BOOK REVIEW

MATHEMATICAL APPARATUS OF THE THEORY OF ANGULAR MOMENTUM—by A. P. Yutsis, I. B. Levinson and V. V. Vanagas. Published by the Israel Program for Scientific translation. Price...

The book under review, an English translation from the original Russian, is an important and fruitful contribution to the current literature on the highly useful and specialized branch of quantum mechanics—the theory of angular momentum. It starts with a brief discussion of the relation between angular momentum operators and spatial rotations. The subsequent chapters mainly deal to begin with the problem of vector addition of two angular momenta, then with the problem of addition of an arbitrary number of angular momenta, and finally discuss the various properties of vector coupling co-efficients. A major part has been devoted to the highly useful graphical methods for operations with Jm- and $3nJ$-coefficients, and properties of irreducible tensor operators and their matric elements. The book thus, may be considered as a review of the properties of vector coupling co-efficients – the so-called Clebs-Gordon and Wigner coefficients, an important mathematical apparatus in the quantum mechanical calculations involving the coupling of a number of angular momentum operators. In vector coupling problem, one usually finds various terminologies, used by different workers such as Clebs-Gordon coefficients, Wigner coefficients, Racah's W-coefficients, $3J$-coefficients, Jm-coefficients, $3nJ$-coefficients etc., between which confusion in definitions is often met with in literature. The authors have, carefully and preserved their distinction to their as well as readers' convenience with specific definition for each of them.

The authors appear to have assumed the reader's preliminary acquaintance with the methods of group theory and the properties of quantum mechanical angular momentum operator and one encounters the frequent reference to Condon and Shortby's book "The Theory of Atomic Spectra", Wigner's book "Group theory" and Racah's work (1942, Phys. Rev). Moreover, many of the results and mathematical inferences have been simply quoted without giving their proofs, perhaps to avoid cumbrous and tedious algebraic computation. Stress has been laid on the methods of calculation rather than on the derivation of these methods. Of course, the authors did not fail to give the complete references of the original works where an inquisitive reader may find the necessary proofs to his satisfaction. On the whole, the book will be highly useful to the scientific workers engaged in advanced research in many branches of Theoretical Physics, and interested more in having the ready formulae and methods of calculation rather than in their complicated derivations.

As stated earlier, the present contribution is a translation from the original Russian and the reviewer is unable to assure the faithfullness to the translations. However, the translator in his note admits that "translation, unlike rotation, cannot be always represented in a 'unitary' form". Even assuming unavoidable deviations from the original Russian, the translation lacks no clarity, continuity and lucidity of exposition.

U. S. Ghosh

1. Angular momentum operators and spatial rotations 2. Angular momentum eigenfunctions and representations of the rotation group . 3. Addition of angular momenta; reduction of the direct product of representations of the rotation group . 4. Expressions forthe Clebsch.,-Go~an coefficients and the.ir properties S. Wigner coeffidents and their properties . Chapter II.Â This may constitute an impediment when the apparatus is employed in more complicated cases. The present book fills this gap. The writing of this book began before Edmonds' book appeared in print. In physics, the angular momentum of an object rotating about some reference point is the measure of the extent to which the object will continue to rotate about that point unless acted upon by an external torque. In particular, if a point mass rotates about an axis, then the angular momentum with respect to a point on the axis is related to the mass of the object, its velocity, and its distance from the axis. Angular momentum operators have been defined in Section 1.3 on the basis of the commutation rules (1.3-1). Another important aspect of angular momentum operators is their close relationship to rotations. Consider once more the coordinate rotation (2.1-5), but instead of a finite rotation angle Î± about the z axis, let the angle be an infinitesimal one, Î´Î±. In that case, to first orderÂ Frank E. Harris, in Mathematical Methods for Physicists (Seventh Edition), 2013. Spinors. It turns out that half-integral angular momentum states are needed to describe the intrinsic angular momentum of the electron and many other particles. Since these particles also have magnetic moments, an intuitive interpretation is that their charge distributions are spinning about some axis; hence the term spin.