microscopic physics, however, are best revealed when one is interested in the time-dependent collective behavior of systems. Neutron scattering is the only experimental method available to study the nature of excitations such as magnons, phonons, rotons and excitons, and to investigate diffusion and tunneling in the full range of crystal momenta and energies. Neutron scattering provides fundamental information about the properties of condensed-matter systems that cannot be obtained with any other experimental technique.

The classic reference book presenting the traditional topics of condensed-matter physics of interest to neutron scatterers has been Walter Marshall and Stephen Lovesey's *Theory of Thermal Neutron Scattering* (Oxford U.P., New York, 1971). That text covers the basic theoretical concepts needed for the interpretation of experimental neutron-scattering data. Lovesey, who is a theoretical physicist at the Rutherford-Appleton Laboratory in England, has updated the original text to produce *Theory of Neutron Scattering from Condensed Matter*. He has split the original text into two volumes, the first of which covers nuclear scattering, while the second is devoted to magnetic scattering. The references and examples have been updated, and there are some new examples (particularly in Volume 1). However, the new book, for

the most part, is identical to the original work. In this regard it would be more appropriate to refer to it as a second edition of Marshall and Lovesey. It is only a little longer than the original text (681 pages versus 608).

One of the important advantages of neutrons is that they are a weakly interacting probe, so that the physical properties of the sample are generally not distorted by the scattering process (in contrast to electron scattering, for example) and hence the interpretation of experimental data often reduces to a proper description of the collective behavior of the system. As a result, the book spends much of its time describing the basic concepts of condensed-matter physics, such as magnons and phonons; these are often good discussions in their own right. As advertised in the title, there is essentially no discussion of experimental techniques, and consequently the text is not helpful for the experimenter, who is interested in taking data. For diffraction experiments George Bacon's *Neutron Diffraction* (Oxford U.P., New York, 1975) should be consulted, while for inelastic scattering no experimental textbook is available.

One of the deficiencies of the present pair of volumes is that they provide no coverage of new subjects that have become prominent since the writing of the first edition. For example, there is no discussion of liquid crystals, spin glasses, low-dimensional systems, charge-density waves or the physics that can be revealed with newer experimental techniques such as backscattering, spin-echo spectrometry and small-angle scattering, or with pulsed neutrons. Nevertheless the two volumes constitute the best neutron-scattering book available for condensed-matter physicists.

JEFFREY W. LYNN
University of Maryland

Numerical Methods in Fluid Dynamics

Edited by F. Brezzi
333 pp. Springer-Verlag, New York, 1985.
\$20.50

Numerical Methods in Fluid Dynamics contains the texts of four lectures given at the third 1983 session of the Centro Internazionale Matematico Estivo, held at Como, Italy, in July 1983. These "state of the art" lectures are general discussions of the major numerical methods in computational fluid mechanics: finite-difference, finite-element, spectral and particle methods (the last category includes, among other techniques, the particle-in-cell method, the random-vortex method and particle methods in plasma physics). The contributors are among the lead-

ing people in their fields. They take the reader on a path from initiation into a particular method to its state at the time the lectures were delivered. As in most recent such publications one must make do with photo-offset printing and no index.

STANLEY A. BERGER
University of California at Berkeley

new books

Astronomy, cosmology and space physics

Calibration of Fundamental Stellar Quantities. *International Astronomical Union Symposium 111.* Proc. Symp., Como, Italy, May 1984. D. S. Hayes, L. E. Pasinetti, A. G. Davis Philip, eds. 644 pp. Reidel, Boston, 1985. \$69.50 hardcover; \$29.50 paper

High Resolution in Solar Physics. *Lecture Notes in Physics 233.* Proc. Spec. Session Int. Astron. Union, Toulouse, September 1984. R. Muller, ed. 320 pp. Springer-Verlag, New York, 1986. \$20.50

Methods in the Qualitative Theory of Dynamical Systems in Astrophysics and Gas Dynamics. O. I. Bogoyavlensky. 301 pp. Springer-Verlag, New York, 1985. \$49.00. *Monograph*

Nearby Molecular Clouds. *Lecture Notes in Physics 237.* Proc. Colloq. Int. Astron. Union, Toulouse, September 1984. G. Serra, ed. 242 pp. Springer-Verlag, New York, 1985. \$13.70

The Search for Extraterrestrial Life: Recent Developments. *International Astronomical Union Symposium 112.* Proc. Symp., Boston, June 1984. M. D. Papagianis, ed. 579 pp. Reidel, Boston, 1985. \$64.00 hardcover; \$29.50 paper

The Sun and Solar System Debris: A Catalog of Astronomical Anomalies. W. R. Corliss. 282 pp. The Sourcebook Project, Glen Arm, Md., 1986. \$17.95. *Catalog*

Atomic, molecular and chemical physics

High Resolution Spectral Atlas of Nitrogen Dioxide 559-597 nm. *Springer Series in Chemical Physics 41.* K. Uehara, H. Sada. 226 pp. Springer-Verlag, New York, 1985. \$37.00

Spectroscopy of Molecular Excitons. *Springer Series in Chemical Physics 16.* V. L. Broude, E. F. Sheka, E. I. Rashba. 271 pp. Springer-Verlag, New York, 1985. \$48.00. *Monograph*

Time-Resolved Vibrational Spectroscopy. *Springer Proceedings in Physics 4.* Proc. Conf., Bayreuth-Bischofsgrün, FRG, June 1985. A. Laubereau, M. Stockburger, eds. 302 pp. Springer-Verlag, New York, 1985. \$34.00

Geophysics and planetary science

Atmospheric Carbon Dioxide and the Global Carbon Cycle. J. R. Trabalka, ed.

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