text is an unremitting litany of accident hazards either deliberately suppressed or incompletely analyzed by the nuclear powers-that-be. There are mistakes, as for example in the assertions that one can see leakage in the pressure vessel before a catastrophic failure (one can't, and that was the origin of the British debate about pressurized water reactors) or that a reactor can somehow explode like an atomic bomb (it can't). Nonetheless, this book has a great deal of pertinent technical material about the safety of reactors and is a good source, when read warily. It is also true, as repeated throughout the book, that no one has been able to analyze all the tracks that can lead to a major reactor accident, and that public policy must therefore be made in an atmosphere of technical ignorance. This will always be true, since no foreseeable computer has the capability to analyze the kind of three-dimensional, two-phase unsteady fluid flow associated with a reactor accident; there are many other areas in which the kind of scientific solidity that one would like to see as the underpinning for reactor-safety analyses is simply missing. That is the central social issue.

It is in the analysis of how one deals with such matters that Webb is furthest out. He argues a Constitutional case—that, because the nuclear program was not specifically mandated by the framers of the Constitution, it is unconstitutional, and that most probably the entire Federal Government is illegally organized. He wants to shut down all reactors, subject to the will of the People, but he is short on practical suggestions for ascertaining that will. Webb is also vague on how far down the line one goes (Do we vote on whether relativity is correct?).

A personal note: In the chapter on The American Physical Society's report (written by a committee of which I was chairman), Webb says "To raise [such] issues . . . would fundamentally question the use of nuclear power, which may explain the reluctance of the nuclear-engineering and physics community to discuss them." Webb's world is populated by villains, apparently including the entire physics community, and I resent the broad tarry brush.

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Physics of Computer Memory Devices

S. Middelhoek, P. K. George, P. Dekker
402 pp. Academic, London, 1976. $31.50

The past 25 years has seen the development of the digital computer progress from a laboratory curiosity to being the foundation of a very large commercial marketplace. Many aspects of physics

Electronic Properties of Quasi-Two-Dimensional Systems

edited by **J.J. QUINN** and **PH. J. STILES**

Reprinted from the journal Surface Science, Vol. 58, No. 1

1976 x + 354 pages
Price: US $51.95/Dfl. 130.00

This book contains the proceedings of the 1975 International Conference held at Brown University. The main topics emphasized are: (a) accumulation and inversion layers on semiconducting surfaces - in particular surface quantization, optical properties and cyclotron resonance, galvanomagnetic effects, localization and disorder, and many body effects; (b) electrons on the surface of liquid helium; and (c) electronic properties of layered compounds.

The book contains five review papers on the above subjects, forty-seven contributed papers, and an extensive bibliography. Together they reflect the prodigious growth in effort being devoted to the understanding of the electronic properties of pseudo-two-dimensional systems, and the resulting interesting developments.

Atomic Structure and Mechanical Properties of Metals

Proceedings of the International School of Physics "Enrico Fermi", Course LXI, Varenna, 8-20 Juy 1974

edited by **G. CAGLIOTI**

1976 xxiv + 662 pages
Price: US $91.95/Dfl. 230.00
Subscription price: US $77.95/Dfl. 195.00

North-Holland Publishing Company has now acquired the exclusive distribution rights (on a world-wide basis) for the internationally famous Enrico Fermi Summer School Proceedings, Varenna, Italy. The eight volumes which are scheduled for publication in 1976/1977 are available at a special discount of 15% to subscribers to the series.

The proceedings in this volume present the state of the art and foreseeable developments of this subject - materials science, a field which requires interdisciplinary contact between physicists, chemists and engineers. As this is still a developing topic, the book is among the first of its kind and as such should constitute a suitable basis for both the materials producers interested in the design production and transformation of new materials with predetermined mechanical properties, and the materials users interested in the optimization of the reliable utilization of technological materials.

CONTRIBUTORS: G. Angelino, G. Benedek, J. C. Bilello, D. Birchon, S. Boffi, V. Bortolani, G. Caglioti, V. Celli, J. Friedel, A. N. Goland, G. T. Hahn, P. B. Hirsch, H. C. Kim, G. Kostorz, N. M. March, M. Mirabile, H. Nijman, G. Piatti, P. Schiller, A. Schneiders.

Atomic Processes and Applications

edited by **P. G. BURKE** and **B. L. MOISEIWITSCH**

1976 x + 526 pages
Price: US $65.95/Dfl. 165.00

This volume, dedicated to Professor David R. Bates on the occasion of his sixtieth birthday, provides a unique opportunity of assessing the current position of the various branches of atomic and molecular physics, and planetary and space physics to which he has contributed so much during the past three decades at University College, London and at the Queen's University of Belfast.

CONTENTS: D. R. Bates - A Sixtieth Birthday Tribute *(H. S. W. Massey)*. A Brief Overview of Stratospheric Aeronomy *(M. Nicolet)*. The Upper Atmosphere of the Earth *(J. C. G. Walker)*. Man's Impact on the Global Environment: Some Recent Problems in Atmospheric Pollution *(M. B. McElroy)*. The Interstellar Molecules CH and CH^+ *(A. Dalgarno)*. Dielectronic Recombination *(M. J. Seaton and P. J. Storey)*. Photoionization of Atomic Systems *(P. G. Burke)*. Atomic Structure and Oscillator Strengths *(A. L. Stewart)*. Negative Ions *(B. L. Moiseiwitsch)*. Atomic Scattering Computations *(I. C. Percival)*. Electron Scattering by Atoms *(M. R. C. McDowell)*. Ionic Recombinations *(M. R. Flannery)*. Low Energy Heavy Particle Collisions *(R. McCarroll)*. High Energy Heavy Particle Collisions *(K. L. Bell and A. E. Kingston)*.

Statistical Physics

edited by **L. PÁL** and **P. SZÉPFALUSY**

1976 252 pages
Price: US $33.95/Dfl. 85.00

This volume contains the invited lectures given at the IUPAP International Conference on Statistical Physics held in Budapest, Hungary, 25-29 August 1975, and reflects the developments made in this field during the last few years. The central theme of the book is the description of the original ideas and the most recent advances of Wilson's renormalization group theory - the theory which resulted in the subsequent breakthrough in the theory of phase transformations and critical phenomena. Other aspects of the theory of phase transitions are also examined and several papers are devoted to the theory of open systems, i.e. systems far from thermal equilibrium, while an excellent account is given of certain problems of kinetic theory.

CONTRIBUTORS: A. A. Abrikosov, K. Binder, H. Haken, B. I. Halperin, A. Houghton, G. Jona-Lasinio, L. P. Kadanoff, P.C. Martin, L. Pál, P. Résibois, Ja. Sinai, N. G. van Kampen, K. G. Wilson, M. C. Yalabik.

Nuclear Theory

by **JUDAH M. EISENBERG** and **WALTER GREINER**

Volume 3: **Microscopic Theory of the Nucleus**

1976 xvi + 520 pages
Second corrected printing
Price: US $29.95/Dfl. 75.00 Paperback

This book completes the new paperback edition of the 3-volume series on nuclear theory. Like its predecessors, it is intended for anyone who has followed a conventional one-year course in quantum mechanics. The great majority of the subject matter presented is described in considerable detail and the work is suitable for use as a text in graduate-level nuclear physics courses as well as being of value to research workers.

A review of the first edition:

"The book is well-written and pleasant to read. It provides the reader with a good introduction to many of the theoretical tools used in present-day nuclear physics . . . constitutes an admirable attempt to summarize and present to the student the status of the field. It succeeds to do so in concise and clear form. It can be warmly recommended."

Applied Physics

CONTENTS: Introduction. **Part I. Two- and Three-Nucleon Systems.** The nucleon-nucleon interaction. Phase shift analysis. Varieties of nucleon-nucleon interactions. The three-nucleon problem. **Part II. Nuclear Matter.** Formal theory of many-particle systems. Infinite nuclear matter. **Part III. Theories of the Structure of Light Nuclei.** Hartree-Fock and particle-hole formalisms and the random phase approximation. Application of the Hartree-Fock and the particle-hole formalisms. Nuclear rotations. **Part IV. Theories of the Structure of Heavier Nuclei.** Pairing and quasiparticles. Collective motion in nuclei. **Appendices:** A. The projection of physical states. B. Collective coordinates in a consistent microscopic theory. **References. Index.**

Volume 2: **Excitation Mechanisms of the Nucleus: Electromagnetic and Weak Interactions**

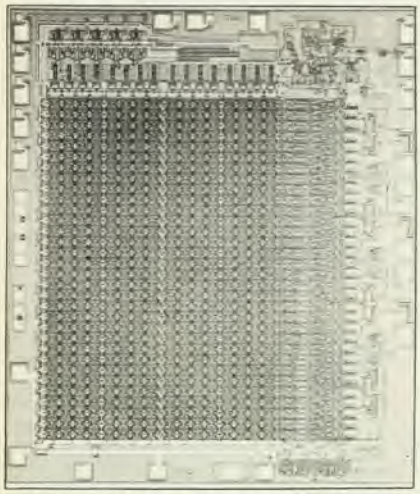
2nd revised edition
1976 xiv + 422 pages
Price: US $27.95/Dfl. 70.00 Paperback

Volume 1: **Nuclear Models; Collective and Single-Particle Phenomena**

2nd revised edition
1975 xvi + 486 pages
Price: US $19.95/Dfl. 50.00 Paperback

have matured under the drive of this commercial thrust. Solid-state physics, acoustics, magnetics, semiconductors and superconductivity, among other disciplines, have been extensively applied to the needs of assembling computers. More classical subjects, such as aerodynamics, optics, lubrication and fine particle dispersions, also have their place in the physics of computer memories.

Simon Middelhoek, Peter George and Peter Dekker have produced a thin volume entitled *Physics of Computer Memory Devices* from course notes that were produced for undergraduates at the Delft University of Technology. As an outline for a course in applied physics, the book would probably provide a starting



Random-access memory device. The AMS 7040 is a 256-word by 4-bit NMOS RAM produced by Advanced Memory Systems Inc, for microprocessing and memory systems.

point. The problem is the very wide range of interesting, practical physics that the title covers. Middelhoek, George and Dekker are each recognized workers in the physics of devices, especially magnetic devices, but their expertise overlaps too greatly for them to address the subject of this book effectively.

The book begins with a 12-page discussion of computer history and architecture. Since both the history and the architecture bear on requirements that the device must satisfy, and since the budding applied physicist must understand these requirements in detail to be effective in his work, this section is much too brief and too weak to be effective.

The rest of the volume is addressed to more specific technologies but does not give the flavor of the range of applications of physics to information storage. For example, the whole field of digital magnetic recording is treated in 30 pages, while the subject of delay lines gets 52 pages. Recurrent underlying themes are not emphasized, much to the confusion of any beginning student. In any text of this nature that attempts to characterize a rapidly moving field there is a temptation to be current and to project the future. This approach is doomed to failure, because the progress is so great that what was the leading approach two years ago is well behind now. Thus the discussion of semiconductor memories is dated in this text.

The references cited cover a very wide range of interesting subjects and would serve as a very good basic-reading guide for a course based on this text. At the price for this book, one would like either greater depth on a few general-physics topics or a much broader coverage of the general technology. On the whole, I feel that this volume misses the target and that if there is a need for a text on the physics of memory devices, then this volume does not meet it.

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Energy, Vol. 2: Non-nuclear Energy Technologies

S. S. Penner, L. Icerman
673 pp. Addison-Wesley, Reading, Mass., 1975. $19.50 clothbound, $13.50 paperbound

Energy: The Solar-Hydrogen Alternative

J. O'M. Bockris
365 pp. Halsted, New York, 1976. $27.50

Although governments and peoples act currently as if the "energy crisis" were over—as if the abatement of the oil boycott were permanent, as if Alaskan and North Sea oil and gas were infinite treasure troves whose only problems are distributive in nature—mature reflection convincingly indicates that the crisis's relaxation is only temporary. The energy problem remains with us—the conflict between finite, non-renewable energy resources and the continuing growth in world-wide energy demand, seen as reflecting the desired growth in general prosperity. There is thus a continuing need for public review and debate on the problem and its proposed solution paradigms, and hence a market exists for books to guide and inform these discussions.

In a democratic society the decision-making layman needs some insight into the basic scientific background to the supply and use of energy, as well as to the side-effects of such use. He must have some idea of the constraints imposed by science and nature, so as to know what to expect and what not to expect. It is obvious that there will be no perceived need for individual or societal change or sacrifice if it is generally believed that technology will be able to supply unlimited quantities of the desired energy at low cost. By "cost" I mean to include here the usual economic costs, as well as environmental and societal changes and the constraints placed upon the lives of future inhabitants of our finite planet.

Those who will mold and carry out the decisions of the citizenry—technologists, both presently working and students—have need of a comprehensive picture of the problem so as to be able to guide the discussions of their fellow citizens and to insert their own skills most productively for themselves and their society. They will have to know more than technology and its foundations in physical science; historical, societal, political and resource limits may place more severe constraints upon their advice and actions than are placed by the laws of the physical universe.

For all concerned, there are two ways to look at "the energy problem," in the short term and in the long term. The short-term view of the problem—of which Project Independence is characteristic—seeks solutions in the form of changes from one type of existing resource to another. For example, one may seek to replace Mid-Eastern oil by Alaskan oil, by oil from coal liquifaction, or by oil from tar sands and oil shales. Primarily, this approach requires a narrow engineering view—how to build new energy-extraction equipment cheaply and reliably. It is taken for granted that there are vast quantities of these "new" resources (enough to warrant the capital investments required); all that is needed is the means to tap them and convert them into close approximations to the usual fuels.

The long-term view looks to the running out of all non-renewable (fossil) fuels and is concerned with the overall picture, including global pollutional problems as we burn off all of the Earth's carbonaceous fossil fuels. From this perspective, one asks questions such as: What will be the impact on the presently perceived long resource lifetime of coal if we proceed to derive all of our increasing petroleum demands from liquified coal? Will the vast amounts of energy required to develop new, post-fossil-fuel energy sources be available to us when we get around to seriously attempting to create and deploy such resources?

The two books under review here illustrate this short-term, long-term dichotomy. The book by Stanford S. Penner and Larry Icerman embodies the short-term, engineering point of view (though to be fair, it is part of a three-volume set, the other two of which, *Demands, Resources, Impact, Technology and Policy* (1974) and *Nuclear Energy and Energy Policies* (1976)—not under review or seen by this reviewer—may