Hopfinger evidently does not really think much of nmr as a conformational tool. However, one must give him credit for choosing an excellent illustrative example, that is, Torchia's treatment of proline ring conformations.

A conspicuous feature of this book is the author's tendency to ignore large segments of the literature, even when highly relevant. This is understandable in an elementary or introductory text, but, although some introductory material is included, it is clearly not that kind of book. For example, the reader is evidently expected to have considerable understanding of the stereochemistry and conformational behavior of vinyl polymers; to cite an instance, the term "*mr* triads" is introduced without explanation. Again, a complicated analysis of polymethacrylic acid conformations is presented without any preparation in the form of a more general discussion of the rotational states of synthetic polymer chains. In these instances and many others, the discussion is clearly recognizable as being on a scholarly level, and as such ought to encompass, at least by reference, *all* the significant work in the broad field it covers, not just that which happens to appeal to the author. The brevity of the reference lists and the omission of any mention of much significant research clearly shows that the author has not recognized this obligation. It is therefore not possible to recommend this book as a comprehensive treatment of its field, although there is much of interest in it.

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Problems in Optics

M. Rousseau, J. P. Mathieu
366 pp. Pergamon, New York, 1973.
$18.00

In recent years many of the physics courses presented to advanced undergraduates and beginning graduate students in the US have tended to deluge the student with the details of physical theory. In such courses the student's chief self-activity is concerned with the discussion, mastery and criticism of theory. Frequently, he gains little insight into the ways in which theory can be applied effectively to obtain detailed solutions of problems that are of current interest to modern science. An alternative teaching technique is to show the student how specific problems can be solved in detail by applying basic considerations; by this latter technique the student should gain an

understanding and deeper appreciation of physical theory. Originally intended as a companion volume to J. P. Mathieu's major text *Optics*, this book, *Problems in Optics*, can by itself be used effectively by teachers interested in employing the problem-solving techniques of teaching—the general theory can be presented in lectures or by reference to standard texts.

The book consists of challenging problems for which the authors present detailed solutions. They drew many of the problems from certification examinations that are taken by students in France and which correspond in a general way to the qualifying examinations taken by young graduate students in this country. Mathieu of Paris and M. Rousseau of Rennes acknowledge their debt to numerous active research workers in France for suggestions of pertinent problems of current interest and to J. W. Blaker of Vassar for his fine translation of the original French text.

The authors interpret optics broadly and include many problems covering topics frequently presented to American students in separate courses on electrodynamics, atomic and molecular spectroscopy, quantum mechanics and solid-state physics. Along with more traditional topics, the chapter on interference covers Fourier-transform spectroscopy. In addition to the usual problems involving the Fresnel equations, the chapter on electromagnetic optics includes problems on antenna patterns, resonant cavities and radiation pressure. The authors include treatments of the optical properties of semiconductors along with black bodies and Kirchoff's law in a chapter on emission and absorption. The chapter on diffraction has problems on holography and on the production and diffraction of x rays along with conventional problems involving Fresnel and Fraunhofer phenomena. An excellent treatment of the optical properties of gases and solids is included in the chapter on refraction and dispersion along with problems involving electromagnetic waves in plasmas.

The quantum-optics chapter includes many of the readily soluble problems included in an introductory course in quantum mechanics: the contrasts between electromagnetic and de Broglie waves, uncertainty relations, potential barriers, the deuteron and Planck radiators along with first-order and second-order perturbation calculations of the ground state of the helium atom and the Stark effect for a rotor, respectively. In addition to treatments of the energy states and spectra of atoms and molecules, the chapter on spectroscopy includes problems on the Doppler effect, spectral line shapes, the Mössbauer effect and the relations between spectra and specific heats.

Problems in Optics should prove useful to faculty members preparing their own problem sets for the enlightenment and evaluation of their students; it should also prove useful to students as a study guide and as a basis for self-evaluation. The book employs modern SI units throughout and thus should provide a model for certain American authors who persist in the use of the archaic systems of units they encountered in early childhood and who continue to regard the SI as part of a sinister Jacobin plot!

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Advanced Molecular Quantum Mechanics

R. E. Moss
300 pp. Halsted, New York, 1973.
$18.50

During the last two decades the boundaries between physics and chemistry have become increasingly ill-defined. This has been especially true of the interface of atomic and molecular physics with quantum chemistry, where a new discipline that might be termed "molecular science" is emerging. This book, one of a series of studies in chemical physics, underlines one direction in which chemistry is moving as the techniques for applying basic quantum mechanics to complicated chemical problems continue to develop successfully. Although the book is intended for graduate students of chemistry working in today's chemistry department, and is entitled *Advanced Molecular Quantum Mechanics*, its contents fall almost completely within areas that form the heart of atomic physics. Thus its subtitle, "An Introduction to Relativistic Quantum Mechanics and the Quantum Theory of Radiation" is more than appropriate for this book, because just seven percent of its pages is devoted to truly molecular problems.

To meet these changing times, Richard Moss has written a book designed first to help today's graduate theoretical chemist make up for his lack of an undergraduate physics major, and second to guide him into the relativistic theory of one- and two-electron atoms. In addition many an advanced graduate student in atomic physics might consider this book as a fresh starting point for a review of some of the physics courses he has already taken.

Moss includes advanced undergraduate physics in chapters on nonrelativistic quantum mechanics, vector and tensor calculus, Lagrangian classical mechanics, special relativity and in two chapters on classical electromag-