

searchers. The focus is on detectors and applications. The first of the book's three sections focuses on fundamentals of the Josephson effect, the second deals with fabrication techniques for SQUIDS and junctions. The chapter on high- T_c Josephson contacts and devices is almost entirely concerned with what used to be high-temperature materials: NbN and Nb₃Ge. The book also includes a discussion of 77-K SQUIDS fabricated from bulk YBCO compounds. The use of SQUIDS for biomagnetic measurements is briefly discussed, with an emphasis on thin-film gradiometers. The rest of the second section deals with high-frequency applications and scanning electron microscopy studies. The final section of *Superconducting Quantum Electronics* discusses the use of superconducting electronics in voltage standards, current comparators and shift registers. The impact of high-temperature superconductivity is also discussed.

One strength of *Superconducting Quantum Electronics* is its discussion of fabrication techniques. In summary this book covers well those topics it discusses, but should not be considered a review of the entire field. It does not go into the same depth as either of the other two texts reviewed here.

An outgrowth of a NATO Advanced Study Institute, *Superconducting Electronics* should become the standard reference text on SQUID applications. The chapter authors are expert in their knowledge of the topic: The editors, Harold Weinstock and Martin Nissenoff, chose some of the best in their fields. If there is a bias in *Superconducting Electronics*, it is towards the lower-frequency applications. No other text covers this aspect of superconductivity in such depth. The book's only shortcoming is that the higher-frequency applications (microwave and millimeter regimes) are not covered as thoroughly as they are in Hinken's text.

Superconducting Electronics starts with excellent theoretical reviews on superconductivity, quantum interference in normal metals and tunneling. The chapter on fabrication of both low- and high-temperature superconductivity is quite good. *Superconducting Electronics* covers both analog and digital applications in depth. Biomagnetism, nonlinear properties, SIS junctions, signal processing, Josephson large-scale-integration technology and superconducting field-effect devices are just some of the topics covered.

The chapters on SQUIDS by John Clarke and Gordon Donaldson are to

be commended for their readability and ease of understanding. *Superconducting Electronics* deals not only with devices from the experimenter's standpoint, but it also discusses cryogenic requirements. The treatments of high-temperature superconductivity are of greater depth than those in the other two texts. My only criticism is the typesetting: Because the book is printed from camera-ready pages, the type styles change from chapter to chapter.

If you can only choose one book, Weinstock and Nissenoff's *Superconducting Electronics* is clearly the best of the three. If your interests are focused on the high frequencies, then Hinken's *Superconductor Electronics* may be more appropriate to your needs. By bringing out three texts on superconducting electronics, Springer-Verlag has allowed the serious experimentalist to pick and choose according to his or her interests.

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A Shield in Space? Technology, Politics, and the Strategic Defense Initiative

Sanford Lakoff and
Herbert F. York
U. California P., Berkeley,
1989. 409 pp. \$37.50 hc ISBN
0-520-06650-2

It is somewhat remarkable that after the expenditure of well over 20 billion dollars and a controversial existence of some seven years, the Strategic Defensive Initiative has not been the subject of a comprehensive book. Sanford Lakoff and Herbert York have now filled that void with *A Shield in Space*, a thorough examination of the full spectrum of political and technical issues inherent in this program. There have been many monographs or collections that examined various aspects of SDI, or that advocated or condemned it, but none are as balanced or as complete in their presentations as this book. If there is a criticism, it would be that Lakoff and York's book is somewhat repetitive on some issues as a result of their multidimensional treatment.

The authors are eminently qualified for their task. Lakoff is a professor of political science at the University of California, San Diego. York is director emeritus of the Institute on Global Conflict and Cooperation and a professor of physics at the University of San Diego. York also was the first

Director of the Lawrence Livermore National Laboratory as well as the first Director of Defense Research and Engineering in the Eisenhower and Kennedy Administrations.

A Shield in Space provides a good summary of the technical developments and political events over the last 20 years that are essential to any comprehensive discussion of SDI and its implications for the future. However, the major portion of the book is devoted to a discussion of the possible outcomes for SDI technology and of policy options for the US-USSR strategic relationship. Unfortunately, as with all books written in the last year or so, world events have moved much faster and farther than the imagination or daring of most authors. The result is that the political options considered by Lakoff and York appear limited in terms of the current world situation. The East-West relationship in Europe, which has driven much of our strategic policy through the concept of extended deterrence, is much different from the one they describe. As might be expected, their judgments in the technical areas are much closer to the mark.

Lakoff and York do a good job of presenting all sides in the SDI debates; there is no question of where their true sentiments lie. While they believe in carrying out an active research and development program on SDI technologies, they have little faith that the technical goals set out by President Reagan for the program will be met. Their main message is that "SDI is a classic example of misplaced faith in the promise of technological salvation. . . . To expect advances in technology to provide security, in and by themselves, is to ask more than they can possibly provide. . . . To adopt this illusory faith that technology alone can achieve national security is also to ignore the need to address the political sources of insecurity by diplomatic means."

One factor contributing to their view is the paradox they describe wherein "even if a robust shield is built, and even if it could be reasonably expected to work as advertised, critics will come forward with claims that it is unreliable and that the other costly activities needed to maintain the old-fashioned kind of deterrence must still be supported. The irony is that those who will find the flaws in even a robust strategic defense are apt to be the same researchers who are now urging the United States to proceed with SDI before the Soviets do it first. . . . A space shield, no matter how elaborate, cannot be pro-

BOOKS

tected from zealous defense researchers who want to breach the next frontier lest the adversary do so first."

The technical level of the book and its descriptions of the various technologies envisaged for development in the SDI program are aimed at the "scientific layman." For a more detailed discussion of these technologies, the reader is referred to the excellent 1987 study by the American Physical Society (Rev. Mod. Phys. 59, S1, 1987) that is frequently referenced in the book.

Overall, *A Shield in Space* is a valuable addition to the "arms control" bookshelf, providing a good, well-referenced discussion of all the political and technical issues relevant to the SDI debate.

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Principles of Magnetic Resonance

C. P. Slichter

Springer-Verlag, New York, 1990 [1978]. Third edition.

655 pp. \$49.50 hc

ISBN 0-387-50157-6

Magnetic resonance—nuclear magnetic resonance and electron paramagnetic resonance—had its beginnings as a phenomenon of interest to a handful of solid-state physicists. The techniques have subsequently evolved into what are probably the single most important tools for investigating a number of properties of solids. The 1950 discovery of the chemical shift and indirect spin couplings in nmr spectra and the realization that these spectral features provide the capability of identifying different molecular species, attracted many chemists to the field. Their interest was further stimulated by the ability to determine rates of chemical reactions; thus, nmr provides information on both molecular structure and dynamics.

The field continued to expand during the 1970s and '80s, driven by both technological and scientific advances. In particular, the development of superconducting solenoids; minicomputers; and rf, microwave and digital electronics provided the capability to perform a variety of experiments that were previously either cumbersome or impossible. Pulsed and Fourier-transform methods quickly replaced the once standard cw techniques and led to the development of multidimensional spectroscopy—first two-, then three- and now four-dimensional experiments. In addition, during this period there was an explosion in the

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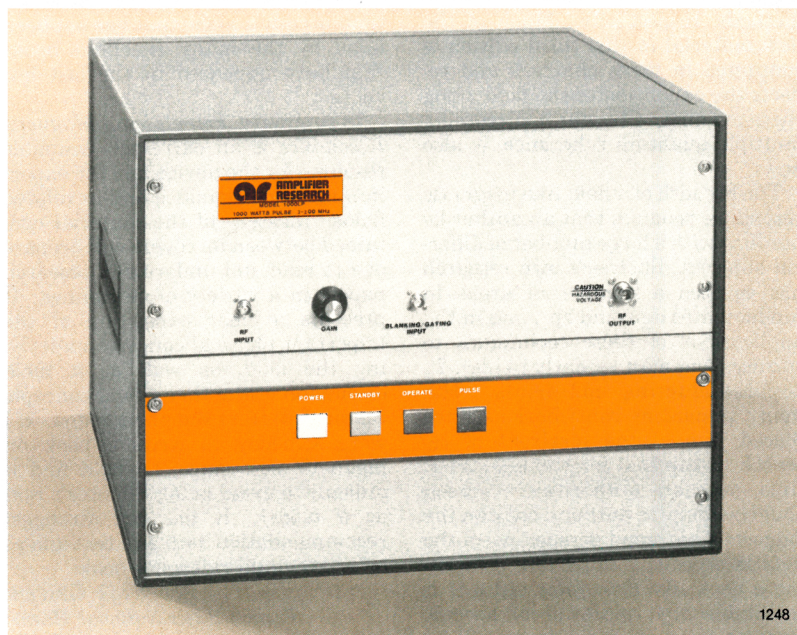
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