

interested in understanding the essence of contemporary particle physics. Oerter is to be commended for successfully pulling off a challenging project, one that we physicists hope can possibly change this Rodney Dangerfield of theories into, if not a beautiful Jackie Kennedy, at least a model that gets more respect.

Low-Temperature Physics

Christian Enss and Siegfried Hunklinger
Springer, New York, 2005. \$79.95
 (573 pp.).
ISBN 3-540-23164-1

Low-Temperature Physics is unique in the breadth of topics covered in one text and the extent to which it emphasizes the interconnectedness of various subjects, which is frequently lost in this age of specialization. Christian Enss and Siegfried Hunklinger have written an extremely readable book that effectively treats most of the classical topics in a succinct yet reasonably complete manner; it also includes a survey chapter on experimental techniques. The book will be useful to students who are entering parts of the broader field of experimental condensed matter physics in which low temperature is a critical tool. The text provides background on foundational aspects of physics and explains the principles of cooling and thermometry in a manner that should make the operation of modern turnkey apparatus less mysterious.

With minor exceptions regarding discussions of the physics of liquid helium-3, the book can be easily read by students who know elementary quantum mechanics and statistical physics. Exercises at the end of each chapter make studying the subject material much less passive; they either illustrate important points or ask for numerical work that gives students a better quantitative understanding of the subject.

The book is divided into three parts, "Quantum Fluids," "Solids at Low Temperatures," and "Principles of Refrigeration and Thermometry." The first part covers the general properties of He; contains a masterfully written section on ^4He , which includes a clear description of the classical experiments

and modern ones on macroscopic quantum behavior; and treats normal and superfluid ^3He and the properties of ^3He - ^4He mixtures. The emphasis is always on the experiments and in most cases simple explanations of the phenomena. As with other parts of the book, citations to the original literature will help readers interested in details that cannot be included in a text of finite size.

The second part, on solids at low temperatures, starts with discussions of phonons and electrons, which greatly augment material covered in elementary books on solid-state physics. The authors then proceed to consider certain types of spin systems such as paramagnets, spin glasses, and systems exhibiting nuclear magnetic ordering. They even provide a section on negative spin temperatures. Some of the topics are important parts of what might be called classical low-temperature physics that are not generally included in conventional texts on solid-state or statistical physics.

Tunneling systems, the area of the authors' research, is usually not treated in as much detail in other contemporary texts. The topic involves a number of phenomena that are not yet fully explained, especially in the case of disordered systems. The discussion could have included additional material on electrical transport phenomena because they are an important part of contemporary research.

The treatment of superconductivity provides an excellent introduction to the phenomenology and includes accessible coverage of the Bardeen-Cooper-Schrieffer theory and macroscopic quantum effects. The chapter is not a substitute for any of the textbooks specific to superconductivity, such as Michael Tinkham's *Introduction to Superconductivity*, (McGraw-Hill, 1975), but it is adequate for someone working in another area or using such superconducting devices as SQUIDs, superconducting quantum interference devices. The section also contains brief discussions of some contemporary superconducting materials such as organic superconductors, the interplay of magnetism and superconductivity, heavy fermions, and high- T_c materials.

The final part of the book, on refrigeration and thermometry, was a delight to read. It clearly explains the principles of various commonly used techniques without going into too much technical detail. Chapters offer references to satisfy readers interested in more information.

In some ways, reading *Low-Temperature Physics* was a trip down memory lane because the book treats well the classical topics of the field of low-temperature physics, and it does an excellent job in about 550 pages. To a large extent, the subjects discussed are mature; many other topics could have been included or treated more extensively to give the book a more contemporary flavor. For example, the authors could have mentioned the physics of systems of reduced dimensions, such as those that manifest the integer and fractional quantum Hall effects. Also, the treatment of high-temperature superconductors and strongly correlated electron systems only scratches the surface of subjects that are the focus of intense work in the contemporary research environment. Despite such shortcomings, much is to be learned from Enss and Hunklinger's book. And students who read *Low-Temperature Physics* will benefit from it.

Allen Goldman
*University of Minnesota
 Minneapolis*

The Equation That Couldn't Be Solved

How Mathematical Genius Discovered the Language of Symmetry

Mario Livio
Simon & Schuster, New York, 2005.
\$26.95 (353 pp.).
ISBN 0-7432-5820-7

Hiding in the Mirror

The Mysterious Allure of Extra Dimensions, from Plato to String Theory and Beyond

Lawrence M. Krauss
Viking, New York, 2005. \$24.95
(276 pp.). ISBN 0-670-03395-2

In hindsight one could judge these books by their covers. With its parchment-like background, multiple typefaces, butterfly photograph, and sprawling layout, Mario Livio's *The Equation That Couldn't Be Solved: How Mathematical Genius Discovered the Language of Symmetry* promises a richly detailed story linking life, history, and mathematics. Lawrence Krauss's *Hiding in the Mirror: The Mysterious Allure of Extra Dimensions, from Plato to String Theory and Beyond*, with its geometric graphics, single visual focal point, and subtle literary allusion, hints at the more streamlined story and argument within.