The chapter on the many-body theory is good in the sense that it goes carefully through the many calculations done in the 1960s, and the serious student will appreciate the details of the different approximate methods by different groups. But an overview is lacking. For example, how viable is the approximation of setting the effective mass of the particles equal to one and of the holes considerably less than one? We are not told. There is, though, a good critique of the Scott–Moszkowski method. Near the end of this chapter the Kuo–Brown matrix elements are mentioned, but not in enough detail for the student to understand what they are all about. It would have been nice to show an example of a two-particle spectrum—for example, Po^{210}—in which the spectrum is collapsed if the "bare" G matrix is used, but nicely spread out when the core polarization corrections are included.

Theory of Nuclear Structure has several strengths, too. The formalisms are presented in considerable detail and the formulas are written clearly and accurately. This book is extremely useful to a prospective PhD student in nuclear theory faced with the problem of learning a great deal of material in a short period of time, just to get to the point where he can begin his thesis. The material presented is basic and important. Some topics are included that one does not often see elsewhere. I was happy to see discussions of semi-infinite nuclear matter in the chapter on many-body theory, and of approximate methods of angular-momentum projection in the chapter on microscopic theory of nuclear structure. The sections on pairing and the Hartree–Fock approximation are good, and concerning the latter, it is nice to see an extensive discussion of the work of Levinson and coworkers in the s–d shell.

I would not hesitate to recommend this book to prospective PhD students in nuclear physics. I would probably use this book as a reference text if I were to teach a course in nuclear physics in the near future. But I would have to supplement the text with concrete examples and updates from the journals.

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Relativity and Engineering

J. Van Bladel
402 pp. Springer-Verlag, New York, 1984. $29.00

This textbook on relativity is a "no-nonsense engineering" approach to the subject. And, I might add, it is a delight to have such a treatment of what others have considered philosophical (and hence treated in a wordy manner). Van Bladel gives a direct, straightforward analysis of the many complicated and subtle effects of relativity, such as the visual appearance of objects moving at high speed.

The engineering approach is even carried to the extent of not giving a derivation of the Lorentz transformation! However, the reader can find all of the physics required for such a derivation in the book. Instead, Van Bladel devotes space to a careful treatment of many important general phenomena, such as electromagnetism in moving media or Maxwell's equations in a gravitational field, and to a large number of specific examples such as the scattering and reflection of radiation by a moving body, the Cherenkov effect, magnetic levitation, radiation of a moving dipole and so on. All these examples are treated with remarkable clarity and physical insight.

Particularly appealing, and a direct result of the author's great depth and range of knowledge, are the extensive references to the literature (complete with titles, which I find most useful). These references are often to articles in pedagogical journals and thus provide a fine way for the student to approach the literature.

I highly recommend the book for students and practicing physicists. This book is an excellent complement to others and would be my choice if I had to select, either as a text or a reference book, only one book on relativity.

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Direct Nuclear Reactions

Norman K. Glendenning
378 pp., Academic, New York, 1983. $62.00

A direct nuclear reaction is one that involves the excitation of simple nuclear degrees of freedom. Such reactions have been very important over the last 30 years for obtaining detailed information about the structure of the atomic nucleus. Theoretical research in this area continues with extensions to high energies, large interacting systems and quark degrees of freedom.

Direct Nuclear Reactions describes the theoretical framework within which direct reactions are analyzed today and includes considerable mathematical detail. In the early chapters the book deals carefully with multichannel scattering theory and the foundations of an optical potential for elastic scattering. This preparation is important because the wavefunctions calculated in an optical potential model are used in the distorted-wave Born approximation, which is the primary calculational tool for direct reactions.

The central part of the book discusses applications of the DWBA to inelastic scattering and particle-transfer reactions. The extension of the first-order theory to a treatment using coupled channels follows in a natural way. Norman Glendenning presents this material in a clear and concise fashion. A minor criticism I have concerns notation: Glendenning prefers the seldom used "*C* form" for the vector-coupling coefficients, although he occasionally switches to $3j$ symbols. I believe that a review text such as this should employ a standard convention, which in this case is the abbreviated Condon–Shortley, that is, $\langle j_1 j_2 m_1 m_2 | JM \rangle$, notation.

The final half of the book applies the direct-reaction formalism to specific cases where details of the nuclear structure are spelled out as needed. Of particular interest are the treatments of two-nucleon transfer and heavy-ion reactions. Glendenning is an expert on both of these subjects and has contributed to many of the calculations described in this book. He describes the state of the art as of about 1980. It is inevitable that such a cutoff would eliminate the discussion of topics currently in vogue; in particular, spin-dependent phenomena and relativistic nuclear models are given very little attention.

Glendenning has compiled an extensive bibliography with over 300 references. In glancing over these references I spotted several misspelt names—I hope this error rate did not propagate to the volume and page numbers.

It is natural to compare this book to one with the same title and publication date by G. R. Satchler (Oxford U.P.). Satchler's book has twice the number of pages (and has more words or equations per page as well) and provides a thorough presentation of the formulation and techniques of direct nuclear reactions. Glendenning's book is more concerned with application to nuclear-reaction models, especially those in use in heavy-ion physics. Specialists in this field will find both books useful. Other nuclear physicists may be satisfied with library access.

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new books

Geophysics and Planetary Science

Lightning. M. A. Uman. 298 pp. Dover, New York, 1984. $7.95. *Reprint*

Student Texts and Popularizations

The Physics Disk. S. Simon. 74 pp. Prentice-Hall, Englewood Cliffs, N.J., 1985. $29.50. *Educational computer program*