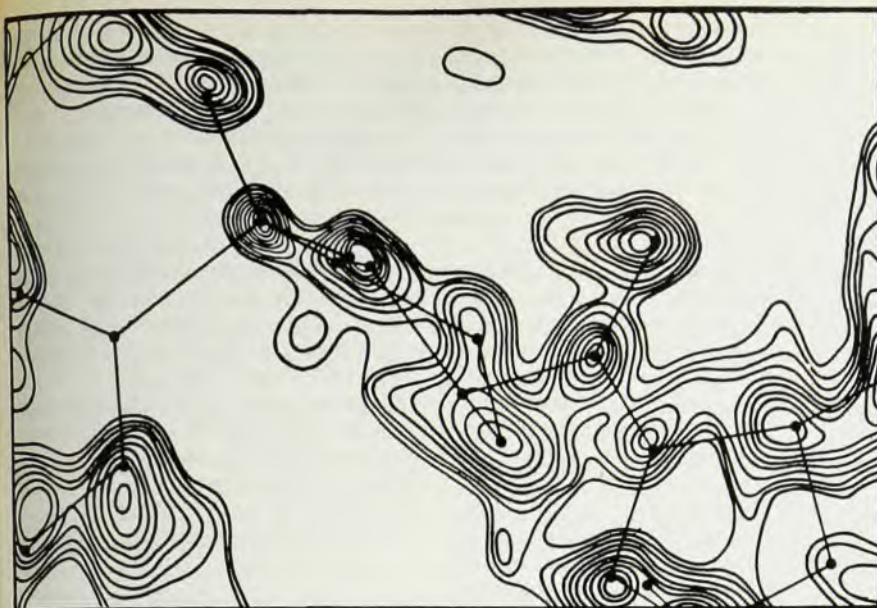




Fourier synthesis of the centrosymmetric projection of tosyl-L-propyl-L-hydroxoprolin monohydrate ($C_{17}H_{24}O_7S$). Illustrated is a weighted sum function carried out geometrically on the Patterson function. From *Fourier Methods in Crystallography*.

chapters the authors develop and discuss Fourier syntheses of various functions related to x-ray diffraction intensities. Their discussion is made particularly clear by the use of convolution principles. This allows the reader to visualize easily the salient features in the maps that result from the several Fourier syntheses.

The authors do not cover the subject of quantitative electron-density maps from accurate diffraction data. On the contrary, the monograph addresses itself to structure determinations by revealing salient peaks around atomic positions through Fourier synthesis. The importance of phase angles is strikingly illustrated in chapter 4. Large errors in the structure-factor amplitude can be tolerated if one only desires the sites of the atoms.

Chapters 6 through 8 develop types of synthesis that are based on partially known structures. This is really a "boot-strap" operation, which in practice has had some success. Again by use of the convolution theorem, the authors set down the expected strength of the several peaks in the Fourier map. Although the β_{gen} synthesis appears to be the method of choice, it does suffer from singularities that can occur in the Fourier coefficients, so that various ad hoc weighting schemes have been invoked. This is probably why β_{gen} syntheses have not been widely used for structure determinations.

The last part of the book, chapters 9 through 13, is an excellent treatment on phasing utilizing isomorphism and anomalous scattering. Ramachandran was one of the early workers in developing these techniques, which have been of value to the protein crystallo-

grapher. A combination of isomorphous replacement data and anomalous dispersion data can lead to a unique solution of the phase problem. The theory of these two techniques is well illustrated with appropriate figures and the algebra is clearly laid out. The use of anomalous dispersion phenomena in analyzing neutron diffraction data is a bonus topic in chapter 13.

The crystallographer devoted to solving natural products, inorganic structures, minerals or organic molecular crystals will probably find a small niche in his Gladstone bag for this monograph. A protein crystallographer, particularly a student, may well find this book an invaluable reference work. The bibliography although not exhaustive, is sufficiently complete and of value to one in search of Fourier phasing methods.

ROBERT F. STEWART
Carnegie-Mellon University

Elementary Particle Theory

By A. D. Martin, T. D. Spearman

527 pp. American Elsevier (North-Holland), New York, 1970. \$27.50

There are two reasons why this is more or less the best textbook available to a novice for learning the concepts and techniques useful in phenomenological high-energy physics. The first is that the authors successfully resist the temptation to quote lots of results without adequate detailed explanation;

New Books

Vacuum Metallurgy

Edited by O. Winkler, Blazers Ltd. for High Vacuum Technique and Thin Films, and R. Bakish, Bakish Materials Corp., New Jersey

This vast undertaking represents the first comprehensive review of vacuum metallurgy, described by specialists in both scientific research and industrial application.

CONTENTS: Thermodynamics and kinetics in vacuum metallurgy. Vacuum engineering. Use of vacuum techniques in extractive metallurgy and refining of metals. Vacuum degassing. Vacuum melting. Determination of the gas content of metals by vacuum degassing methods. Vacuum sintering. Vacuum heat treatment. Joining. Vacuum coating. Effect of high vacuum on some important properties of metals and alloys. Conversion table. Author index. Subject index. 1971, 906 pp., 165 tables, 536 illus., \$85.00

Grain Boundaries and Interfaces

Edited by P. Chaudhari and J. W. Mathews, IBM, Thomas J. Watson Research Center in Yorktown Heights, New York

This book contains the proceedings of an international conference on the structure and properties of grain boundaries and interfaces, at the IBM, Thomas J. Watson Research Center, August 23-25, 1971. Contribution to the conference was by invitation only and the contributors represent the outstanding scientists in the field. Post-paper discussions have been printed in full. 1972, approx. 650 pp., \$48.50

Vacuum Technology

An Introduction

By L. G. Carpenter, Consulting Physicist

CONTENTS: Vacua and vacuum technology. Conductance and pump speed. Vacuum pumps. Measurement of pressure, materials and the design of apparatus. Ultra-high vacuum. Applications of vacuum technology. Appendices. Author index. Subject index. 1970, 144 pp., 16 diagrams, \$9.75

American Elsevier
Publishing Company, Inc.

52 Vanderbilt Avenue
New York, N. Y. 10017

Circle No. 33 on Reader Service Card

Tropel: first in collimator ratings.



Here's how Tropel rates in the three most important collimator criteria.

Quality: first. Tropel collimators are examples of Tropel leadership in optical design and fabrication. Each one is exhaustively tested.

Range of Application: widest. Tropel laser collimators work in the UV, visible or the infrared. Both low and high power applications. 280 series work from 440nm to 1.2 μ m. Transmission is high at 98%. Apertures from 1.5mm to 125mm. 270 series for UV operation from 270nm to 450nm. And for the infrared, there's the 290 series, with quality better than $\lambda/10$.

New developments: a steady flow of them. New air-spaced doublets replace cemented triplets in many models. New apochromatic collimators bring all wavelengths to the same point. Tropel's intensive development program on adjustable collimator mounts. Your specific collimator needs may be outside Tropel's standard model list. With a little modification, and not too much expense, we can supply you with the exact collimator you need. Write or call us.

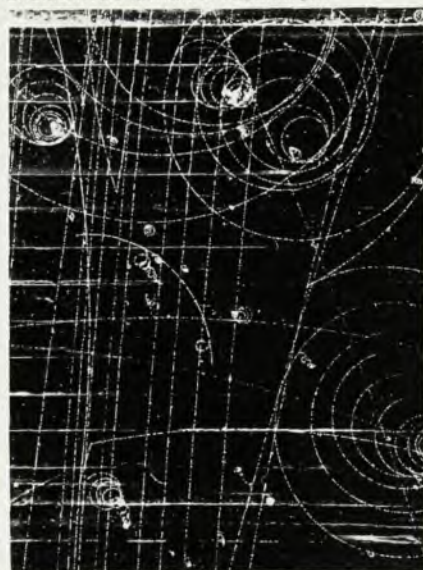
TROPEL, INC.

52 West Avenue,
Fairport, N.Y. 14450
Phone (716) 377-3200

or, to put it the opposite way, they do a good detailed job of motivating and deriving all the results they present. The second is the inclusion of exercises and problems with hints at solutions. It can hardly be emphasized enough that most students only learn a real grasp of the concepts by using them to solve problems.

The main inadequacy of the book is connected with the successes above, and is the reason why the book will generally be of somewhat more value to newcomers than to workers trying to extend themselves a bit—a lot of applications of the ideas to standard situations (with all the results available for instant access) are missing. But one cannot have everything, and I think the authors have chosen properly. The only way out is to combine books, and taking Martin and Spearman together with good books that present a lot of detailed results (for example those by H. Pilkuhn or B. T. Feld) gives a fairly well rounded library.

BROOKHAVEN NATIONAL LABORATORY



Most of the standard tools needed for high-energy hadron physics are presented. The treatment of helicity amplitudes is the most complete and clear one of which I am aware; although for pedagogical purposes it is somewhat spread out through the book making it a bit hard to spot just the result one needs when using the book as a reference. Since our current ideas about interpreting data in hadron physics are most simply phrased in terms of the direct-channel helicity amplitudes, the emphasis on them in the book probably will help it to retain its relevance as a text for some time. At the present time, over two years after the book was completed, the only thing that appears to be a bit out of date is the emphasis on kinematical singulari-

ties of amplitudes, a subject whose interest is inversely proportional to our understanding of it. The treatment of polarizations, density matrices, and the important physics to be learned from the many higher-spin particles around, is still not adequate in this book nor any other.

The treatments of the Lorentz group, symmetry properties and analyticity properties are useful, and the discussion of isospin conventions and phases is very nice. An introduction to formal Regge-pole theory and a glimpse of the stimulating ideas involving finite energy sum rules in πN charge-exchange scattering, and duality, give a well chosen conclusion to the book.

GORDON L. KANE

Rutherford High Energy Laboratory
UK

Theory of Vibrational Spectroscopy

By Derek Steele

226 pp. Saunders, Philadelphia
1971. \$15.00

Any new introductory textbook in a field as active as vibrational spectroscopy has an obvious advantage over earlier, even classic monographs, in that it can emphasize topics that have taken on greater importance as the field has evolved and can ignore others which have not. In the case of vibrational spectroscopy this is a considerable advantage because the earlier introductory texts were written (either in fact or in spirit) before computers became generally accessible and before lasers were even invented.

This new text by Derek Steele is possibly the first written for undergraduate and beginning graduate students that recognizes the impact of these two developments on vibrational spectroscopy. Because laser sources have revolutionized Raman spectroscopy, it is a rapidly expanding field of research today. Steele gives a good outline of the theory of the Raman effect and includes a discussion of the relationship of Raman intensities to chemical-bond properties and of the resonance Raman effect. Steele emphasizes the importance of the computer to all areas of vibrational spectroscopy. Most topics are developed in ways that lead to many of the algorithms used in programming spectroscopic problems.

A less obvious influence of the computer on spectroscopy is found in the reasonably modern discussions of the results of spectroscopic analysis made possible by the computer. These include a description of some of the more important models for the potential functions of molecules that are used to interpret spectroscopic data in terms of