

REDUCED SU(3) CFP's *

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PROGRAM SUMMARY

Title of program: REDUCED SU(3) CFPs

Catalogue number: ABKG

Computer: AMDAHL 470V/6
 IBM 360;
Installation: Univ. Michigan, Ann Arbor,
 Michigan

Operating System: MTS

Program language used: FORTRAN

High speed storage required: 197k words

No. of bits in a word: 32

Overlay structure: none

No. of magnetic tapes required: none

Other peripherals used: card reader, line printer

No. of cards in combined program and test deck: 3655

CPC Library data deck used:
 Catalogue number: AAC*; Title: DATA FOR ABKG

No. of cards in data deck: 7423

Keywords: Nuclear physics, theoretical methods, CFP, SU(3), SU(4), shell model, spectroscopic amplitude, α -transfer, pseudo-SU(3).

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 ** Block 3 of the program was developed at The Weizmann Institute, Rehovot, Israel.

Nature of physical problem

Reduced SU(3) x -particle coefficients of fractional parentage (CFP) are calculated, for any nuclear shell and arbitrary shell model states in an SU(3) \times SU(4) or an SU(3) \times SU(2) scheme. These CFP together with the SU(3) coupling coefficients available with the code of ref. [1] make it possible to perform standard shell model calculations in the SU(3) scheme.

Method of solution

Raising and lowering operators of SU(3) and SU(4) are used to construct explicitly shell model states of good SU(3) \times SU(4) symmetry [2]. These states are written in terms of Fermion creation operators. Overlaps can then be calculated directly and lengthy recursion is thus avoided.

Restrictions on the complexity of the problem

Since the size of arrays depends strongly on the nuclear shell and the number of particles, provision is made for easy adjustment of dimensions. However, the number of components of a highest weight state in the many-particle basis should not exceed 200 or else truncation error may accumulate.

Typical running time

It is a critical function of the nuclear shell, the number of particles, as well as the options selected.

Unusual features of the program

All the large integer arrays which store numbers that are always less than 256 start with the letter "L". Therefore in IBM 360/370 or similar operating systems advantage may be taken of the statement IMPLICIT INTEGER*2(L) to save up to 35% of high speed storage.

References

- [1] Y. Akiyama and J.P. Draayer, *Comp. Phys. Comm.* 5 (1973) 405.
- [2] K.T. Hecht and D. Braunschweig, *Nucl. Phys. A*244 (1975) 365.