Martin J. Buerger, wrote a very fine book on moving crystal methods (*X-ray Crystallography,* published in 1942). He has also written extensively on the 230 space groups, into which every crystal must fall (*Elementary Crystallography,* 1956), and is the inventor of the precession camera, a very fine instrument.

The reason given is the simplicity of the instrumentation, and it seems that the other two authors, José Luis Amorós and Marisa Canut de Amorós have been using the Laue method and writing about it for several years. They are the authors of the book *Molecular Crystals: Their Transforms and Diffuse Scattering,* (1968) and also of a previous book on the same subject written in Spanish (1965). They emphasize the use of the Laue method to examine a single crystal for symmetry—a thing more difficult to do with powder methods.

This book is a fairly thorough treatment of the Laue method of crystal examination. It treats the geometry of stereographic projection, gnomonic projection and stereognomonic projection, giving equations relating these projections to directions in space. It also briefly describes the taking of Laue photographs on flat film, cylindrical film, and on double cones surrounding the crystal.

Charts such as the Wulff and Greninger nets and Bernal charts assist in the indexing of the Laue spots as shown by the authors, and they also explain the scales used by Wykoff.

Nowadays the Laue method is used mainly to assist in finding symmetry directions in crystals, and Polaroid cameras are used to save time and the necessity of maintaining a photographic dark room. The authors do not mention this fact. Either wet photography or "Polaroid" would appear equally effective in examining symmetry or in detecting crystal imperfections.

The book gives a lot of the history of x-ray crystallography and would appear to be the last word on the Laue method.

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Applied Nonlinear Optics

F. Zernike, J. E. Midwinter
199 pp. Wiley, New York, 1973. $14.95

This book has been written for physicists and engineers who are interested in device applications of nonlinear optics. Appropriately enough, the authors do not undertake to cover the whole field of nonlinear optics, but restrict themselves to quadratic electronic nonlinearities, for example, effects determined only by the first two terms in the polarizability

$$P = X^{(1)}E + X^{(2)}E^2 + X^{(3)}E^3 + \dots$$

In addition, the authors have elected to deal only superficially with applications to the modulation of light (acousto-optic and electro-optic effects).

The strength of the book lies in its wealth of practical information about second-harmonic generation, parametric upconversion and optical parametric amplification and oscillation. These are important new techniques for generating new and variable frequencies of light by mixing with a powerful laser beam. I would not recommend it as a text in nonlinear optics, but rather as a reference. This is not to say that it does not do a good job of clarifying many relationships that are necessary to workers in the field.

About the authors, both are well qualified in the field: Frits Zernike has made a number of important fundamental measurements of nonlinear materials parameters, and John Midwinter had done much of the pioneering work in 3-wave interactions at the Royal Radar Establishment and at the Perkin-Elmer Corporation. It is regrettable 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