

roduction to Particle Physics by Roland Omnès.

The title is a little misleading because the particles considered include all members of the SU(3) multiplets of the pion and nucleon, as well as meson and baryon resonances. Presumably, the title was chosen because most of the available experimental data concerns pions and nucleons. Electromagnetic and weak interactions are included in so far as they are related to strong interactions. For example, there are chapters on photomeson production from nucleons and current algebra. The most notable omission is nucleon-nucleon scattering—the book would be more useful if a chapter on this topic were included. An advantage of this book is the inclusion of such modern concepts as duality, the Veneziano model, inclusive reactions and partons. I hope the authors keep the book up-to-date by revising it every few years. A sizable and useful bibliography is provided. No page numbers are given in most of the references to other books, but this is a minor flaw.

The Pion-Nucleon System could be used as a text for a graduate course in strong-interaction physics. The discussions of basic scattering theory, Regge-pole theory, resonance theory, SU(2) and SU(3) symmetries, and duality can be understood by graduate students with few necessary references to other works. On the other hand, the treatment is much more advanced for some topics, such as the derivation of pion-nucleon dispersion relations, the application of Regge-pole theory to pion-nucleon scattering, and the discussion of current algebra. To some extent this is unavoidable, since the authors do not wish to double the size of the book by teaching field theory. However, the chapter on current algebra is not as clear as the treatment in some other books, such as *Current Algebras*, by Stephen L. Adler and Roger F. Dashen.

Both the authors have had much experience in writing about particle physics. Moorhouse has written or collaborated on many excellent research papers in which various theoretical concepts of particle physics are applied to experimental data. Bransden has worked on similar papers, and has also written a well known review article on the K-meson-nucleon system for *High Energy Physics*, Vol. III, (E. H. S. Burhop, ed.).

If a graduate student is in search of one book to use as a basis for learning the present-day status of the physics of meson-baryon interactions, this is the best available book for him.

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Statistical Mechanics, Kinetic Theory, and Stochastic Processes

C. V. Heer
602 pp. Academic, New York, 1972.
\$18.50

Statistical physics is a subject that has fascinated scientists for well over a century. Although some of it involves questions of considerable subtlety, much of the subject can be developed apart from foundational difficulties and advanced mathematical tech-

niques, and can be introduced early in the curriculum. The subject matter ranges widely—from the free-molecule gas to the foundations of classical thermodynamics.

Therein lies a difficulty: it is all too easy for a textbook on statistical physics to end up as a hodgepodge of apparently disconnected results, with very little suggestion of the coherence of the subject. Even ignoring such monstrosities, we find a great diversity of approaches, which can conveniently be classified according to their nearness to one of two extremes. At one extreme we find an emphasis on en-

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semble theory and thermodynamic reasoning. At its best, this approach brings out the power and generality of the subject; at its worst, it amounts to badly-done thermodynamics. At the other extreme we find the emphasis on purely statistical calculations. At its best, this approach provides physical insight and the ability to analyze new problems; at its worst, it leaves the student powerless to deal with anything other than an ideal gas and a perfect crystal.

Where, then, does the present book lie in such a spectrum? In any case we can expect a competent job from C. V. Heer, who is well known for his contributions in low-temperature physics. The title gives a pretty good clue, which is confirmed by the first sentence of the jacket blurb, namely, "This is a statistical mechanics text for today." Clearly this text inclines toward the statistical end and away from the thermodynamic end. It consists of three roughly equal parts, corresponding respectively to kinetic theory, statistical thermodynamics, and stochastic processes. The first part starts with the free-molecule gas and the photon gas, followed by a chapter on the statistics of general independent processes. Binary collisions are then introduced and the kinetic-theory part ends with a chapter on general transport phenomena via the Boltzmann equation.

An abrupt discontinuity of viewpoint initiates the second part, which encompasses equilibrium statistical mechanics. Most of the conventional topics are included, plus a few extra ones. Since this material is now so traditional, it is harder for Heer to introduce much novelty. The thermodynamic part is weaker than in some other current texts, and it is not always clear to what extent any particular result depends on thermodynamics alone (that is, is model-independent) and to what extent it depends on details of the model used.

The third part, on stochastic processes, is in many ways the best part of the book. I know of no other place where this material appears in such a readily available form.

This book could serve as a textbook for an undergraduate course, by careful selection of the chapters to be covered. It could also serve as a textbook for a rather thorough graduate course. Problems are scattered throughout the text. These are helpful, but I suspect most teachers will wish there were more.

All in all, it is hard to judge a textbook fairly without using it at least once in teaching a course, which I haven't done. Nevertheless, my feeling is that this is a good book, containing many gems, but that it won't suit the

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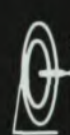
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tastes of many teachers, especially those favoring the thermodynamical approach. My advice to anyone trying to decide on a textbook for a statistical-physics course is to examine this one carefully: even if you decide not to adopt it as an official text, you will find much that is useful.

E. A. MASON

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Rare Earth Permanent Magnets

E. A. Nesbitt, J. H. Wernick

199 pp., Academic, New York, 1973.
\$12.50

A significant improvement in permanent magnets has occurred during the past several years with the development of rare-earth-cobalt intermetallic compounds. These materials offer higher-energy products and certain simplifications in preparation over Alnico. *Rare Earth Permanent Magnets* serves a timely need in bringing together the considerable research that has been done on these materials. Both E. A. Nesbitt and J. H. Wernick have been engaged for many years in research on the magnetic properties of materials at the Bell Laboratories. Portions of the work presented in this book originated with them. We are fortunate to have such well qualified authors.

The book is written in the style of R. M. Bozorth's *Ferromagnetism*, giving detailed information on the metallurgy of the rare-earth compounds and extensive data of their physical and magnetic properties. This is accompanied by simple explanations—elementary aspects of magnetism are developed first to provide an understanding of the subject of permanent magnetism. I feel, however, this first chapter of the book is too brief. For example, the discussion of the concept of demagnetization, so important to an understanding of permanent magnets, is not adequate. The remainder of the book is materials oriented, treating first the rare-earth elements followed by compound formation. A detailed account of cast-permanent magnets of the cobalt-copper-samarium and cobalt-copper-cerium systems is given. Preparation methods by powder metallurgy are discussed. In the last chapter comparisons are made between various types of permanent-magnet materials.

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