

relativity to undergraduates—and perhaps also to himself—will find Ohanian's book suggestive, and many of the details interesting and original.

* * *

Wolfgang Rindler is Professor of Physics and Mathematics at The University of Texas at Dallas and is himself the author of two texts on relativity. He coined the terms "event horizon" and "particle horizon" and gave those entities their earliest systematic treatment.

Structure and Evolutionary History of the Solar System

H. Alfvén, G. Arrhenius

276 pp. D. Reidel, Dordrecht, Holland, 1975. \$32.00 clothbound, \$24.00 paperback

The book is based on, and is in fact almost identical to, four papers published in "Astrophysics and Space Science." The authors give their own views of the structure and formation of the solar system and make no attempt at reviewing, or even mentioning, rival theories. Consequently, this is a very useful book if one is interested in the theories of Hannes Alfvén and Gustaf Arrhenius, but it is of little use for general information regarding the subject. Of course, both Alfvén and Arrhenius are major contributors to the field, and their personal views are therefore of considerable interest.

Alfvén and Arrhenius believe that the Sun, with a magnetic field many times stronger than its present field, accreted matter from an interstellar cloud. During its infall this matter becomes ionized. The authors recognize three distinct ionization regions, roughly where the nonvolatiles, the compounds of carbon, oxygen and nitrogen and hydrogen and helium become ionized. When ionization occurs, the material is influenced by the magnetic field, which prevents further infall and gives the material angular momentum. Thus three rings—or bands—are formed, each of different composition. (Unfortunately, these compositional bands do not correspond to those found in our planetary system; the ordering is different.)

The authors then discuss the formation of planets within such rings and describe the idea of "jet streaming," a form of gravitational focusing where collisions between the particles in a band produce a tighter and tighter ring or stream, which eventually accumulates into one body. Alfvén and Arrhenius also believe that the satellite systems formed by a similar process, except now of course with the appropriate planet as a parent body.

The book is certainly valuable to all astronomers actively working in the field

of planetary cosmogony or who are contemplating entering it. It has little value if all that is required is a "potted" version of the current stage of knowledge. The volume should certainly be available in all scientific libraries.

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Solid State Physics

N. W. Ashcroft, N. D. Mermin

826 pp. Holt, Rinehart and Winston, New York, 1976. \$19.95

For several years members of the solid-state community have been aware of the fact that two well-known Cornell physicists, Neil Ashcroft and David Mermin, were writing a textbook on solid-state physics. Rumor had it that this book would take a new look at this well-trodden field and that it would be of great help to those who taught introductory courses in the solid state for physicists or for engineers, and had mixed luck in choosing a suitable text or texts. No doubt the book lives up to its expectations as far as a refreshingly new attitude is concerned.

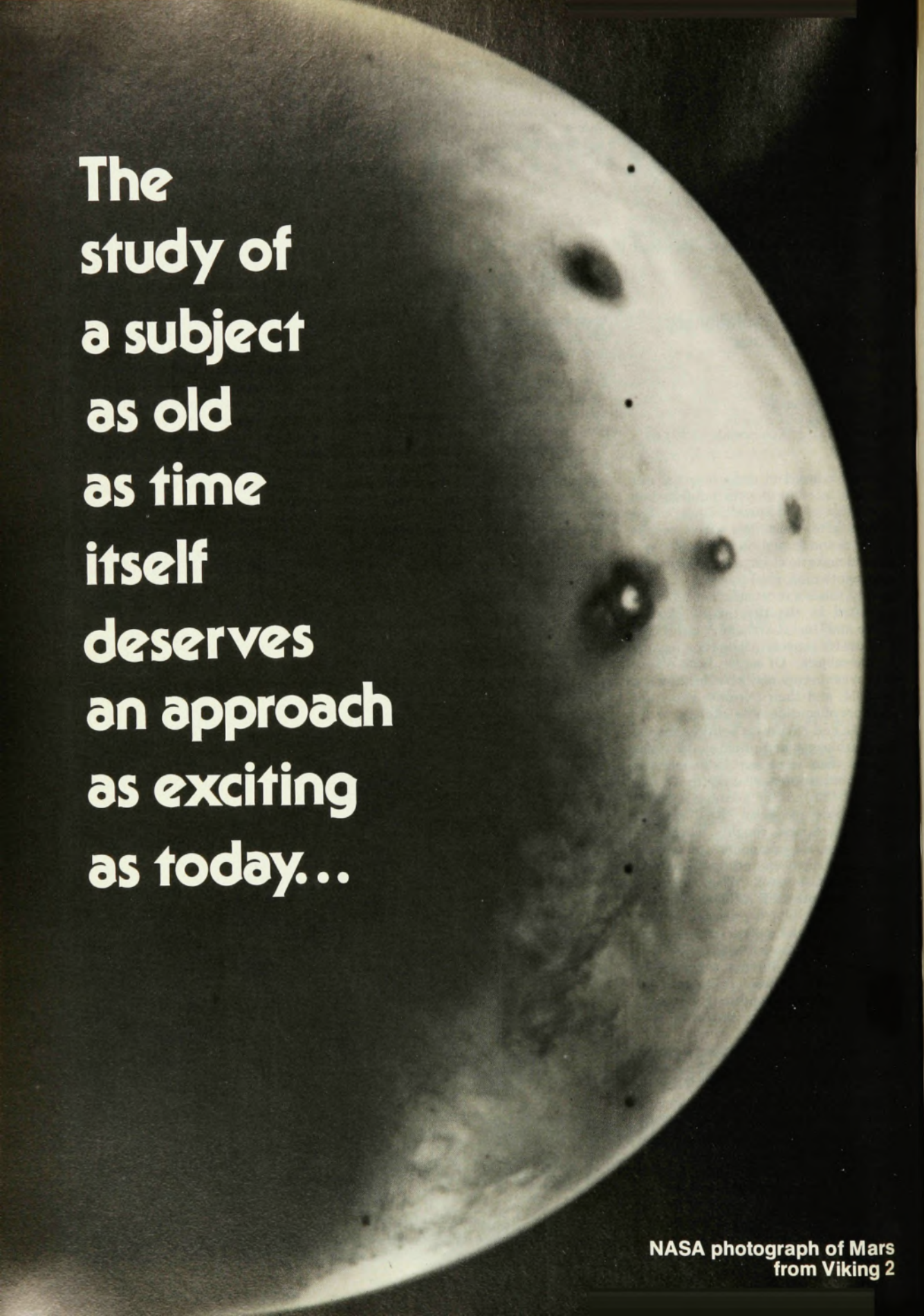
Whether it will prove to be a boon for the students and for those like myself who taught the subject for a few decades, only practice will show, but the prognostications are very good indeed.

In contrast with many other texts the book is well organized from a pedagogical point of view. As the authors point out in their preface, the book does not have a "linear" arrangement of topics. Right from the first three chapters ("Drude Theory of Metals," "Sommerfeld Theory of Metals," "Failure of the Free Electron Model"), it is clear that the sequence of chapters is so chosen as to give the students an early grasp of the elementary concepts of solids on the basis of which they can then find their way to other more advanced topics. In fact, there is a most enlightening, detailed table showing not only the necessary prerequisites for each chapter, but also how to use the book for a one-semester or for a two-semester course. This feature will undoubtedly appeal to many readers and users.

The strength of the book is in the stress it puts on the basic concepts of the theory of solids and of the various phenomena. This is achieved by giving first a carefully structured intuitive picture or argument, which is then followed by a quantitative formulation. In this connection it may be worth pointing out that the book has



Proposed Fermi surface for bcc tungsten. The structure at the center is an electron pocket, surrounded by hole pockets in zone faces and at corners. From the book, after A. V. Gold.



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By **Jay M. Pasachoff**, Williams College—
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Illustrated by George Kelvin.
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1977, 544 pages, \$14.50; Study Guide, Instructor's Manual, and Laboratory Manual available.

applied mathematical physics with programmable pocket calculators

ROBERT M. EISBERG, University of California, Santa Barbara

A guide for using pocket calculators with programmable capabilities, this text provides a series of programs that make it possible for the student to treat key topics in physics. Most of the programs employ differential equations solved by numerical methods. The text contains physical interpretations of the results obtained from many worked examples, and problems, chapter summaries, and bibliography.

1977, 192 pages, \$6.95 paper.

Prices subject to change.

nearly twice as many formulas and equations and about a third fewer illustrations than the well-known text by Charles Kittel of about the same size and weight. Both books require familiarity with introductory quantum mechanics, the new book relying perhaps more on rigorous procedures. The material presented in tables is comparable in both books. (Unfortunately, the old Pauling ionic radii in alkali halides are used instead of the new Tossi-Fumi radii.) There are two kinds of problems appended at the end of chapters: those that actually are an extension of the text itself because they require the development of new formulas (Boundary Conditions on Electron Wave-Functions in Crystals, The Origin of the van der Waals Force, The Depletion Layer in Thermal Equilibrium, The Cooper Problem and others), and those that are of the more standard variety and call for the application of formalisms provided in the text. I feel that in future editions more problems of the second type should be added.

As a result of the stress on fundamentals, less space than usual is devoted to narrower topics such as molecular crystals, melting, lasers, polarons, lattice defects and so forth; it is here that the personal prejudices and preferences of the readers will affect their judgement of the choices made by the authors. No doubt drastic steps were necessary to keep the book a manageable size.

At the end there are 16 short appendices devoted to such topics as effective mass, Green's theorem, optical properties of solids and conservation of crystal momentum. The book is well cross-referenced and indexed, and it has many excellent footnotes. This is a most valuable volume for all solid staters.

R. SMOLUCHOWSKI

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Elastodynamics, Vols. 1 and 2

A. C. Eringen, E. S. Suhubi
341 and 660 pp., respectively. Academic,
New York, 1974 and 1975. \$38.50 and
\$65.00, respectively

Elastodynamics is concerned with the stress and strain in elastic solids, subject to time-dependent external forces and prescribed displacements, the latter usually on the boundary of the solid. The topic includes vibrations of, and wave and shock propagation in, elastic bodies; it forms a fundamental part of seismology, geology and many branches of engineering. The subject dates back at least to the Euler-Bernoulli theory of the vibration of bars (1744); it was further developed in

the nineteenth century and, like most branches of applied mathematics, it has greatly expanded since the second world war.

It is impossible to cover the entire field completely, even in a thousand pages—the combined length of the volumes under review. The authors were bound to make a selection. Volume 1 treats the nonlinear theory, most of which has been developed in the last twenty years, and volume 2, the linear theory excluding thermal effects. After developing the governing equations in the early chapters, the authors give detailed treatments of se-

lected specific problems. The first volume deals, in succession, with singular surfaces (shock and acceleration waves), the known analytic solutions for finite motions and finally with small motions superimposed on large static deformations. The second volume organizes the material according to the number of independent space variables, which correlates well with the order of mathematical difficulty. There are chapters on one-, two- and three-dimensional solutions, with a final chapter on diffraction of elastic waves. The authors include 25 pages of references.

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