plied physics. It seems uncertain that it could serve well in that role—perhaps a chemistry student would be more in tune with the general approach.

The book could be characterized as a qualitative account of the electrical properties of solids. There is no coherent theoretical basis to tie together the catalogue of facts or semifacts given. An extreme but nevertheless illustrative case is the temperature-dependence of conduction. Suchet states that ionic conductivity varies as $\exp(-Q/RT)$ while semiconduction varies as $\exp(-E/2kT)$. It is indicated that these "are more or less related to temperature in the same way" because exponential laws occur frequently in physics. Thus the unity of the subject is lost even in cases where one would have thought it inescapable.

One unusual feature of the book is the discussion, again qualitative, of a large number of applications of solid conductors, with tables relevant to these applications. Perhaps this aspect will prove attractive to some readers, though physicists will probably prefer a book such as John McKelvey's *Solid State and Semiconductor Physics* (Harper and Row, 1966), which emphasizes the theoretical background rather than the technical details and can therefore provide a basis for going beyond the applications that are explicitly discussed.

WALTER A. HARRISON
Department of Applied Physics
Stanford University

Practical Quantum Mechanics

S. Flügge
618 pp. Springer-Verlag, New York, 1974. $14.80

As the different branches of physics diverge to an increasing extent, quantum mechanics remains as one unifying element common to all of physics. For this reason, any original exposition of the subject of quantum mechanics is of interest, despite the existence of a number of excellent monographs. Siegfried Flügge, best known as the editor of the *Encyclopedia of Physics*, has provided us with a new look at the subject in his *Practical Quantum Mechanics*, now published as a single volume.

The original German edition, more appropriately entitled *Calculational Techniques in Quantum Mechanics (Rechenmethoden der Quantentheorie)*, appeared many years ago. A completely revised and enlarged edition divided into two volumes appeared in English in 1971, as *Grundlehren der mathematischen Wissenschaften, Vol-*

umes 177 and 178, but at a price that only libraries could afford. The present one-volume paperback edition makes Flügge's work available to a much wider audience.

The subject matter of quantum mechanics is presented as a series of sections called "problems." Each problem is designed to answer a specific question formulated as a one-paragraph statement at the beginning of the section. This technique of exposition is most successful when applied to specific physical examples chosen from atomic, molecular and nuclear physics, particularly in areas to which Flügge himself has made contributions. In these cases, a reader with a reasonably substantial prior knowledge of basic quantum mechanics will see the theory applied in ways not usually described in most textbooks with the possible exception, in some cases, of Landau's and Lifshiftz's two volumes. One has the feeling that Flügge is most interested in problems that have an exact mathematical solution; methods of approximation (particularly the various aspects of perturbation theory) are perhaps less strongly emphasized than one might expect of a book on applied quantum mechanics. What he stresses all along are methods, approaches, techniques, rather than basic ideas, and this is consistent with the objective of Flügge's book.

Unfortunately, the book suffers from a basic flaw that may affect its widespread use, namely the use (or misuse) of the English language. Perhaps the least troublesome aspect of the imperfections of Flügge's English are connected with choices of vocabulary: he frequently employs literal translations of German words not used in the same sense in English, or he substitutes for a standard expression a synonym that does not provoke the same mental association. Thus, first-order changes *stand in the first line,* particles are *included* between walls, signs are *inversed,* the configuration passes from *oblong* to oblate (instead of prolate to oblate), a Hamiltonian is *un*relativistic, a beam has plane-wave *qualities* (instead of properties), particles are *equal* instead of identical, partial differential equations are *factorized* rather than separated, a discussion is *alleviated, dummies* are *exchanged* (meaning that dummy indices are interchanged), an exponential operator is *explained* by its power expansion rather than defined by its power-series expansion, and the author has *fallen in with* the publisher's suggestion. In most cases, the author's meaning is nevertheless clear.

But what are we to make of a section entitled "Solutions Neighbouring Eigenfunctions," which makes no sense in English, but does in German where the adjective *benachbart* is put into its genitive declension, or of the expression

"the muon orbital radius is running to about ½ of it."? As a final example, consider the following sentence: "The relations hold for any linear combination of products consisting of an arbitrary number of p_k's and x_k's, i.e. for any integer functions in these variables, as had to be proved." What he meant to say is "that the relations hold for any linear combination of products of arbitrary integral powers of the p_k's and x_k's, as was to be proved."

An unfortunate consequence of Flügge's idiosynchratic use of English is a lack of clarity in the explanation of concepts that are employed in the solution of problems. It has been said in jest that the international language of science is broken English. Perhaps this medium of communication is less likely to lead to misunderstanding in verbal exchanges, where gestures and foreign words are available, than in a textbook or monograph. At any rate, Springer-Verlag should be urged to hire an English-speaking editor with a background in physics.

With the reservation just expressed, Flügge's book is a useful addition to the literature of applied quantum mechanics and should be of interest to graduate students at an intermediate level, and to many experimenters.

WOLFGANG FRANZEN
Boston University
Boston, Massachusetts

Modern Atomic Physics, Vol. 1: Fundamental Principles; Vol. 2: Quantum Theory and Its Applications

B. Cagnac, J.-C. Pebay-Peyroula
328 pp.; 253 pp. Halsted, New York, 1975.
$16.95; $17.95

Very few atomic physics texts are suitable for courses at the beginning graduate or final-year undergraduate level. This, however, is the level of the two-volume text *Modern Atomic Physics* by Bernard Cagnac and Jean-Claude Pebay-Peyroula, and it is a particular pleasure to see such a book published. The two volumes were initially the two volumes of *Physique Atomique*, by the same two authors, which are frequently used in French universities for a standard one-year course in atomic physics. The translation, by J. S. Deech of the University of Reading, is literal in the sense that the sentence structure is similar. However, the translator has very sensibly given himself the freedom to adjust the language to normal English usage. In all respects, the translation is admirable.

The two authors are well known for their research work in atomic physics: