

University of Pittsburgh, has authored over 250 journal articles. For nearly 20 years he has also been waging a battle against public misunderstanding of radiation, radiation hazards and nuclear power. This book is a cry of frustration. Although Cohen is a well-publicized scientist, his (and similar) views seem to be passed over by journalists and the public in favor of the positions of people with far fewer scientific credentials. He writes: "The opposition to nuclear power among politicians started in the early 1970s when they stopped taking advice from the scientific establishment and instead began taking it from political activist groups." He believes "the American public must be educated . . . about nuclear power." This book is Cohen's attempt to provide that education.

Nuclear power is widely used around the world: In 1989 nuclear power supplied 75% of France's electricity, 28% of Japan's and 45% of Sweden's. Even in the United States, where nuclear power is seen as having died, last year 20% of our electricity came from nuclear power plants, and concern about global warming has led to a rekindling of interest in nuclear power. Cohen's book is quite timely and brings the perspective of a knowledgeable scientist. Cohen is a proponent of nuclear power. He foresees electricity shortages after 1993, and he believes that they should be met by nuclear power. He writes: "the new generation of nuclear power plants . . . will not only provide electricity at a lower cost than coal-generated electric power, but they will also be a thousand times safer than plants of the present generation." Cohen does not claim to be a nuclear reactor expert, and his descriptions of the potential to be realized by new designs should be viewed quite cautiously. Those designs remain, as Admiral Rickover might say, paper reactors.

Cohen argues that it is impossible to understand radiation effects without numbers. His discussion of background radiation stresses radon. He notes that people living near the Three-Mile Island reactor "get more radiation exposure from radon in their homes every day than they got from the 1979 accident." In a chapter devoted to understanding risks, Cohen addresses decreased life expectancy from many causes, including smoking, being overweight, being unmarried, being uneducated level and being poor. Examination of the last provides a discussion and a summary that are worth the price of the book: "Wealth makes health,

and poverty kills."

Regarding another major nuclear power issue, disposal of high-level waste, he writes: "Radioactive waste . . . is a rather trivial technological problem." He calculates that if it were buried, the high-level waste from one year's operation of one large nuclear plant would eventually cause 0.018 deaths after many millions of years. This is to be compared with 50 eventual deaths due to the emissions from one year's operation of a large coal plant. In one of several attacks against the media, Cohen criticizes journalists' coverage of the high-level waste issue: "What more despicable suppression of information can there be than refusing to transmit the truth about important questions to the public?"

Believing that "citizens of the distant future will look upon [plutonium] as one of God's greatest gifts to humanity," Cohen devotes a chapter to demystifying plutonium. He expresses puzzlement that "the antinuclear movement has devoted so much energy to trying to convince the public that [plutonium] is an important health hazard. Those with scientific background among them must realize it is a phony issue."

This book is an excellent source of reference information on radiation effects, particularly by those who want a compendium of data and are willing to work around the occasional pro-nuclear tilt given to the information. The book is well written, easily understandable by a good high school science student or a liberal arts graduate. Although the scientific reader can benefit from the data, the main intended audience is the educated lay person.

This book is not as witty or as well developed on risk as the book *Technological Risk* published earlier this year by Harold Lewis (Norton, New York, 1990). Cohen however is as concerned as Lewis about the waste of resources in the United States. Cohen asks the reader to "consider how much money our society is willing to spend to save a life. Typical amounts are: programs in Third World nations, \$200; cancer screening, \$75 000; highway safety, \$120 000; air pollution control, \$1 million; natural radioactivity in drinking water, \$5 million; nuclear plant safety, \$2.5 billion."

This book will not be pleasing to the antinuclear movement. It also will not be particularly pleasing to the pro-nuclear movement, because Cohen bases his arguments on facts, not rhetoric. He is not easily characterized, for example, when he predicts that in the far future, nuclear power

will provide base load electricity generation and photovoltaics will handle the intermediate and peak loads. Setting aside Cohen's descriptions of his frustrating interactions with the press, this is an enjoyable book.

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The Superfluid Phases of Helium 3

Dieter Vollhardt and
Peter Wölfle

Taylor and Francis, New York,
1990. 639 pp. \$149.50 hc
ISBN 0-85066-412-8

The discovery of superfluidity in ^3He by Douglas Osheroff and his colleagues at Cornell in 1972 was one of the truly exciting developments in low-temperature physics. I still remember vividly the electricity in the air at the APS meeting in the spring of that year when Osheroff first presented the susceptibility data that clearly showed that the "transitions" seen at Cornell were associated with the ^3He liquid. The response of the theoretical community was prompt and dramatic, led in critical ways by Tony Leggett.

The Superfluid Phases of Helium 3 by Dieter Vollhardt and Peter Wölfle is an attempt to present the theoretical status of the field as it exists today, following nearly 20 years of intense effort by a dedicated theoretical and experimental community. In the authors' words, "the time has come to write a book that collects not only the ideas and concepts of superfluid ^3He that have been developed in these years, but also the methods of theoretical physics used and the results obtained."

The authors have done a remarkable job of synthesis and exposition; Work represented by nearly 1500 papers is mentioned in roughly 560 pages of text. In addition to the subject index, there is an author index that is cross-referenced to a complete alphabetical index listing all of the published works cited. Each chapter concludes with a brief list of suggested further reading, which points the reader to particularly helpful articles, books or reviews. As a practical guide to the theoretical literature, the book is an essential reference for anyone active in the field. Any reader with a background in quantum mechanics and statistical physics will find the book accessible; no prior knowledge of superfluidity or the superconducting state is required.

BOOKS

The first four chapters provide a general introduction to the subject of superfluid ^3He beginning with an elementary discussion of the superfluid states and a review of the theory of normal Fermi liquids. Chapter four gives a brief review of the basic experimental properties of superfluid ^3He .

The remaining eight chapters provide a survey of most of the theoretical developments that have led to our present understanding of the subject. These chapters are topical, with comprehensive treatment given to superflow, textures and hydrodynamics. However, the treatment fluctuates: It is comprehensive and detailed at many points and less so at others. Collective modes are given less coverage than might have been anticipated, given Wolfe's important and extensive contributions to that topic. Wherever relevant in the discussions of theory, the authors relate it to experimental data to help describe the physical situation and to illustrate the degree to which the predictions match reality.

The writing style is fresh and lively in spite of the advanced level of discussion in many areas of the book. This is due to the substantial effort the authors have expended to make a complex subject accessible. *The Superfluid Phases of Helium 3* will be a required reference for many, many years to come both for researchers interested in the theoretical techniques and for others who need to understand the theory of superfluid helium 3.

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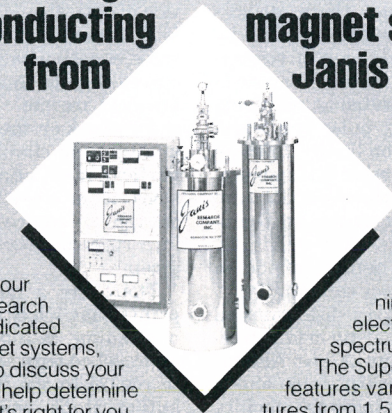
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Charles A. Brau
Academic, San Diego, Calif.,
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