Furthermore, time dependent hyperfine interaction still represents large theoretical problems in contrast to static hyperfine interaction.

For these reasons one might welcome a new journal specifically devoted to the field of hyperfine interaction. On the other hand it is perhaps a somewhat small area only to consider the specific problems connected to hyperfine interactions. In fact the editors of the journal are aware of this fact as is evident from the subtitle. It will therefore be exciting to see in the future whether this new journal will be the place for a development of many new fields which in some way have connection to hyperfine interaction. Until now three issues of the journal have appeared. In these the center of gravity is in the field of solid state physics. Around 2/3 of the articles are in this field and within solid state physics, the topic of impurities covers more than 50%. The rest is approximately equally divided between nuclear physics and articles specifically devoted to problems in hyperfine interaction.

ROGER BAUER

ATOMIC ENERGY LEVELS AND GROTRIAN DIAGRAMS, VOL. 1, HYDROGEN I-PHOSPHORUS XV, by S. Bashkin and J. O. Stoner, Jr., North-Holland Publishing Co., Amsterdam 1975. 615 pp., $59.95, Dfl. 150.00.

Grotrian diagrams are diagrams showing optical transitions from one spectroscopic term to another. The early work by W. Grotrian (Graphische Darstellung der Spektren, Springer, Berlin 1928) was so important that his name has been associated with the pictorial representations of optical transitions. Since his pioneering work and until now, no general attempt has been made to compile or construct Grotrian Diagrams, presumably because of the rapid growth of information. This new book by Bashkin and Stoner presents diagrams for all elements hydrogen through phosphorus, and for all ionization stages of these elements. A very large amount of work has been put into this, and the result is indeed good. For many of the elements so much information is available, that it has been necessary to present one single charge-state by use of several diagrams. This makes most of the diagrams quite transparent, at the same time as all existing information is available.

The book will find its use in all locations where optical spectroscopy (pure as well as applied) is in use, and a copy of it simply must be in any library of physics, astronomy or chemistry (I have arranged two copies for our laboratory, and I have a private one to use at home).

It can be added, that the linguistical style is pleasant. As an example, instead of using the frequently used expression "See reference. . .", the form "Please see reference. . ." is used.

E. VEJE

THE DYNAMICS OF SPECTROSCOPIC TRANSITIONS, by James D. Macomber. John Wiley and Sons, New York, 1976, $23.00, £11.50. 332 pages, 93 figures, 67 bibliographical references, 37 problems, a general index and a key to symbols.

This book attempts to give a pedagogic description of the state of a quantum system during the interval between the initiation and termination of the transition process. The purpose is to provide a more satisfying and intuitive approach to the teaching of Quantum Mechanics, avoiding the common tendency to conceal the dynamics of a transition in the language of "discontinuous quantum jumps", the details of which are termed "unknowable because of the uncertainty principle". The author likens this view to a situation in which all measurements of geological polar exploration are made, logically enough, along the polar axis of the earth. The famous explorer Admiral Byrd is observed first at the North Pole and then at the South Pole, and, since he is never observed on the line through the interior of the earth which joins the poles, it could be concluded that he underwent a discontinuous quantum jump. The author's goal in writing the book was to provide the student with the quantum mechanical equivalent of the solid ground over the earth's surface which, although a superposition of the eigenstates of polar exploration, nonetheless provided Byrd with a continuous dynamical path for his transition. The book concerns itself with these superposition states and seeks to map out the progress of the system through the transition process by the study of coherent transient effects, primarily drawn from the field of Magnetic Resonance and its optical analogs.

The book is aimed at a student who may have had only one introductory course in Quantum Mechanics at the junior or senior American undergraduate level, and therefore includes a brief review of introductory Quantum Mechanics and Electricity and Magnetism. The interaction of radiation and matter is treated in terms of the semiclassical model, in which dipole moments are calculated by Quantum Mechanics and radiation fields by Classical Electromagnetic theory. After this review the author moves boldly into the formulation and use of density matrix notation, with rather pleasing results. The concept of an ensemble average over quantum mechanical states emerges immediately,

and through the magic of coherence and cooperative effects the behavior of entire macroscopic ensembles is made to mimic quantum mechanical expectation values before the reader's very eyes. Thus the student is introduced to spin echos, photon echos, self induced transparency, superradiance, etc., as a series of useful teaching examples.

My only reservations about the book concern its rather narrow bias toward Magnetic Resonance experiments. This sometimes leads the author to underrate the state of the art of other fields of physics. For example he repeatedly cites conventional emission spectroscopy as an example of a field utilizing only an "incoherent jumble of electromagnetic waves". One could argue the meaning of "conventional", but comparing 1975 Magnetic Resonance experiments to 1920 emission spectroscopy could give students an erroneous view of contemporary physics. In fact many contributions to modern emission spectroscopy have been made using the beam foil source, which exhibits mixed parity and mixed angular momentum coherences as well as excitation alignment and orientation. The measurement of fine and hyperfine structure by quantum beats arising from these coherences not only runs counter to such inferences, but could have provided additional teaching examples from a broader range. The author also had to face the problem posed by Magnetic Resonance notation, where the practice is to denote the magnetic field which produces a force on a test current by H (which others reserve for the portion of the field derived from macroscopic currents) rather than the customary symbol B. Thus B and H have their standard definitions in Chapters 1–3, but B is replaced by H thereafter. Although this ambiguity may be unavoidable, the statement on page 84 that D is "equal to the net effective polarization, which is the sum of the 'genuine' polarization, P, and the equivalent polarization due to the driving field E" is confusing in the same way, and seems to deny to E its usual role as the field which produces a force on a test charge. There is also a statement on page 2 that "As in all wave phenomena, the wavelength, frequency, and speed are related by the formula $\lambda\omega/2\pi = c$", which may disturb teachers who must explain DeBroglie waves. The book is relatively free from missprint, with a few curious exceptions, such as the value of the speed of light to 2.99×10^8 m/sec (a truncation of 2.998?) in Eq. (1.2) and the statement on page 12 that the occupation of Pierre Bouguer (the famous 18th century French Royal Professor of Hydrography and physicist) was as a pharmacist.

On the whole, the book is written very well and very enthusiastically, and provides a new and modern approach which should be useful in the teaching of Quantum Mechanics. The author states in the preface that he would be most pleased if some readers were to develop research interests in NMR, EPR and lasers. This certainly seems quite likely, unless other researchers can provide an equally fascinating brief for their speciality.

LORENZO J. CURTIS