probabilities. Graphs of Nilsson level scheme of single particle orbits in spheroidal potential. Table of measured ground state spins of odd-A and odd-odd nuclei. Tables of Clebsch-Gordan coefficients.

Chapter X. *Calibration Standards.*

Tables of standard gamma and electron lines and of standard alpha rays. Gamma-ray absorption coefficient in NaI crystals. Table of standard nuclides for calibration of gamma-ray spectrometer.

The tables and graphs have been presented so as to be easily read, and the quality of the printing is good. Much of the material is used frequently by nuclear physicists but is widely scattered in the literature. Thus, this book should prove very helpful to people in the field of nuclear physics, and this reviewer recommends it highly.

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2[D, L].—L. K. Frevel, J. W. Turley & D. R. Petersen, *Seven-Place Table of Iterated Sine*, The Dow Chemical Company, Midland, Michigan, 1959. Deposited in UMT File.

Following a detailed description of the method of computation employed, the authors give a 7D table of the nth iterated sine function of x for $n = 0(.05)10$, and $x = k(\pi/20)$, where $k = 1(1)10$. It is stated that the computations were perperformed on a Datatron 204, and the results are considered correct to within $5 \cdot 10^{-7}$.

J. W. W.

3[G].—K. M. Howell, *Revised Tables of 6j-Symbols*, U. Southampton Math. Dept., Research Report 59-1, 1959, xvi + 181 p., 33 cm.

The Wigner $6j$-symbol has been defined by Wigner in general in connection with the reduction of the triple Kronecker product of any simply reducible group. In these tables this group is taken to be either the three-dimensional rotation group or the two-dimensional unitary group. The symbols are denoted by

$$\begin{Bmatrix} j_1 & j_2 & j_3 \\ k_1 & k_2 & k_3 \end{Bmatrix}$$

where the quantities $j_1, \cdots, k_3$ are integers or half-integers. If we let

$$J_0 = j_1 + j_2 + j_3, \qquad J_1 = j_1 + k_2 + k_3, \qquad J_2 = j_2 + k_1 + k_3$$
$$J_3 = j_3 + k_1 + k_2$$
$$K_1 = j_1 + j_2 + k_1 + k_2 \qquad K_2 = j_1 + j_3 + k_1 + k_3$$
$$K_3 = j_2 + j_3 + k_2 + k_3,$$

then the explicit expression for the $6j$-symbol is

$$\begin{Bmatrix} j_1 & j_2 & j_3 \\ k_1 & k_2 & k_3 \end{Bmatrix} = \{\prod_{r,s} (K_r - J_s)!/\prod_s (J_s + 1)!\}^{\frac{1}{2}}$$
$$\cdot \sum_t (-1)^t (t+1)!/\{\prod_r (K_r - t)! \prod_s (t - J_s)!\}.$$

These symbols are invariant under the 144 products of separate permutations of the K_r alone and the separate permutations of the J_s alone. The symmetries of the $6j$-symbols are made use of in the organization of the tables. In the present (revised) edition of the tables a wider group of symmetries is exploited than in the earlier edition.

In the tables the $6j$-symbols are classified in terms of a set of six ordered parameters, and the tables are arranged in descending "speedometer" order of these parameters. Rules for determining the values of these parameters from given $j_1, \cdots, k_3$ are included.

The square of the value of the $6j$-symbol is printed in the table, together with its correct sign. In addition the entries are written as rational fractions in terms of their prime factors. Thus the fraction $-4/5\sqrt{21}$ is written as $-2\cdot2\cdot2\cdot2/3\cdot5\cdot5\cdot7$. A composite member, all of whose factors are greater than 103 is printed as if it were a prime.

The tables were duplicated from stencils cut directly from the output tape of a Ferranti Pegasus Computer. The program used in the computer was essentially the same as that used for the earlier version of the tables. It is stated that, "It seems reasonably sure that these tables are as reliable as, and more comprehensive than, the first set of tables of the $6j$-symbol."

A. H. T.

4[H, M].—H. J. Gawlik, *Zeros of Legendre Polynomials of orders 2–64 and weight coefficients of Gauss quadrature formulae*, A. R. D. E. (Armament Research and Development Establishment) Memorandum (B) 77/58, Fort Halstead, Kent, December 1958, 25 p.

The Gauss quadrature formula is $\int_{-1}^{1} f(x)\,dx = \sum_{r=1}^{n} A_r f(a_r)$ with A_r, a_r chosen so that the equality is valid whenever $f(x)$ is any polynomial of degree $2n - 1$ or less. The quantities a_r are the zeros of the Legendre polynomial $P_n(x)$, while

$$A_r = \frac{1}{P_n'(a_r)} \int_{-1}^{1} \frac{P_r(x)}{x - a_r}\,dx.$$

The memorandum here reviewed gives 20-decimal values of a_r and A_r for all zeros a_r of each polynomial $P_n(x)$, for $n = 2(1)64$, and is by far the most extensive and accurate of such tables available.

The most extensive of the previously published tables is that of Lowan, Davids, and Levinson [1], which gives a similar table to 15 decimals for $n = 2(1)16$. This table has been reproduced several times, in whole or in part [2]. It has been supplemented by a table by Davis and Rabinowitz [3], which gives 20-decimal values for $n = 2, 4, 8, 16, 20, 24, 32, 40, 48$. Discrepancies between Davis & Rabinowitz and Gawlik amount to only a unit in the 20th decimal in several places, with the probability that Gawlik is the more accurate; both tables would thus appear to be reliable.

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1. Amer. Math. Soc., *Bull.*, v. 48, 1942, p. 739–743; v. 49, 1943, p. 939 (errata).
2. See, for example, *NBS* Applied Mathematics Series, No. 37, *Tables of Functions and of Zeros of Functions*, 1954.
3. NBS, *Jn. of Research*, v. 56, 1956, p. 35–37.