offers a number of improvements that have been suggested over the years. Among those he favors, as do I, are the use of structured questionnaires to attempt to quantify and standardize recommendations, the involving of authors in the refereeing process, the establishment of a right of appeal for authors and the development of uniform guidelines for manuscript review. Among the ones he rejects, as do I, are increasing the number of reviewers, eliminating reviewer anonymity and reviewing according to a double-blind procedure (that is, concealing the author's as well as the referee's identity). Except for the appeals process, I believe that all American Institute of Physics journals and certainly all APS journals follow his favored suggestions and do not follow the ones he does not favor, although APS does permit double-blind reviewing at the request of the author.

I recommend this book for anyone interested in how the often maligned but extraordinarily survivable peer review process works.

BENJAMIN BEDERSON
New York University
New York, New York

Experimental Low Temperature Physics

Anthony Kent
AIP, New York, 1993. 212 pp.
$55.00 hc ISBN 1-56396-030-3

In *Experimental Low Temperature Physics*, Anthony Kent has written a useful, uncomplicated and descriptive book that, in his words, "concentrates on the methods used to achieve low temperatures in the laboratory." Before deciding to buy this book, one should understand its goal: It is not a heavily referenced compendium of techniques for the specialist, nor is it a detailed discussion of the physics for advanced graduate students. Rather, the book lives up to the claim made in the preface that it is "an uncomplicated introduction to experimental aspects of low-temperature physics . . . at a level that might be of use to an undergraduate-project student or a first-year research student. . . ." Thus, the book will be of primary use to students who have a substantial background in undergraduate-level physics and are, for example, encountering the use of low-temperature techniques in the advanced laboratory for the first time. The book will also be of some use to graduate students who are just beginning thesis work in an area that employs some of the techniques of experimental low-temperature physics.

About half of the book is devoted to an adequate discussion of the techniques used to reach low temperatures (from below 1 mK up to 300 K) and the various methods of thermometry used to measure temperature. The reader is prepared for this by an initial review of thermodynamics and the properties of solids and liquid helium at low temperature; this review includes a discussion of superconductivity. The material on techniques is sensibly broken into separate chapters for three ranges of temperature: 1–300 K, which includes information on cryostats and helium liquefaction; 1 mK–1 K, which deals primarily with ^{3}He and dilution refrigeration; and temperatures below 1 mK, which concentrates on demagnetization.

The final chapter, "Experimental Techniques, Hints and Tips," provides a useful discussion of vacuum and pumping calculations but is thin on nitty-gritty "tips and hints" and the sorts of topical but detailed tricks of the trade available elsewhere—in, for example, *Experimental Techniques in Condensed Matter Physics at Low Temperatures* by Robert C. Richardson and Eric N. Smith (Addison-Wesley, 1988).

The book has several strengths, including numerous useful illustrations, a good summary of conductivity and specific heat, a nice discussion of nuclear cooling and a significant discussion of thermometry. There is also a nice discussion of "What is low temperature?" and an appendix that gives an introduction to the rapidly moving field of laser cooling. A particularly useful feature of the book is the set of quantitative examples that illustrate, among other things, heat flow, thermal equilibration and pumping speed as these topics might be encountered in the design of experimental apparatus.

The book also has a few frustrating points. These include the relative paucity of primary references and the absence of significant discussion of some very important techniques, including capacitance gauges, the use of SQUIDS and modern electrical feed-through designs. The paucity of references is partially compensated for by the fact that a number of the references are to books that themselves contain extensive primary references.

This book would be a useful addition to the library of an advanced undergraduate or a beginning laboratory graduate student. In spite of a few limitations, *Experimental Low Temperature Physics* will be quite useful to the community it is intended to serve.

ROBERT B. HALLOCK
University of Massachusetts, Amherst

A First Course in Computational Physics

Paul L. DeVries
Wiley, New York, 1993.
424 pp. $54.95 hc
ISBN 0-471-54869-3

Computational physics—the simulation of physical problems on a computer—is a key ingredient in the everyday professional life of a physicist. There is broad recognition of its central importance and a general consensus that it must be a part of the curriculum for physics majors. But how to teach computational physics? At the very least, the art of computational physics—in contrast to naïve number crunching—is the triad of physics, numerical and applied mathematics and programming. In the (really not so) good old days, when I was in college, these subjects were taught in three different courses offered by three different departments. Naturally, the triad was quite dissonant, and a physics student was lucky if an exercise in applied mathematics had any relation to physics. More important, the student never learned how to write a physics simulation program, how to test it or how to develop any trust in its results. This was the norm until about a decade ago, when Steven Koonin set the standard for teaching computational physics, including the unification of all its aspects, in his landmark book *Computational Physics* (Benjamin-Cummings, 1985), which unified the three aspects of the subject.

Clearly, Paul DeVries favors a different approach. In his *A First Course in Computational Physics*, the emphasis is on the development of the basic numerical tools to do computational physics rather than on computational physics itself. In fact, there is very little physics in the book. However, if you are a freshman in physics or a novice in computational physics and have some command of FORTRAN, the book might provide the starter kit you were always looking for. (From my own experience of nearly a decade of teaching computational physics, I know that there are quite a few students who fall into this category, and they are not all physics freshmen.) To reach those students, DeVries offers some preliminaries concerning good programming, FORTRAN, and graphics, and then takes the reader on a journey through the areas of numerical analysis that physicists are likely to encounter in their everyday lives, including ordinary and partial differential equations, integration, Fourier analysis, interpolation and approximation, and so on.

In every area, the basic and some advanced tools are developed. No special mathematical skills are required, as the author derives the numerical methods, starting methodically from zero (Taylor's expansion, for example) and not skipping any intermediate steps until the desired result is obtained. Having the method in hand, DeVries develops the appropriate piece of computer code, again step by step, with useful accompanying comments about good programming. (I wish my computer-science teacher had followed a similar approach, as this would have saved me and my collaborators quite some time and hassle.) For those who want to experience the small pieces of program, the codes are included on a floppy disk that comes with the book and runs on IBM PC-compatible microcomputers. The book is written in a lively and witty style, which young readers will enjoy. (One doesn't find section headers like "Look, Ma, No Derivatives" or "Fools Rush In . . . " in the typical German *Handbuch*.)

In summary, Paul DeVries's book should be titled *A FIRST COURSE in Computational Physics*, as it provides a useful starter kit containing the tools needed for computational physics. (The advanced kit is already available as William H. Press and coauthors' *Numerical Recipes*, Cambridge, 1986). But it is a starter only; a follow-up, in my opinion, is still needed in order to convey what computational physics is all about: the simulation of physical problems on a computer. For this, of course, we already have Koonin's book or, on a more intermediate level, *Theoretical Physics on the PC* by Erich Schmid and coauthors, (Springer, 1987).

KARLHEINZ LANGANKE
California Institute of Technology
Pasadena, California

Classical Electromagnetic Theory

Jack Vanderlinde
Wiley, New York, 1993.
384 pp. $64.95 hc
ISBN 0-471-57269-1

This book, according to the author's preface, is designed to make a "reasonable transition" between "elementary" texts like David J. Griffiths *Introduction to Electrodynamics* (Prentice-Hall, 1989) and graduate-level texts like J. D. Jackson's *Classical Electrodynamics* (Wiley, 1975). Although its level of presentation does indeed place it somewhere between those two texts, I am not sure there is really a gap that needs bridging. In most undergraduate curriculums, "elementary" means a one-semester course at something like the level of Edward M. Purcell's *Electricity and Magnetism* (McGraw-Hill, 1985); this will be followed by one or two semesters at the level of Griffiths, and the student's next encounter with the subject is in a year's graduate course. Students I know who have followed this pattern have had no particular difficulty, and given the many other demands on undergraduate physics curricula I doubt that many programs can afford the luxury of the additional two semesters for which Vanderlinde's book is intended.

That hesitation aside, the book has two interesting features that set it apart from other advanced undergraduate texts. First, its opening chapters, intended as review, include an attractively parallel treatment of electric and magnetic fields: Chapter 1 discusses fields and potentials and their relations to their sources for both electric and magnetic contexts, with the conceptual similarities between the Biot–Savart law and Coulomb's law being implicitly stressed; chapter 2 continues the parallel in its unified treatment of electric and magnetic multipole expansions. Second, tensor notation—in particular, the permutation symbol and the Einstein summation convention—is used throughout the text to streamline cumbersome vector operations in addition to its more traditional use with the stress tensor and the covariant formulation of relativity. An extensive appendix lays the groundwork. (Throughout the book, vectors are indicated by arrows rather than boldface, giving the text an unnecessarily cluttered appearance.)

In other respects, the content overlaps strongly with that of Griffiths, although roughly one-third of the book is devoted to added or extended topics. Among the latter are a fuller treatment of Laplace and Poisson equation solutions, including conformal mapping and Green's functions; sections on the magnetic scalar potential and magnetic circuits; an expanded treatment of the electrostatics and magnetostatics of linear media; and a chapter on waveguides, including cylindrical guides, cavities and optical fibers. Numerical techniques are mentioned in only one brief subsection. The overall approach is formal, relatively austere and would probably not work well for a first course beyond Purcell; instructors of more advanced students might well consider Vanderlinde's book.

RICHARD NOER
Carleton College
Northfield, Minnesota

Photodissociation Dynamics

Reinhard Schinke
Cambridge U. P., New York, 1993. 417 pp. $89.95 hc
ISBN 0-521-38368-4

A half-collision is simpler than a whole collision. This is a major motivation for fundamental studies of photodissociation dynamics. Nonetheless, the field of half-collisions provides grand challenges to theoretical models of chemical dynamics. The volume under review shows why.

The word that comes closest to describing the overall tone of *Photodissociation Dynamics* is "intimate": the attempt by a theoretical chemical physicist to describe the most intimate details of the interactions of atoms and molecules and the ways in which those interactions control their resulting dynamical behavior in half-collisions. Although Reinhard Schinke is a theorist, the book's mix of theory and experimental results is also intimate, and Schinke has resisted admirably the temptation to insert details of theory for their own sake.

The field of molecular photodissociation has been somewhat of a late bloomer; its full beauty has emerged only upon the flowering of sophisticated laser techniques in the laboratory and powerful approaches for modeling the dynamics on computers. As a consequence, Schinke's emphasis is on recent work: Of the volume's 750 references, more than 80% date from 1980 or later.

A major thrust of modern molecular collision theory has been away from viewing a bimolecular collision as

$$A_i + B_j \rightarrow A_k + B_l$$

where i, j, k and l label quantum states, and toward viewing the collision as

$$A_i + B_j \rightarrow (AB^*)_\alpha \rightarrow A_k + B_l$$

where * denotes an elusive interaction complex, activated complex, transition state or resonance, and α specifies its quantum state. Transition probabilities can then be written as