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Book reviews

Altmann, S. L. Rotations, quaternions, and double groups. Oxford: Clarendon Press 1986. 217 pp, various figures (ISBN 0-19-855372-2). £35.00

This book is a nice counterpoint to the many existing textbooks on group theory for chemists and physicists. Its main topic are the irreducible representations of point groups in those cases were electron spin plays a role. The standard treatment, following Bethe, is by means of double groups. Altmann has reasons to renounce on the concept of double groups and to prefer projective representations (as introduced by Schur) of the ordinary point groups instead. Quaternions turn out to be very useful for this purpose, provided that one uses their parametrization according to Rodrigues rather than that of Hamilton. The delicate sign problems are then almost automatically dealt with.

The book has a high didactic standard and is easy to read. Chapter 1 gives a very nice account of the history of quaternions and explains why so far they never became really popular.

The reader has to wait until chapter 12 to find an outline of the theory of quaternions. In between there is a lot on elementary aspects of groups, of angular momentum, of spinors, stereographic projections, projective representations, Euler angles and many other useful things. Fortunately the various chapters are almost self-contained, so that one can read them in the order that one prefers. Anyone who likes groups but who dislikes rotations because of the problems with phase conventions, troubles with Euler angles and so on, will probably change his mind after he has read Altmann's book. A second volume on this topic by the same author would be welcome, from which one should like to learn more on Lie-groups, on higher hypercomplex numbers like those associated with the Dirac matrices, and related things.

This book is recommended to anyone who is interested in group theory and its applications to chemical or physical problems irrespective of whether or not spin is involved

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Pyykkö, P.: Relativistic theory of atoms and molecules–a bibliography 1916–1985. (Lecture Notes in Chemistry, vol. 41) Berlin Heidelberg New York Tokyo: Springer 1986. XI+389 pp (ISBN 3-540-17167-3) DM 74, --

Over the years the author, one of the leading scientists in the field concerned, has collected all relevant publications related to relativistic phenomena in atoms and molecules. This covers the large field between pure QED theory and the detailed discussion of simple model systems, between sophisticated calculations on small atoms and the qualitative discussion of heavy molecules, between physics and chemistry.

The book consists of two parts. In the first part, the material is organized under nine headlines. Each section starts with a few introductory sentences. These are followed by a series of tables presenting the references to different subfields. The tables are arranged chronologically. Each reference is characterized by a line of text. Thereby, of course, only a single aspect of the papers can be appreciated in each case. Nevertheless, the use of this book will be faster, more effective, and cheaper than the set-up of an individual profile and the execution of a computerized literature retrieval.

The second part of the book contains more than 3100 references, lexically ordered according to the authors. It is very useful that the full titles are given. In this context the announcement of the present bibliography as an IBM-PC compatible file (520 kb on a two-sided diskette, being processable by Wordstar) seems very promising.

There is no question that the book should be available in every library, and on the shelf of everyone working in this field.

W. H. E. Schwarz, Siegen