understanding the development of science.

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The reviewer is with Case Western Reserve University, where he is Ambrose Swasey Professor of Physics.

Emphasis on hard facts

PHYSICS OF PLANETS. (NASA-TT-F-515). By V. I. Moroz. 412 pp. NASA, Washington, DC, 1968. $3.00

by ROMAN SMOLUCHOWSKI

There are few, if any, sciences that stir the imagination more than astrophysics. Even the length of articles in the *New York Times*, which actually is acquiring an enviable reputation as a "science journal," shows that the only peers of astrophysics in this respect are genetics and other biosciences. For the last ten years or so we have been bombarded with spectacular discoveries concerning either remote parts of the universe, which are populated by such mysterious objects as quasars, pulsars and John Wheeler's "black holes," or concerning our own familiar and much more easily identifiable solar system and its planets.

Unfortunately there are no recent books in English written on a reasonably advanced level dealing with physics of all planets. Some do exist on the popular side, such as the otherwise excellent series published by the National Aeronautics and Space Administration and edited by C. M. Michaux. Others encompass several volumes each written by many authors, which precludes continuity and uniformity of level, and there are also books that deal only with a few planets, like the recent (1968) and very good *Introduction to Planetary Physics* by W. M. Kaula.

The author of *Physics of Planets*, V. I. Moroz from the P. K. Sternberg Astronomical Institute in Moscow, has contributed widely to spectroscopic observations of nearly all planets. His present book is an excellent and compact introduction to the whole field of planetary physics. It starts with a good summary of basic concepts, tools and pertinent measurements, followed by chapters dealing with Mars, Venus, Mercury and the giant planets. There are a large number of illustrations, diagrams and over 600 references.

MT WILSON AND PALOMAR OBSERVATORIES

JUPITER with red spot and shadow of the satellite Ganymede above.

The tone of the book would appeal to a skeptical observer; that is, the primary effort is placed on facts and on their evaluation, and only the most acceptable theories are expounded in some detail. This is a very welcome feature in a field where the ratio of hard facts to theories and hypotheses is probably even lower than in biosciences.

The main drawback is that the references do not go beyond 1965, and thus the book does not cover such exciting observations as F. J. Low's measurements of the thermal emission of Jupiter, newer data on the nature of the polar caps of Mars and of its surface composition and the recent controversy concerning the surface temperature of Venus. On the other hand, the results obtained by Mariner 4 and the complex decametric- and decimetric-radiation patterns of Jupiter are discussed in considerable detail. I was particularly impressed by the space devoted to Jupiter's red spot, to the famous "south tropical disturbance" and to the atmospheres of Jupiter and Mars. Many numerical data in the book are more up to date than those in C. W. Allen's *Astrophysical Quantities*, which was last revised in 1962.

On the negative side, one has to mention first the poor translation and careless proofreading. For instance "oblateness" is translated as "compression," and a column in table 97 is titled "Ratio of Planet Mass to Satellite Mass" when it should be "Ratio of the Mean Radius of the Satellite Orbit to Planet Radius." As a result the reader is told that Jupiter is 2.5 times as heavy as its famous fifth satellite. But a very valuable feature of the book is that besides references to Western literature there are numerous references to Soviet literature, which is so often unknown to us. Altogether the book is useful and should find a wide audience.

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R. Smoluchowski is professor of solid state sciences at Princeton University and has been active in the part of astrophysics that deals with properties of condensed matter, especially the surfaces and the interior of the moon, Mars and Jupiter.

A partisan view

QUANTUM THEORY OF MATTER. (2nd edition) By John C. Slater. 763 pp. McGraw-Hill, New York, 1968. $15.00

by PHILIP L. TAYLOR

It is probably true to say that the quantum theory of matter is a subject that has broadened rather than deepened in the 18 years since the first edition of this text was published. Our current view of a crystal as a bestiary of elementary excitations has led to an understanding of many previously puzzling phenomena. On the other hand, our present knowledge of atoms and molecules, as well as of energy bands in solids, owes more to large digital computers that helped us develop concepts formulated in the early days of quantum mechanics.

In this new edition of his book, John Slater has chosen not to follow the path of diversification, but has instead concentrated on enlarging his treatment of the topics covered in the first edition. Thus the first half of the book represents an introduction to quantum mechanics in the wave-mechanical-cum-historical tradition, and the second half discusses the application of the one- and two-electron Schrödinger equation to a large variety of molecules and solids. The discussion of molecular orbitals is particularly clear and extensive and includes descriptions of the ammonia, ethylene and benzene molecules. There are ample instructive problems at the end of each chapter.

Some readers may fault this text for its failure to mention any aspect of collective behavior or of those most ex-

citing states of matter, the superfluid and the superconductor. I would be more inclined to accept this work for what it is—a partisan view of the theory of matter—and forgive its author for retaining the book's overly ambitious title. This new edition will be warmly welcomed by anyone who has enjoyed the earlier version, and will bear further witness to Slater's qualities as one of our most notable teachers.

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Philip Taylor is associate professor of physics at Case Western Reserve University, and is the author of a forthcoming text on the quantum theory of solids.

Waves and lines

LIGHT AND SOUND FOR ENGINEERS. By R. C. Stanley. 344 pp. Hart Publishing Co., 1968. $12.00

by ROBERT LINDSAY

This book, by a British author who is lecturer in applied physics at Brighton College of Technology, is an effort to provide a broader and deeper exposition of sound and optics than the typical British engineering student might be expected to obtain from his elementary physics course. The chapters devoted to geometrical optics give considerable attention to such often bypassed topics as thick lenses, aberrations and photometry as well as analyzing in more than usual detail some of the commonly encountered optical instruments.

The chapters on physical optics employ standard approaches to interference, diffraction and resolving power with a theoretical development based almost completely on the principles of superposition and the Huygens tradition. No mention is made of recent work in lasers and holography. The chapters on sound include the description of techniques for measuring the velocity of sound in solids, liquids and gases, a thorough but elementary treatment of the vibrating string and several resonance situations and a survey of architectural acoustics and ultrasonics.

Most US engineering curricula require three or four semesters of elementary physics. Existing texts already treat these subjects at a reasonable depth and it appears unlikely that a book at this relatively low level would be suitable as a regular text. It does have some attractive features that would make it worthwhile for reference purposes, including a commendable neatness of organization, a clarity of exposition that takes nothing for granted and many meticulously drawn diagrams. To the teacher of elementary physics it would provide a good source of supplementary material, but for the practically minded engineer and technician, who encounters problems involving light and sound, it has enough useful information that can be obtained quickly to make it a good place to look first.

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Robert Lindsay is a professor of physics at Trinity College and has been teaching physics to science and engineering majors for 15 years.

Two aids for galactic research

STELLAR KINEMATICS. By W. M. Smart. 320 pp. Wiley, New York, 1968. $12.50

GALACTIC ASTRONOMY. By Dimitri Mihalas, with collaboration of Paul McRae Routly. 257 pp. W. H. Freeman, San Francisco, Calif., 1968. $10.00

by KENNETH YOSS

These two books are useful additions to the sparse list in galactic research, which is receiving more attention with the recent availability of a new generation of modern observational equipment. Proper appreciation and analysis of the resulting data is essential, and these two books should aid in this increased activity.

Despite the first-glance similarity (six of eight chapters in one are on the same topics as six of 14 in the other), the purposes are totally different, as are the levels of usefulness. One is a textbook for a first course in galactic structure, the other a detailed mathematical explanation of well known classical problems in stellar kinematics.

W. M. Smart is well known for his precise mathematical developments concerning problems in galactic structure. His *Spherical Astronomy* and *Stellar Dynamics* are classics, familiar to and often used by researchers in galactic structure. *Stellar Kinematics* is limited to basic problems concerning stellar motions, and many sections are modifications from *Stellar Dynamics,* which does not lessen its usefulness. Smart's attention to detail is

MEDIEVAL COSMOLOGY. Woodcut depicts traveler putting his head through the vault of the sky to discover the complexities that move the stars. (Photo taken from *Knowledge and Wonder* by Victor F. Weisskopf, Doubleday, 1966.)