ble that this writing just predates the exciting device-oriented work of Stephen Harris who demonstrated efficient nonlinear frequency tripling of light, although this involves $X^{(3)}$.

Technically the book contains excellent illustrations, (I would have liked even more), has a weak index, the normal number of new-book misprints, including a rather important error indicating that symmetry class $\bar{4}2m$ crystals (including KDP) have the same pattern of nonlinear susceptibility tensor coefficients as class $\bar{4}3m$. (Namely, all nonzero coefficients are equal.) Nonetheless, I recommend the book highly to researchers in the above mentioned nonlinear device areas.

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Molecular Structure and Thermodynamics

F. P. Incropera
331 pp. Wiley, New York, 1974. $16.95.

Because the language of science is now almost exclusively based on atoms and molecules, the education of engineers, who apply science to practical problems, should include a good understanding of the molecular structure of matter. To accomplish this goal at Purdue University, where he is professor of mechanical engineering, Frank P. Incropera has regularly offered a one-semester course in molecular structure and statistical thermodynamics. This text is the basis of that course. It presumes a previous course in thermodynamics, but would duplicate any physical-chemistry course that stressed quantum mechanics and molecular structure.

The book sets out to treat an enormous amount of material in a short space. There are 150 pages devoted to quantum mechanics and an equal number for statistical thermodynamics, all in all covering most of the material of typical one-term courses on those disciplines. The presentation throughout is terse, demanding, clearly written and conventional in content. Questions at the ends of chapters encourage students to think over what they have read; Incropera also provides problem sets for each chapter. The statistical mechanics is presented via the Lagrange multiplier technique, which gives the right answers for ideal gases. This technique involves proofs that appear as complicated as those of the more vesatile ensemble theory, but the author claims it is pedagogically advantageous.

The text appears generally accurate. It mistakenly asserts that the partition function Q_N for a gas of N non-interacting fermions is precisely $q^N/N!$, where q is the particle partition function. It perpetuates the unfortunate feature of many texts in its figures of depicting the repulsive cores of interatomic and intermolecular potentials as being far too small relative to the widths of the attractive wells. It goes beyond this to stress the unrealistic nature of the hard-sphere potential, yet hard spheres are in fact the zeroth-order potential of choice for perturbation theories of the liquid state. Some readers will find unacceptable the book's use of the gas constant R defined on the basis of a unit mass, thus varying from one substance to another, rather than on the basis of a mole of material.

I am a bit uncertain as to what group of students would especially suit this text. However, if the book actually contributes to a better understanding of the molecular structure of matter among the engineering students for which it was written, it will have been a success.

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High Energy Hadron Physics

M. L. Perl
562 pp. Wiley, New York, 1974. $21.95

This book makes a serious attempt to cover the main aspects of hadron physics at high energies. (By high energy Martin Perl means more than a few GeV where resonances are no longer important.) Topics discussed extensively include the optical model, the S-matrix, cross sections, two-body reactions, inelastic interactions, helicity formalism, and the one-particle exchange model. Regge theory, photon–hadron and lepton–hadron interactions are also treated along with brief discussions of SU_3, quarks and the parton model. A single, very short chapter is devoted to a discussion of symmetry principles. On those topics that Perl gives extensive treatment, he derives the important formulas or at least outlines the derivation, whereas for the topics given only brief discussion, he merely writes down the many results.

Because we do not possess a profound understanding of strong interactions, the many experimental phenomena are often each described by an array of models. To attempt to treat all of these models on an equal basis would be confusing. Perl makes a creditable effort to delineate the main patterns by emphasizing what he calls "recurrent themes." He indicates how certain

basic ideas occur again and again in different guises. His highly intuitive approach will appeal more to experimentalists than to theorists.

While I felt that there should have been more discussion of the parton model and certainly a more extensive description of symmetry principles, Perl does cover his chosen topics clearly. A study of this text will give the careful reader a balanced understanding of the current state of high-energy strong-interaction physics. I recommend it especially for advanced graduate and post-graduate students. The casual reader must be warned, however, that there is a regrettably large number of errors, most of them typographical.

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Nuclear Electronics

P. W. Nicholson
388 pp. Wiley, New York, 1974. $24.95

This book spans most areas of interest in the nuclear electronics and detection field. In most cases the treatment is on a conceptual level (similar to *Nuclear Radiation Detection* by W. J. Price) which is very beneficial for the reader who is not well acquainted with the principles involved. However, P. W. Nicholson emphasizes modern techniques used in electronics, where Price emphasized detector and detection techniques prior to 1958.

Although there is very little attempt to cover the detailed theory of various concepts, the author provides a very well selected list of references that allow the reader to pursue the various subjects to any desired extent.

Two of the chapters, "Resolution in Spectroscopy Systems," and "Amplifiers," appear to have the most appropriate treatment. In these chapters, the author covers such subjects as the statistical nature of noise by defining the three basic types of noise, the equivalent noise charge, optimum signal-to-noise ratio (including the optimum cusp pulse shaping), semi-Gaussian pulse shaping and many other subjects that are of vital interest to the nuclear-physics experimenter.

Nicholson discusses the many methods of time derivation in nuclear experiments, including fast–slow coincidence circuits, limiter-type pick-offs, leading-edge triggers, zero-crossing discriminators and constant fraction of pulse height pick-offs. Instead of attempting to explain the performance and limitations of such techniques in detail, he simply quotes results of leading papers on the specific subjects. In the "Timing Circuits" chapter alone, the author uses 85 references to establish the major points.

The last two chapters of the book cover the subjects of multichannel analyzers and computer analysis. On the subject of MCA's, the author emphasizes the various methods of analog-to-digital conversion, such as the Wilkinson, successive approximation and dual-ramp types. There is very little discussion on the subject of memories or on various methods of displaying the data.

In summary, this book is a significant contribution for those interested in obtaining a broad understanding of the various nuclear electronics concept. With the extensive list of specific references, the reader can probe to any depth that he desires.

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Elementary Particles and Fields

Nuclear and Particle Physics A: Background and Symmetries. H. Frauenfelder, E. M. Henley. 573 pp. W. A. Benjamin Advanced Book Program, Reading, Mass., 1975. $21.50 hardcover, $13.50 paperback

Atoms and Molecules

Atomic Inner-Shell Processes, Vol. 2: Experimental Approaches and Applications. B. Crasemann, ed. 220 pp. Academic, New York, 1975. $27.50

Atomic Physics. J. C. Willmott. 357 pp. Wiley, New York, 1975. $22.00

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Excited States, Vol. 2. E. C. Lim, ed. 403 pp. Academic, New York, 1975. $29.50

Higher Excited States of Polyatomic Molecules, Vol. 2. M. B. Robin. 418 pp. Academic, New York, 1975. $39.50

Seltenerdelemente, Teil B3: Sc, Y, La und Lanthanide. (Gmelin Handbuch der Anorganischen Chemie.) G. Kirschenstein, ed. 344 pp. Springer-Verlag, New York, 1974. $186.50

Tables of Spectral-Line Intensities, 2nd ed., Part 1: Arranged by Elements; Part 2: Arranged by Wavelengths. (NBS Monograph 145). W. F. Meggers, C. H. Corliss, B. F. Scribner. 387 pp., 213 pp. National Bureau of Standards, Washington, D.C., 1975. (Available from the US Government Printing Office, Washington, D.C. 20402 as Catalog No. C13.44:145/I) Part 1, $8.55; part 2, $6.80

Vibrational Spectra and Structure, Vol. 3. J. R. Durig, ed. 328 pp. Marcel Dekker, New York, 1975. $29.75

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