to speech and radar signal processing.

Both books were written by the right pairs of individuals. Oppenheim and Schafer are professors of Electrical Engineering (at MIT and Georgia Tech, respectively), and the pedagogical touch in their book is just right. Rabiner and Gold are industrial research scientists (at Bell Labs and Lincoln Lab, respectively), and the practical problems of implementation are appropriately emphasized. All four authors are well known and widely respected for their research contributions to the field of digital signal processing.

The increased usage of digital computers and digital components in laboratory equipment appears to imply that many experimental scientists are going to find themselves confronting the problems of digital signal processing. These two books should form the basic library for anyone faced with such problems: Oppenheim and Schafer for the basic concepts and theory, and Rabiner and Gold for practical implementations and advanced concepts.

* * *

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Angular Momentum Theory for Diatomic Molecules

B. R. Judd
238 pp. Academic, New York, 1975. $22.50

This book represents a rather successful attempt to introduce to molecular spectroscopists the extensive tensorial formalism developed historically for treating angular-momentum problems in atoms. Brian Judd has been an active research worker for some years in applying tensorial methods to atomic problems, and his thorough understanding of his own field evidently lies at the root of the particularly clear writing and the careful choice of a surprisingly large range of examples of significant interest to the molecular spectroscopist. Examples discussed include: the rigid rotator, Friedrich Hund's coupling cases in a $^2\Phi$ state, the electronic structure of the hydrogen molecular ion, the fine-structure Hamiltonian for the hydrogen molecule in a $^3\Pi_u$ state, nuclear quadrupole splittings in a $^3\Pi_{0u}$ state of the iodine molecule, Λ-type doubling in a $^3\Pi$ state, Stark and Zeeman effects, diamagnetic shielding, and others.

The book is skillfully pedagogical. Readers with no previous exposure to the subject can clearly benefit from the text, especially since the first chapter is devoted to such topics as rotation matrices, spherical tensors, the Wigner–Eckart theorem, and 3-j, 6-j and 9-j symbols. Significant benefits for the previously unexposed will undoubtedly require, however, some effort directed toward solving the problems at the end of each chapter.

Readers with previous knowledge of the subject will be delighted by the detailed discussions of the examples chosen, and by the up-to-date and extensive references. Some familiarity with group theory is supposed. In fact, readers without a good understanding of the continuous rotation group in three dimensions may have difficulty with the discussions of the continuous rotation group in four dimensions, which play a significant role in treating various topics throughout the book.

This reviewer's only criticism of the volume is perhaps more in the nature of a warning. Because tensorial notation is so compact, so powerful, and so widely applicable, it is often possible to derive formally admissible but physically incorrect results, primarily as a result of paying insufficient attention to the connection between the physics of the situation and the mathematics that is to mirror this physics. In the hands of an experienced worker no such misfortune need arise. But Judd's clear exposé may tempt others, after acquiring only a superficial knowledge, to venture forth on their own in uncharted waters. Such voyages are not uniformly successful.

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Course of Theoretical Physics, Volume 4: Relativistic Quantum Theory

V. B. Berestetskii (part one only), **E. M. Lifshitz, L. P. Pitaevskii**
616 pp. Addison-Wesley, Reading, Mass., 1971 (part one), 1973 (part two). $16.00 (part one), $12.50 (part two)

These books will sell well because they constitute volume 4 in the "Landau–Lifshitz" course in theoretical physics. Owners of volumes 1, 2, 3, 5, 6, and so on will not find it possible to resist putting volume 4 in its proper place.

Unfortunately, the Landau–Lifshitz series is not the proper place for these books. I suppose this is partly because of the absence of Landau, but even more because of the nature of the subject matter. The authors observe

that relativistic quantum mechanics is not a settled theory and that as a result they cannot hope to present the unified and elegant approach that characterizes the exposition in the other volumes; their solution is to stick to the "safe" topics, namely weak and strong interactions at a phenomenological level and quantum electrodynamics.

Part I covers a great variety of physical phenomena in which relativity and quantum mechanics can be combined at the present level of theoretical understanding to give realistic answers. Notably absent are formal developments for their own sake. Part II deals with radiative corrections in electrodynamics and with the more successful phenomenologies of other interactions—SU(3), for example. If there is any systematic distinction to be made between the two parts, it is that while most factual statements in both will probably be regarded as true 50 years from now, the justification for those in part II will have suffered greater change by that time.

Both Landau and Dirac have displayed the ability to be brief, mysterious and profound. Dirac has the additional virtue (or vice) that it is only after reading him that one realizes just how much he has slipped past one. Landau was not so smooth and in reading his arguments one feels the gaps. These gaps, though—things that were "obvious" to Landau—were generally profound and occasionally the subject of PhD theses. The present volumes keep the Landau tradition in providing gaps; now, however, such omissions can mostly be put down to bad pedagogy.

For example, consider the problem of the non-localizability of the photon: The authors relate this to the fact that a wave excitation cannot be localized to better than one wavelength. Why a nonrelativistic electron is more localizable than a photon is not at all evident from their discussion. Their mathematical treatment of the same subject makes the whole thing seem accidental. In fact there is no reason to be mysterious, since the localizability *problems* of massless particles are among the better understood of relativistic quantum phenomena (they have to do with the constraints, like $\nabla \cdot \mathbf{B} = 0$, needed to eliminate unwanted helicity states . . . should I say "obviously"?).

At large distances neutral atoms do not have the r^{-6} interaction energy of van der Waals attraction; instead, the potential goes like r^{-7}. Here is a relativistic effect—a tame one, perhaps, because it does not need all the machinery of quantum electrodynamics, but one which is of some interest and for which I had never gone through the proof. I confess that after studying the relevant section, I still have no intuition for why r^{-7} appears. The calculation is notably


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By **Jerry S. Faughan** and **Karl F. Kuhn**, both of Eastern Kentucky University, Richmond. About 445 pp., 505 ill. Just Ready.

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untransparent: infinities (having nothing to do with renormalization) are tossed about with abandon and at the end an r^{-7} results. No qualitative comparison is made with the shorter-distance behavior. Something must be happening to give time averages of the induced dipole moments, but if the reader wants to find out more on this subject he must look elsewhere.

Part II is much the same. Renormalization, always difficult to present, does not fare well here either. For K-meson decay the mass matrix $(M - i\Gamma)$, justified only by the Wigner–Weisskopf analysis, is presented without even the usual "obviously." If perchance the student should realize that this is one of today's outstanding unsolved problems, there is no hint of where to turn for further reference.

Isn't there anything good to say about these books? As I read them, and as the nature of this review began to be evident, the foregoing question oppressed me more and more. Perhaps this negative report arises from having hoped for too much. The multitude of calculations of relativistic effects in all sorts of systems from atoms to elementary particles can provide a valuable source of information; many of these topics are not covered elsewhere except in the original literature. Somehow, though, relegating a book in the Landau–Lifshitz series to the status of a handbook is so demoralizing that the secondary merits of the volume (when measured on the scale of ordinary books) are inadequate consolation.

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Science Policy Making in the United States and the Batavia Accelerator

A. G. Jachim
208 pp. Southern Illinois U. P., Carbondale, 1975. $8.95

This book is concerned with the politics of Gigabuck Physics. It is described as a "case study of the allocation of a 200-BeV accelerator to Weston, Illinois, set in a social systems framework by a political scientist." The book attempts to use the Weston decision as a basis for examining science-policy formation in the United States. The author is a faculty member at the State University of New York at Plattsburgh; he had previous experience with science policy as a research assistant at the National Academy of Sciences.

The first three chapters of the book describe the historical and organizational background necessary for under-