

tion to vector analysis, some elementary partial-differential equations, conformal mapping and at least the start of complex-variable theory. The book was obviously written as a text because there are both illustrative and end-of-chapter problems with answers. The book would fit very well into a one-semester course at the end of the second year or beginning of the third year for students in applied mathematics, engineering and physics. For the instructor who might like to introduce some notions of hydrodynamic theory into his classical mechanics, the Chirgwin-Plumpton book would also be a useful auxiliary text.

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James Kelley is a professor of physics at Marquette University.

A synthesis of sun research

SOLAR ACTIVITY. By Einar Tandberg-Hanssen. 464 pp. Blaisdell, Waltham, Mass., 1967 \$16.50

by JULES AARONS

For most of man's requirements, the sun is an unchanging source of energy. It is possible to use the term "solar constant" meaningfully, but the advanced

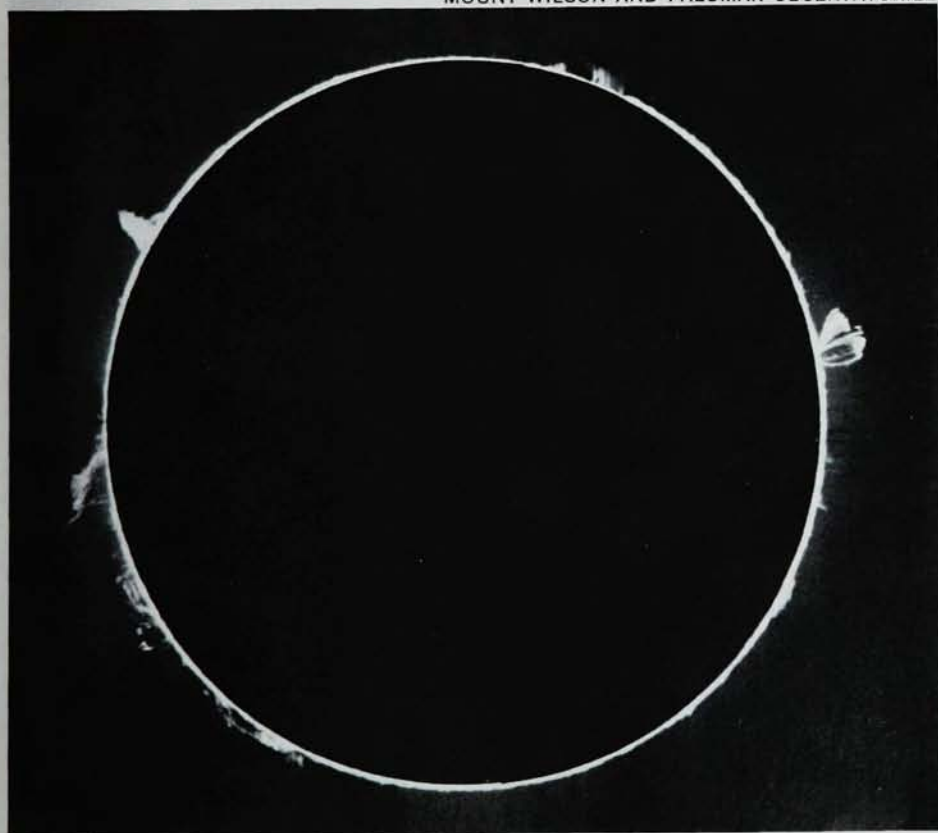
technological needs of communication and navigation require a study of solar activity. Furthermore, a variable is much more exciting to study than a constant, especially so capricious a variable as the sun.

Tandberg-Hanssen's *Solar Activity* is a synthesis of research at the graduate level. The author concentrates on development of models of plages, sunspots, prominences and flares. He culls observational data from the literature, and he describes instrumentation; however, he concentrates on displaying the theoretical development of models. Tandberg-Hanssen does not ride self-research hobby horses, a constant failure in texts written by specialists. He has truly reviewed the field.

The volume starts with a development of basic equations in thermodynamics within the solar plasma. A chapter is devoted to waves in plasma and is then followed by descriptions of solar instrumentation from optical to x-ray tools. From this point observations closely intertwine with model development.

The book falls down somewhat in its description of the results of radio astronomy (it described amply the tools and observational emphasis of radio astronomy). It fails because of the publication date (no fault of its own)

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SOLAR PROMINENCES seen in calcium K-line light, 9 December 1929.

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By F. S. GALASSO,
United Aircraft Research Laboratories,
East Hartford, Connecticut

This authoritative book presents information on approximately 500 perovskite-type compounds, including the various methods of preparing powders, thin films and single crystals of perovskite-type compounds.

1968, 218 pp., \$9.00

PHYSICAL FOUNDATIONS OF TECHNICAL ACOUSTICS

By I. MALECKI,
Member of the Polish Academy of Sciences

Covering both Soviet and Western studies, this volume presents a survey of the physical foundations of sonic and ultrasonic techniques, starting from the physicist's point of view and moving on to the mathematical methods applied.

1968, 752 pp., \$28.00

AN INTRODUCTION TO FIELD QUANTIZATION

By Y. TAKAHASHI,
Dublin Institute for Advanced Studies

An introductory discussion of relativistic quantum field theory, using the non-Hamiltonian methods. The book covers quantization of free fields with higher spin and phonon field, and includes a brief discussion of interacting fields.

1968, 312 pp., \$10.00

PHOTOGRAPHIC RECORDING OF HIGH-SPEED PROCESSES

By A. S. DUBOVIK,
Institute of the Physics of the Earth, Moscow

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Harvey E. White, Professor of Physics and Director, Lawrence Hall of Science, University of California, Berkeley. January 1969, app. 800 pages, about \$11.50.

This book is intended for use in general physics courses for liberal arts and science majors. Algebra and trigonometry are the only prerequisites, although the basic notions of calculus are introduced and employed wherever they provide a better understanding of ideas and problems in physics. It should be emphasized that the calculus is self-contained and never used for its own sake. The 75 chapters provide for maximum flexibility.

a text with a view

FOUNDATIONS OF PHYSICS

Walter C. Michels, Bryn Mawr College; Malcolm Correll, University of Colorado, and the late Arthur L. Patterson. 1968, 900 pages, \$12.95. Teacher's Guide available upon adoption.

From the authors' Preface: "Foundations of Physics is based on the conviction of the authors that every college or university freshman or sophomore who takes an introductory physics course deserves something more than exposure to a body of facts, a package of techniques, and that collection of propositions which constitutes currently accepted theory. It attempts to present physics as a human activity — or even, perhaps, as an attitude of mind — which constantly seeks to reinterpret, to refine, and to extend our knowledge of the physical world."

a non-calculus text

MODERN COLLEGE PHYSICS: Fifth Edition

Harvey E. White, Professor of Physics and Director, Lawrence Hall of Science, University of California, Berkeley. 1966, 784 pages, \$10.75. Teacher's Guide available upon adoption.

"I believe that this is by far the best non-calculus textbook in general physics."—*Dr. R. B. Dow, Towson State College*

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a text for liberal arts majors

DESCRIPTIVE COLLEGE PHYSICS: Second Edition

Harvey E. White, Professor of Physics and Director, Lawrence Hall of Science, University of California, Berkeley. 1963, 409 pages, \$8.75.

In its second edition, this established text uses a new format and a wide use of color. It is designed for a basic one semester course in college physics, usually offered to liberal arts students.

a text founded on basic atomic concepts

PHYSICS: Matter, Energy and the Universe

Gaylord P. Harnwell, University of Pennsylvania; and George J. F. Legge, University of Melbourne. 1967, 608 pages, \$9.95.

Designed for use in a full-year college physics course, this book introduces the quantitative concepts and procedural definitions of physics as bases for understanding present descriptions of physical phenomena in terms of the properties of the elementary particles composing the world of which they are a part. This work is unique in that it (1) uses the basic atomic concepts and elementary statistics to provide the foundation for a description of the properties of matter in bulk, and (2) extends the account to recent advances in nuclear and high-energy physics.

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to describe many of the new results in solar x-ray burst activity; but this field has only recently spawned forth its results.

Tandberg-Hanssen is a member of the staff of the High-Altitude Observatory, National Center for Atmospheric Research, and a lecturer at the University of Colorado. The book encompasses depth in reviewing the research material with sufficient development of concepts to reach the graduate student. The volume is vital for background in solar activity; other volumes fail to cover the theoretical development with same clarity.

The illustrations are sparse but ample for the models studied. The book is highly recommended as a coherent analysis of current ideas in solar activity.

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The author is Chief of the Radio Astronomy Branch of the Air Force Cambridge Research Laboratories.

Aspects of cosmic radiation

PROGRESS IN ELEMENTARY PARTICLE AND COSMIC RAY PHYSICS, VOL. 9. J. G. Wilson, S. A. Wouthuysen, eds. 315 pp. North-Holland, Amsterdam (Interscience, New York), 1967. \$15.50

by HENRY VALK

Following their procedure of alternating review volumes on elementary-particle physics and cosmic rays, the publishers of *Progress in Elementary Particle and Cosmic Ray Physics* devoted the four articles of volume 9 to various aspects of cosmic radiation.

The first article on the origin of the solar wind and cosmic-ray variations, by E. N. Parker of the University of Chicago, discusses qualitatively the dynamical properties of the solar corona and the manner by which its supersonic expansion pushes back the galactic cosmic rays, thus providing for much of the observed variations in cosmic-ray intensity. Because Parker has been one of the prime contributors to our present understanding of the interplanetary magnetic field, it is not surprising to find that his article is concisely (34 pages of text) and lucidly written.

When primary cosmic rays with energies greater than 10^{13} eV enter the earth's atmosphere, they produce secondaries that in turn interact producing more and more particles. As these off-spring of the initiating event progress

towards the earth's surface, they spread out laterally to yield what are called extensive air showers. It has been convenient to detect these events by means of large counter arrays spread over a considerable area. The construction and maintenance of such arrays is sufficiently costly, however, to warrant an investigation of other types of detectors. The second article, by J. V. Jelley of Harwell, concerns the progress that has been made in developing one such alternative: that of detecting and measuring the Cerenkov radiation that these showers produce in the atmosphere. Jelley's review is comprehensive and self-contained, including all aspects of the subject: the theoretical, experimental and practical.

The third article, by M. G. K. Menon and P. V. Ramana Murthy of the Tata Institute, examines the status, as of 1965, of cosmic-ray-intensity measurements deep underground. Here emphasis is placed on the relationship between such measurements and the determination of the energy spectrum of sea-level muons and the detection of high-energy natural neutrinos.

The fourth and final article in the book, by V. S. Murzin of Moscow State University, discusses in some detail the principles and application of the ionization calorimeter. The author emphasizes the versatility of the instrument, particularly as it is used in conjunction with other detection devices such as the cloud chamber and nuclear emulsions.

All in all, the present volume is authoritative, fully maintaining the high standard of its predecessors. It should be a valuable addition to the library of anyone interested in cosmic-ray physics.

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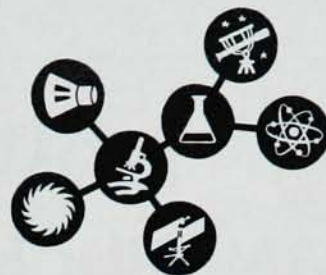
Henry S. Valk is chairman of the physics department, Behlen Laboratory of Physics, University of Nebraska. His special fields include theoretical nuclear and high-energy physics, scientific research administration and elementary-particle theory.

Beyond the atmosphere

TELESCOPES IN SPACE. By Zdeněk Kopal. 140 pp. Faber & Faber, London, 1968. 50s

by PETER G. BERGMANN

This is a nontechnical presentation of the contribution that space technology has made, and will make, to optical astronomy. The author, professor at Manchester University, is also associ-



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