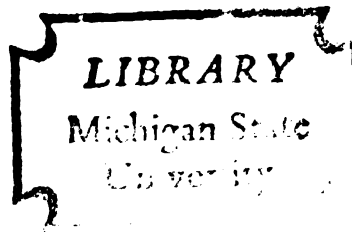


SIMPLE EXCITATIONS OF DOUBLY CLOSED
SHELL NUCLEI

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
RICHARD TRILLING
1972



This is to certify that the
thesis entitled

SIMPLE EXCITATIONS OF DOUBLY CLOSED

SHELL NUCLEI

presented by

Richard Trilling

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Physics

A handwritten signature in cursive script, reading "H. McManus".

Major professor

H. McManus

Date 10/13/72

ABSTRACT

SIMPLE EXCITATIONS OF DOUBLY CLOSED SHELL NUCLEI

By

Richard Trilling

The problem of describing low lying excitations in doubly closed shell nuclei by simple one particle-one hole excitations has long been of theoretical interest. Without including either core correlation or core polarization contributions in the matrix elements the agreement between experiment and theory of previous calculations has been marginal. The previous calculations have failed to produce enough separation between the $T=0, 1$ states of $N=Z$ nuclei and therefore have produced too much isospin mixing in these light nuclei. Another failure of the previous calculations was that the binding energy of the states ($T=0, 1$) was too small. The error in the binding of the $T=0$ states ($N=Z$ nuclei) was much greater than the error in the binding of the $T=1$ states.

The present calculation replaces the monopole term of the multipole expansion of the interaction by a one parameter isospin dependent spherical potential. The parameter is evaluated from the symmetry energy between Ca^{49} and Sc^{49} . The reason for the replacement is to take into account the difference between the single particle energies of the

$A \pm 1$ mass nuclei used in the calculation and those of the A mass system in which the excited particle moves.

Two different interactions, the Kallio-Kolttveit and the Sussex, were used in two different approximations, the TDA and the RPA. The results obtained with the two different interactions are quite similar and aside from the lowest 3^- state the results obtained from the TDA and the RPA were almost identical.

Using the monopole shift the results for O^{16} are greatly improved. The $T=0$, 1 separation energies increase, along with their binding energies, to where they are in close agreement with experiment. The isospin mixing of the new vectors is such that most of the calculated $B(E1)$'s are now in good agreement with experiment.

The transition data for Ca^{40} includes only the 3^- , 5^- $T=0$ levels. The monopole shift does not effect these transitions but gives a net improvement of the position of the levels arising from the three lowest multiplets. The resultant placement of the levels is also in good agreement with the deformed basis calculation of Ca^{40} by Gerace and Greene. The giant dipole state is however about 1 MeV too low when the shift is used.

In Ca^{48} and Sr^{88} only the T_z states were calculated. The monopole shift leads to a definite improvement in the level positions of both nuclei for both the negative parity and the positive parity states.

In all nuclei the RPA over binds the lowest 3^- state; a reduction of the interaction strength to 65%, in order to simulate screening, for all the nuclei leads to a fair agreement between experiment and theory.

It should be noted that the calculations for Sr^{88} predict a strong low lying 5^- state which up to now has not been seen.

SIMPLE EXCITATIONS OF DOUBLY CLOSED SHELL NUCLEI

By

Richard Trilling

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Physics

1972

ACKNOWLEDGEMENTS

I would like to thank Professor Hugh McManus for suggesting this problem and for his guidance and support during the time this work was performed.

Thanks are also due to Dr. Richard Schaeffer for his assistance in the final stages of this work and to Dr. Fred Petrovich for his assistance many times during the course of this work.

Mrs. Julie Perkins is also thanked for the typing of this manuscript.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iv
LIST OF FIGURES	vi
Chapter	
I. INTRODUCTION.	1
II. THE MONOPOLE SHIFT.	5
III. O^{16}	10
3.1 General Discussion	10
3.2 Discussion of States in O^{16}	14
3.3 3^- States in O^{16}	26
IV. Ca^{40}	41
4.1 General Discussion	41
4.2 Discussion of States of Ca^{40}	42
V. Ca^{48}	61
VI. Sr^{88}	73
VII. SUMMARY AND CONCLUSIONS	84
REFERENCES	88
Appendix	
A. RPA PHASE CONVENTIONS AND TRANSITION FORMULAS	91
B. MONOPOLE SHIFT	94
C. SINGLE PARTICLE IDENTIFICATION CODE	100
D. ENERGY AND TRANSITION SUMMARY	102
E. VECTOR AMPLITUDES	161

LIST OF TABLES

Table		Page
2.1	$\epsilon_A - \epsilon_{A+1}$ for N=Z Nuclei	8
2.2	$\epsilon_A - \epsilon_{A+1}$ for N $\neq$ Z Nuclei. Overall T equals that of the g.s. T_0	8
3.1	O^{16} Single Particle Energies	14
3.2	O^{16} . 1^{st} , 1^- T=0 vector components	16
3.3	Sussex Matrix Elements for $(1s_{1/2} - 0p_{1/2})^{00}$ state in O^{16}	20
3.4	1^- , 2^- T=0 Splitting	29
3.5	Partial Summary of O^{16} for Explanation of Maj. Comp. see Appendix C.	32
3.6	O^{16} Centroid Energies, Energy Dispersions and Sum Rules for Representative Configu- rations of the K-K Interaction with the Monopole Shift (For Formulas See Appendix A)	35
4.1	Ca^{40} Single Particle Levels.	45
4.2	Relative Strengths of the 3^- , T=0 States in Ca^{40}	49
4.3	Partial Summary of Ca^{40} for Explanation of (Maj. Comp.) See Appendix C	54
4.4	Ca^{40} Centroid Energies, Energy Dispersions and Sum Rules for Representative Configu- ration of the KK Interaction with the Monopole Shift (For Formulas See Appendix A)	56
5.1	Ca^{48} Single Particle Levels.	61

Table		Page
5.2	Zero Point Energies of the 3 Low Lying Multiplets in Ca^{48}	63
5.3	Partial Summary of Ca^{48} for Explanation of (Maj Comp. See Appendices C and D). . .	68
5.4	Ca^{48} Centroid Energies, Energy Dispersions and Sum Rules for Representative $T_{\leq}$ Configurations of the K-K Interaction with the Monopole Shift (For Formulas See Appendix A)	69
6.1	Sr^{88} Single Particle Levels.	75
6.2	Partial Summary of Sr^{88} for Explanation of (Maj. Comp. See Appendices C and D) . . .	79
6.3	Sr^{88} Centroid Energies, Energy Dispersions and Sum Rules for Representative $T_{\leq}$ Configurations of the K-K Interaction with Monopole Shift (For Formulas See Appendix A)	81

LIST OF FIGURES

Figure		Page
1.	O^{16} Monopole Shifts	36
2.	O^{16} K-K Energy Levels.	37
3.	O^{16} Sussex Energy Levels.	39
4.	Ca^{40} ($0f_{7/2}-0d_{3/2}^{-1}$) Multiplet	57
5.	Ca^{40} ($1p_{3/2}-0d_{3/2}^{-1}$), ($0f_{7/2}-1s_{1/2}^{-1}$) Multiplets.	59
6.	Ca^{48} Monopole Shifts	70
7.	Ca^{48} Energy Levels.	71
8.	Sr^{88} Energy Levels.	82

CHAPTER I

INTRODUCTION

There are several factors which motivated the present series of calculations. A systematic study of the doubly closed shell nuclei O^{16} , Ca^{40} , Ca^{48} , and Sr^{88} would be useful in order to compare their various properties, particularly the distribution of the multipole strengths. All the above nuclei possess a low lying collective 3^- state which exhausts an appreciable part of the octopole transition strength. Another common phenomena is the existence of low lying positive parity states such as a 0^+ which cannot be explained on a lp-lh basis.

A common failure of previous lp-lh calculations was that they failed to provide enough separation between the $T=0$ states and the $T=1$ states in $N=Z$ nuclei such as O^{16} and Ca^{40} . This leads to too large estimates of Coulomb mixing. Very often also the $T=0$ levels were found to be too high in energy. This has been avoided in the present set of calculations by adding an empirical monopole shift.

Additional data have also become available on some of the higher lying $T=1$ states in O^{16} through inelastic

electron scattering (Sl69) and also $T=1$ states in Ca^{40} through the charge exchange reaction $\text{Ca}^{40}(\text{He}^3, t)\text{Sc}^{40}$ (Sc71a). There also exists new data on Sr^{88} through the two particle transfer reaction $\text{Sr}^{86}(t, p)\text{Sr}^{88}$ (Ra70).

The particle-hole matrix elements were calculated for two different interactions, the Kallio-Kolltveit (K-K) interaction and the Sussex interaction. The K-K interaction has a hard core potential and an exponential radial dependence (Ka64). It fits the nucleon-nucleon S-wave phase shifts up to 300 MeV. The matrix elements are evaluated by the Scott-Moszkowski separation method (Mo60), i.e. a separation distance is chosen such that within that distance the repulsion due to the hard core is cancelled by the attractive part of the potential. This matrix element is the first term in the expansion of the reaction matrix acting in states of even angular momentum. The best description of the reaction matrix is perhaps given by M. Macfarlane (Ma69).

The Sussex interaction is derived from the experimental nucleon-nucleon phase shifts by deducing matrix elements of the nucleon-nucleon interaction in a harmonic oscillator basis of the interparticle distance (Er68).

The particle-hole states were calculated within the frame work of both the Tamm-Dancoff Approximation (TDA) and the Random-Phase Approximation (RPA), (La64). The TDA assumes that the ground state of the nucleus is a

particle-hole vacuum and that the excited states are obtained by acting on the ground state with a particle-hole creation operator. The RPA does not assume that the ground state is a particle-hole vacuum, but that it contains correlations, i.e. the ground state has components of 0p-0h, 2p-2h, 4p-4h, etc. There then are two ways of creating excited states, by either creating or destroying a particle-hole pair. There is a slight violation of the Pauli principal in the RPA, i.e. denoting particle levels by 'm' and hole levels by 'i', the particle-hole creation operator is then $b_{mi}^+ = a_m^+ a_i$ from which it follows

$$\langle 0 | b_{mi} b_{mi}^+ | 0 \rangle = 1 - \langle 0 | a_i a_i^+ | 0 \rangle - \langle 0 | a_m^+ a_m | 0 \rangle$$

where $|0\rangle$ is the correlated ground state. If the number of levels is large compared to the number of holes or particles then $\langle 0 | a_i a_i^+ | 0 \rangle$ and $\langle 0 | a_m^+ a_m | 0 \rangle$ are approximately zero and then

$$\langle 0 | b_{mi} b_{mi}^+ | 0 \rangle \sim 1$$

which is the basic assumption of RPA and is called the quasi-boson approximation. (For a description of the RPA vectors and phases see Appendix A).

The basis states for the calculation were chosen following the prescription by Ripka (Ra68). For an $N=Z$ nucleus there are two types of excitations $T=0, 1$. When $N \neq Z$ four types of excitations are considered, proton-proton hole, neutron-neutron hole, $T=0$ and $T=1$.

The realistic forces used do not give a good account of the centroids, so it is necessary to supplement these interactions by a monopole shift discussed in Chapter II.

Each succeeding chapter discusses a single nucleus and treats in detail the basic configurations of the low lying states and the comparison with such experimental information as is available. The energy level information is summarized in level diagrams. Also a table at the end of each chapter summarizes this information on the levels and transition rates. Another table gives the calculated sum rule strengths and widths for various multipole transitions. A corresponding appendix D lists the energy levels and transition rates for all the levels calculated for the particular nucleus and in addition lists the principle component of the vector along with the transition rate due to it alone. Appendix E gives a list of representative state vectors. Overall conclusions are presented in Chapter VII.

The algebra and labeling for single particle levels are summarized in Appendices A through C.

CHAPTER II

THE MONOPOLE SHIFT

In a particle-hole calculation the Hamiltonian $H=H_0+V$ is diagonalized in the basis $|ph^{-1},J\rangle$. The diagonal term

$$\langle ph^{-1},J|H|ph^{-1},J\rangle = \epsilon_p - \epsilon_h + V_c + V_{ph}^J$$

where ϵ_p , ϵ_h are the single particle energies obtained from the $A+1$ nuclei, where V_c contains all the core contributions and where V_{ph}^J is the diagonal particle-hole matrix element.

The centroid of a given p-h multiplet is not at $\epsilon_p - \epsilon_h + V_c$ but is shifted away from this value by the average value of V_{ph}^J for a given p-h multiplet.

$$\begin{aligned} \text{i.e. } \alpha_{ph}^0 &= \sum_J (2J+1) V_{ph}^J / \sum_J (2J+1) \\ &= \frac{1}{(2p+1)(2h+1)} \sum_J (2J+1) \langle ph,J|V|ph,J\rangle \end{aligned}$$

This is also equal to the monopole term in the multipole expansion

$$\text{i.e. } \langle ph^{-1}, J | V | ph^{-1}, J \rangle = \sum_K \alpha_{ph}^K (-1)^{p+h+K} \hat{p} \hat{n} \hat{K} W(phph; JK)$$

of the interaction. The centroid for a given p-h multiplet is therefore located at $\epsilon_p - \epsilon_h + V_c + \alpha_{ph}^0$

An explanation for the presence of α_{ph}^0 is that since the single particle levels from the A mass nucleus were not used, the centroid for the p-h multiplet as determined by the A±1 mass nuclei single particle levels must be corrected. This correction arises because the system does not contain A±1 particles and the single excited particle sees a core of only A-1 particles. The correction is provided by the J independent part of the interaction, the monopole term.

The centroid shift as determined by the interaction does not provide good agreement between observation and theory. An attempt will be made to correct this by removing the monopole term from the diagonal matrix element and by substituting in its place another term. This procedure is due to R. Schaeffer (Sc71).

It can be shown (Appendix B.1) that the monopole term of a diagonal particle hole matrix element coupled to a good J is equivalent to a single particle matrix element where the particle moves in a spherical potential; i.e. a single particle energy term.

The monopole term will therefore be replaced by a term which takes into account this difference in single particle energies.

The spherical potential chosen to evaluate this difference will contain both an iso-scalar part, V_0 , and an iso-vector part, V_1 , both of which are assumed to be slowly varying functions of A .

The potential corresponding to $A+1$ nucleus will be written as

$$V_0(r) + \frac{4}{A+1} V_1(r) \vec{t}_p \cdot \vec{T}_A$$

while for the A mass nucleus it is

$$V_0(r) + \frac{4}{A} V_1(r) \vec{t}_p \cdot \vec{T}_{A-1}$$

The single particle contributions to the single particle energies from this potential are

$$\epsilon_A = \epsilon_0 + \frac{4}{A} \epsilon_1 \langle A | \vec{t}_p \cdot \vec{T}_{A-1} | A \rangle$$

and

$$\epsilon_{A+1} \approx \epsilon_0 + \frac{4}{A} \epsilon_1 \langle A+1 | \vec{t}_p \cdot \vec{T}_A | A \rangle$$

The corrections to the diagonal elements become $\epsilon_A - \epsilon_{A+1} - \alpha_{ph}^0$. The values of $\epsilon_A - \epsilon_{A+1}$ are for the various occurring cases, (Appendix B.2), are in the tables 2.1 and 2.2

TABLE 2.1.-- $\epsilon_A - \epsilon_{A+1}$ for $N=Z$ Nuclei.

$ pp^{-1}\rangle$	$-\epsilon_{1/A}$
$ nn^{-1}\rangle$	$-\epsilon_{1/A}$
$ ph^{-1}, J; T=0\rangle$	$-3\epsilon_{1/A}$
$ ph^{-1}, J; T=1\rangle$	$\epsilon_{1/A}$

TABLE 2.2.-- $\epsilon_A - \epsilon_{A+1}$ for $N \neq Z$ Nuclei. Overall T equals that of the g.s. T_0 .

$ pp^{-1}\rangle$	$-\epsilon_{1/A}$
$ nn^{-1}\rangle$	$-\epsilon_{1/A}$
$ ph^{-1}, J; T=0\rangle$	$-3\epsilon_{1/A}$
$ ph^{-1}, J; T=1\rangle$	$-\epsilon_{1/A}$

For $N \neq Z$ and where the T of the state equals T_0+1

$$|ph^{-1}, J; T=1\rangle \quad (2T_0+1)/A$$

The value of ϵ_1 can be obtained from the symmetry energy of a particle in the $2p_{3/2}$ orbital of Ca^{48}

$$E_s = \epsilon_n + \Delta - \epsilon_p = \frac{4T_0}{A} \epsilon_1 = \frac{1}{3} \epsilon_1$$

where Δ is the coulomb difference between Ca^{49} and Sc^{49} . The value of $\epsilon_1 \sim 20$ MeV. This value will be used for all nuclei.

It is somewhat doubtful whether or not the monopole shift should be used with the RPA due to the multiparticle-multi-hole nature of the RPA ground state.

CHAPTER III

O^{16}

3.1 General Discussion

From looking at the energy spectrum of O^{16} (Fig. 2,3) the most immediate observations that can be made are the following:

- A. The Sussex interaction produces levels which are less bound than those levels which result from the K-K interaction. This can best be explained by looking at Fig. 1 where the average centroid shifts are illustrated. For the K-K interaction there is a shift downward of approximately .6 MeV for the $T=0$ levels while the $T=1$ levels are shifted upwards approximately 2.3 MeV. For the case of the Sussex interaction there is virtually no downward shift of the $T=0$ levels while the $T=1$ levels are shifted upwards about 2.3 MeV. The net result is that not only are the Sussex interaction $T=0$ levels less bound than the $T=0$ levels from the K-K interaction but also the

T=0, T=1 separation is less with a Sussex interaction than with a K-K interaction.

- B. For a given interaction and shift configuration the major effect of the RPA compared with the TDA is to lower the energy of the lowest 3^- , T=0 state by approximately 1.5 to 3 MeV. The effect of the RPA on the next highest level namely the lowest 1^- , T=0 level is considerably smaller and is only about .5 MeV. On the other states the effect of the RPA is even less. It is known (Bl69)(Sc71a) that screening contributions should be added to the interaction in the RPA; this is simulated by a calculation where the strength of the K-K interaction has been reduced to 65% of full strength (Sc71a). The α_{ph}^0 term of the monopole shift was also reduced by the same amount. The main effect of this reduction of the strength is to decrease the binding of the lowest 3^- , T=0 state. All the other states were much less sensitive to the strength of the interaction.
- C. The main effect of the monopole shift for a given configuration is to separate the T=0 and T=1 levels by shifting them both downwards, (Fig. 1,2,3) but while the T=1 levels are shifted

downward by about .8 MeV the $T=0$ levels are shifted downwards by approximately 3.4 MeV. This tends to increase the isotopic purity of the vectors. Since the contribution of the $T=1$ component to a $B(MJ)$ is approximately 25 times larger than the $T=0$ component one would expect the change in isospin mixture to affect the magnetic transitions which come from primarily $T=0$ states. Similarly since $B(E1)=0$ for a $T=0$ state, due to the center of mass correction to the effective charge, one would also expect the monopole shift to affect the $B(E1)$'s, for the $T=0$ states. The final placement of both the $T=0$ and $T=1$ levels for both interactions is approximately the same.

The low lying positive parity states of O^{16} cannot be described as simple $1p-1h$ states. Brown and Green (Br66) have calculated these states using a $2p-2h$ and $4p-4h$ deformed basis created by exciting particles out of the core. The present calculations are therefore confined to the negative parity states.

For the O^{16} calculations the oscillator energy, $\hbar\omega=13.3$ MeV was chosen from electron scattering and corresponds to an oscillator length, $b=1.77$ fm. The Sussex matrix elements were linearly interpolated from the tables for $b=1.7$ and $b=1.8$.

Previous calculations using the RPA with O^{16} have been done by V. Gillet and N. Vinh Mau (Gr64). They used a fitted interaction with 4 parameters with a gaussian radial dependence along with harmonic oscillator wave functions. A least squares fitting of the interaction was done within the framework of the RPA. Their results are quite similar to the present ones.

In the present calculations the single particle energies used were obtained from the neighboring nuclei, O^{15} , N^{15} , F^{17} , O^{17} and the particle-hole gap was derived from binding energies obtained from mass tables (Wa65). These can be seen in Table 3.1.

The single particle energies given are with respect to the well edge of O^{16} . This was done by evaluating

$$\epsilon_{p_{1/2}}^p = O^{16}-N^{15}-p = -12.126$$

$$\epsilon_{p_{1/2}}^n = O^{16}-O^{15}-n = -15.668$$

$$\epsilon_{d_{5/2}}^p = F^{17}-O^{16}-p = -0.601$$

$$\epsilon_{d_{5/2}}^n = O^{17}-O^{16}-n = -4.143$$

The single particle energies are then

TABLE 3.1.--O¹⁶ Single Particle Energies.

	O _{s1/2}	O _{p3/2}	O _{p1/2}	O _{d5/2}	O _{s1/2}	O _{d3/2}
P	-42.126	-18.454	-12.126	-0.601	-0.101	4.500
N	-45.668	-21.828	-15.668	-4.143	-3.272	0.937

These energies compare quite closely to those used by Gillet (Gi64).

It might be useful for the reader while reading this section to refer to Table 3.5 at the end of this section which briefly summarizes the findings for a number of the levels discussed in this section. Table 3.5 is organized in a manner such that the lower levels are separated from the higher lying levels and the latter are organized into complexes as found experimentally.

For a complete summary of the O¹⁶ calculation the reader is referred to Appendix D.1, and Appendix E.1.

3.2 Discussion of States in O¹⁶

A 1⁻, T=0 state is seen at 7.12 MeV with reported B(E1)'s of $1.24 \times 10^{-4} e^2 f^2$ and $1.64 \times 10^{-4} e^2 f^2$ (Aj71). A spectroscopic factor of .41 is observed (Bo69) from the reaction $^{15}\text{N}(^3\text{He}, d)^{16}\text{O}$ for this level which indicates a fair amount of lp-lh structure. From the $^{15}\text{N}(d, n)^{16}\text{O}$

reaction an $\ell=0$ transfer was seen (Fu67, Mu70), this would indicate that a large component of the 1^- , $T=0$ state is $1s_{1/2}-0p_{1/2}^{-1}$. Without using the monopole shift the calculated energy of this state is about 3.5 MeV too high irrespective of the interaction used. Using the monopole shift the energy is brought to within 0.5 MeV of the observed level. For the K-K interaction in the TDA with the shift the calculated energy is 7.42 MeV and the Sussex interaction gives an energy of 6.69 MeV. The transition rates, $B(E1)$'s for the various cases calculated are all approximately $2 \times 10^{-4} e^2 f^2$ (Appendix D.1).

Theoretically the only contribution to a $B(E1)$ from a 1^- , $T=0$ comes from the isospin mixed $T=1$ component of the vector. This is because the $T=0$ component of the vector has an effective charge $e' = e(1 - 2\frac{Z}{A})$ arising from the center of mass motion of the nucleus. The $T=1$ admixture arises from the difference in the neutron and proton single particle energies. The major component of this 1^- vector is in fact a $T=0$, $1s_{1/2}-0p_{1/2}^{-1}$ excitation with an amplitude about .85. There is however a significant amount of mixing among the $T=0$ components. For the K-K interaction in the TDA with shift the amplitudes are

TABLE 3.2.--O¹⁶. 1st, 1⁻, T=0 vector components.

$0d_{5/2}^{-1}0p_{3/2}^{-1}$	$1s_{1/2}^{-1}0p_{3/2}^{-1}$	$0d_{3/2}^{-1}0p_{1/2}^{-1}$
-.308	.334	-.231

The results from the Sussex interaction are similar to those of the K-K except the level energies are slightly lower. The major component of the lowest 1⁻, T=0 state is $1s_{1/2}^{-1}0p_{1/2}^{-1}$ with zero point energy 6.33 MeV so the K-K interaction pushes the level further away from the zero point energy than does the Sussex. This behavior is expected since the K-K interaction is stronger than the Sussex. The monopole shift decreases the transition rate by increasing the T=0, T=1 splitting, i.e. for the K-K interaction without the monopole shift $B(E1) = 3.5 \times 10^{-4} e^2 f^2$, with the shift $B(E1) = 1.1 \times 10^{-4} e^2 f^2$. The monopole shift thus is essential for the energy and improves the transition rate for this lowest 1⁻, T=0 state.

The 1⁻, T=0 state seen at 9.60 MeV has a small spectroscopic factor of .017 for the N¹⁵(d,n)O¹⁶ reaction and is probably a multiparticle-multi-hole state. It would not then be described within the framework of this calculation.

The next reported 1^- , $T=0$ state (Aj71) is at 12.44 MeV with a spectroscopic factor of .75 (Bo69) and a mixed ' ℓ ' transfer of 0,2 (Fu67, Mu70) is seen in the $N^{15}(d,n)O^{16}$ reaction. This implies that the proton is either an $s_{1/2}$ or $d_{3/2}$ coupled to a $p_{1/2}$ hole or if correlations exist in the core (and these are needed to explain the 6.05 MeV 0^+ state) then the proton can be a $d_{5/2}$ coupled to a $p_{3/2}$ hole. Using TDA and the K-K interaction one must again use the monopole shift in order to obtain decent results. Without the shift the energy of the state is at 16.77 MeV and with the shift the energy of the state decreases to 13.60 MeV. The RPA results with either the K-K or Sussex interaction are essentially identical for this level and for all the other levels. Unless the RPA is specifically discussed it can be assumed that it yields the same results for a given interaction and shift configuration. The major configuration for this 1^- , $T=0$ level is $1s_{1/2}^{-1}0p_{3/2}^{-1}$ which is consistent with the ' ℓ ' transfer. The monopole shift increases the $B(E1)$ from $1.7 \times 10^{-4} e^2 f^2$ to $4.5 \times 10^{-3} e^2 f^2$, the experimental values (Aj71) cited are $3.5 \times 10^{-3} e^2 f^2$ and $6.5 \times 10^{-3} e^2 f^2$ so the monopole shift again seems to improve the transition rate. The increase in the transition rate arises from the change in the $1s_{1/2}^{-1}0p_{1/2}^{-1}$, $T=1$ part of the vector. With the addition of the monopole

shift this component increases from .051 to .350.

What has happened is that with the addition of the shift the $1^- T=0$ at 16.77 MeV is moved down to 13.60 MeV where it is mixed somewhat strongly with the 13.17 MeV $T=1$ state. The Sussex interaction starts off with this $1^- T=0$ state higher (18.87 MeV) so after the shift has been added in, the state only comes down to 15.03 MeV which is not as close to the 1^- , $T=1$ at 13.2 MeV as with the K-K interaction. The $B(E1)$ after the shift is therefore smaller ($4.7 \times 10^{-4} e^2 f^2$) than with the K-K interaction.

A 2^- , $T=0$ at 8.87 MeV is observed along with a 0^- , $T=0$ at 10.95. The ' ℓ ' transfer and spectroscopic factors from the $N^{15}(\text{He}^3, d)O^{16}$ reaction (Bo69) indicate that these levels have a large $1p$ - $1h$ component. The ' ℓ ' transfer and spectroscopic factor for the 2^- state are $\ell=2$, $S=.87$ while for the 0^- state they are $\ell=0$, $S=1.77$. The major component would seem to be for the 2^- , $0d_{5/2}-0p_{1/2}^{-1}$ since it is lower in energy than the $0d_{3/2}-p_{1/2}^{-1}$ and for the 0^- it would be the $1s_{1/2}-0p_{1/2}^{-1}$. The K-K interaction without the shift has $E(2^-)=12.25$ and $E(0^-)=12.93$, with the shift $E(2^-)=8.87$ and $E(0^-)=9.78$. The major component for the 2^- is in fact $0d_{5/2}-0p_{1/2}^{-1}$. Again the monopole shift brings the energy into much better agreement with experiment. The experimental $B(M2)=5.44 \times 10^{-3} e^2 f^4$ for the 2^- state. The calculated $B(M2)$'s are too large without the shift,

$4.2 \times 10^{-2} e^2 f^4$ and also too large with the shift, $2.2 \times 10^{-2} e^2 f^4$. The change in the $B(M2)$ is however in the right direction. The reason for the decrease in the $B(M2)$ with the shift is that the shift reduces the mixing of the $0d_{5/2}^{-1} - 0p_{1/2}^{-1}$, $T=1$ amplitude of the state from .144 to .041. This mixture arises from the 1st 2^- , $T=1$ level near 13 MeV. When the $T=1$ component is completely eliminated the $B(M2) = 1.4 \times 10^{-2} e^2 f^4$.

Most of the contribution to the $B(M2)$ is from the $T=1$ component as it is in general for a $B(MJ)$. For $T=0$ states the magnetic moment contribution to the transition matrix element is $u_p + u_n = .88$ while for $T=1$ states the contribution is $u_p - u_n = 4.71$. The ratio of the 2 parts of the $B(MJ)$ are approximately

$$BMJ(1)/BMJ(0) \sim (4.71)^2 / (.88)^2 = 28.6$$

The Sussex interaction reverses the ordering of the $2^-, 0^-$ states placing them at $E(2^-) = 12.12$ MeV and $E(0^-) = 10.66$ MeV without the shift while with the shift they are at $E(2^-) = 7.96$ MeV and $E(0^-) = 10.38$ MeV. The $B(M2)$'s are weaker as expected. The reason for the reversal is that while the 0^- , $T=0$ diagonal matrix elements for the K-K interaction are repulsive, they become attractive for the Sussex interaction. The K-K interaction is restricted to s-waves only. The major component of the 0^- , $T=0$ state is $(1s_{1/2}^{-1} - 0p_{1/2}^{-1})^{00}$. With the Sussex interaction restricted to s-waves only, the above matrix element is also repulsive but the p and d wave contributions make the matrix element attractive.

TABLE 3.3.--Sussex Matrix Elements for $(1s_{1/2}-0p_{1/2})^{00}$ state in O^{16} .

s-wave contribution	1.18
s,p-wave contribution	-0.70
s,p,d-wave contribution	-1.17

A quartet of $T=1$ states ($0^-, 1^-, 2^-, 3^-$) is seen at 13 MeV. For both interactions without using the monopole shift the quartet comes slightly high in energy. With the monopole shift the energy of the quartet is lowered slightly and is in better agreement with experiment. The $T=0, 1$ splitting is also improved. The $T=1$ quartet comes from two different particle-hole configurations.

$$0^-, 1^- : 1s_{1/2}-0p_{1/2}^{-1}$$

$$2^-, 3^- : 0d_{5/2}-0p_{1/2}^{-1}$$

There is virtually no I-spin mixing in any of the $T=1$ states except for the 0^- which has a significant $1s_{1/2}-0p_{1/2}^{-1}$, $T=0$ amplitude for the K-K interaction. The shift decreases the I-spin mixing of $T=0$ component of this amplitude for the K-K interaction from .4 to .1.

The 1^- , $T=1$ member of the quartet is mainly $1s_{1/2}-0p_{3/2}^{-1}$ and has its admixture with the $T=0$ component increased when the monopole shift is used. Without the

shift the $1s_{1/2}-0p_{3/2}^{-1}$, $T=0$ amplitude is .08 and with the shift the amplitude becomes .33. What happens is that the 1^- , $T=1$ level is mixing with a higher $1^-T=0$ level which has been brought down by the shift to 13.60 MeV from 16.77 MeV. (Experimentally the level is seen at 12.44 MeV). The $B(E1)$ for the 1^- , $T=1$ has been measured (Aj71) as both $.021e^2f^2$ and $.013e^2f^2$. The calculated value of the $B(E1)$ from the K-K interaction is $.032e^2f^2$ without the shift and with the shift $B(E1)=.027e^2f^2$ so the $T=0$ admixture is necessary to decrease the $B(E1)$ and move it towards the experimental value. This can be checked by turning off the Coulomb mixing so the state becomes pure $T=1$ and then the $B(E1)=.032e^2f^2$. The single configuration has a $B(E1)=.083e^2f^2$ so the $0d_{5/2}-0p_{3/2}^{-1}$ $T=1$ component of the vector is contributing incoherently.

The 2^- , $T=1$ part of the quartet at 12.97 MeV has reported $B(M2)$'s of $.24e^2f^2$ and $.26e^2f^4$ (Aj71). The calculated $B(M2)$'s for the K-K interaction are too large and the shift increases the value from $.36e^2f^4$ to $.38e^2f^4$: this is reduced from the single particle value of $1.26e^2f^4$. What appears to happen as the $T=0$ admixture of the state decreases, the $B(M2)$ increases. With the K-K interaction and the RPA with no shift the $B(M2)=.30e^3f^4$ which is slightly less than the TDA value, the reason being that the X and Y amplitudes for the major component, $0d_{5/2}-0p_{3/2}^{-1}$ subtract and the $B(M2)$ is sensitive to the $T=1$ components. The

$B(M2)$ for the Sussex interaction is larger, approximately $.5-.6e^2f^4$ as the interfering $0d_{5/2}-0p_{1/2}^{-1}$, $T=1$ component has been reduced by 50%.

Bernstein (Be71) reports seeing two strong isospin admixed levels at 17.63 MeV and 18.10 MeV. Calculations for the K-K interaction without the shift yield a 1^- , $T=0$ state at 17.99 MeV which is very strongly admixed with a 1^- , $T=1$ level at 18.18 MeV. With the use of the monopole shift both levels become isotopically pure, the 1^- , $T=0$ at 17.99 MeV goes to 15.13 MeV while the 18.18 MeV state becomes an almost pure $T=1$ state at 17.16 MeV. The net result is that no strongly admixed isospin states are predicted near 18 MeV.

In nuclei with $T=0$ ground states the $T=1$ states can be preferentially excited by e,e' at large scattering angles and high momentum transfer. The $O^{16}(e,e')O^{16}$ experiment has been performed (Si69) and a number of $T=1$ complexes have been seen. The complex around 13.5 MeV has already been discussed. Another complex is seen at 17 MeV.

An unresolved $T=1$ doublet is seen at 17.20 MeV (St70), one component of which is a 1^- . Another level which has been given a tentative assignment as a 2^- is seen at 17.60 MeV. Calculation yields for the KK-TDA with the monopole shift a 1^- , $T=1$ at 17.16 MeV and a 2^- , $T=1$ at 17.03 MeV. Without using the shift the energies are

1^- (19.18), 2^- (17.99), about one MeV too high. The Sussex interaction yields energies for these two states which are too high, even with the monopole shift, namely 1^- (17.84), 2^- (16.88).

I. Sick, et al. (Si69) used a Serber-Yukawa interaction to calculate the $T=1$ complexes and obtained energies almost 1.5 MeV too high. The experimental $B(E1)$ for the 17.20 MeV 1^- , $T=1$ level is $.012^2 e^2 f^2$. The calculated value from the KK-TDA with monopole shift is $.023 e^2 f^2$. The major component of the vector is $0d_{3/2}-0p_{1/2}^{-1}$ (amp. 90) which by itself would give a $B(E1)=.41 e^2 f^2$, i.e. 20 times larger. The $B(E1)$ is reduced because the state has sizable components which add incoherently to the main component.

For the 2^- , $T=1$ state corresponding to the state at 17.03 MeV the experimental $B(M2)=.051 e^2 f^4$. The $B(M2)=.054 e^2 f^4$ for the KK-TDA with the monopole shift is approximately twice the single configuration value of $.02 e^2 f^4$. The $T=0$ part of the $B(M2)$ is adding coherently, since for a pure $T=1$ vector the $B(M2) = .048 e^2 f^4$.

Other $T=1$ states with KK-TDA and monopole shift fall into three groups, 18 MeV, 20 MeV and 22 MeV-26 MeV. The 18 MeV complex contains 3 levels, a 2^- (18.64), a 4^- (18.77) and a 3^- (17.89). Stroetzel (St70) reports seeing a 2^- at 18.5 MeV via (e,e') but he does not report any parity or decay assignments. The calculated $B(M2) = .086 e^2 f^4$ for the state compared with the single configuration $B(M2) = .61 e^2 f^4$.

The two major components $0d_{5/2}^{-1}0p_{3/2}^{-1}$ (.662) and $1s_{1/2}^{-1}0p_{3/2}^{-1}$ (-.696) of the state have opposite signs for the amplitudes and they contribute incoherently to the transition rate. The strength which is lost goes into the 2^{-} , T=1 (20.13) where the 2 major amplitudes have the same sign.

Nobody has reported seeing a 3^{-} , T=1 state near 18 MeV or a 4^{-} , T=1 state around 18.5 MeV. The 4^{-} , T=1 state has the largest transition strength in that neighborhood, $B(M4) = 830 e^2 f^8$ with the monopole shift. There is however a tentative assignment of a $(1^{-}, 5^{-})$ to a state at 18.6 MeV, obtained from $C^{12}(\alpha, \alpha')C^{12}$ (Ca64).

The 2^{-} (20.13) T=1 (Si69) carries most of the 2^{-} , T=1 transition strength, $B(M2) = 2.24 e^2 f^4$ which is twice the single configuration value and 1.5-2 orders of magnitude greater than any of the other $B(M2)$'s. In this case it is interesting to note that the KK-RPA value is smaller, $B(M2) = 1.99 e^2 f^4$, because the X and Y components of the wavefunction subtract in calculating the transition rate. This is the magnetic quadrupole state seen at 20.32 MeV by (e,e') with an experimental $B(M2) = 1.04 e^2 f^4$. The state is quite collective as seen by looking at the amplitudes (Appendix E.1). Without the monopole shift the calculated energy 2^{-} , T=1 is 20.94 MeV about .5 MeV too high.

The 1^- state from the 20 MeV complex calculated from the KK-TDA with the monopole shift is at 19.55 MeV. A 1^- state is seen at 19.5 MeV with a $B(E1) = 5.2 \times 10^{-3} e^2 f^2$. The shift in this case brings the energy down from 20.21 MeV to 19.55 MeV but also decreases the $B(E1)$ from $1.5 \times 10^{-2} e^2 f^2$ to $8.3 \times 10^{-3} e^2 f^2$, so the $B(E1)$ agrees much better with experiment.

The 22-26 MeV complex contain a number of 1^- states, they are seen at 22.80 MeV and 22.5 MeV (Aj71). The KK-TDA with shift yields states at 22.62 MeV, $B(E1) = 1.12 e^2 f^2$, which is probably the giant dipole state, and a state at 25.46 MeV, $B(E1) = .31 e^2 f^2$ whose transition strength is about 1/3 the giant dipole strength. The 22.26 MeV does not have a $B(E1)$ reported, however from (Da65) the photo nuclear cross section has a large peak between 22 and 22.5 MeV. At about 24.5 MeV the photo nuclear cross section shows another peak about 1/2 the height of the 22.2 MeV peak. This would probably correspond to the 25.46 MeV calculated level.

A 2^- , $T=1$ state at 23.7 MeV has been tentatively identified. This could correspond to the state at 23.14 calculated with the K-K interaction using the monopole shift. The calculation also yields the following other $T=1$ states a 3^- (24.19, $B(E3) = 45 e^2 f^6$), and a 0^- (26.25). None of these states has of yet been identified, however there are lots of unidentified states in the region.

3.3 3^- States in O^{16}

The first negative parity state in O^{16} is a 3^- $T=0$ observed at 6.13 MeV with reported $B(E3)$'s to the ground state of 188, 214, 209 $e^2 f^6$ (Aj71). Calculation with the bare K-K interaction yields an energy for the state of 8.46 MeV and a $B(E3)$ of 71.3 $e^2 f^6$. The monopole shift while decreasing the energy of the state to 5.08 MeV has very little effect on the $B(E3)$, decreasing it to 69.7 $e^2 f^6$. The state vector for the bare K-K interaction without the shift is mainly $0d_{5/2}-0p_{1/2}^{-1}$, $T=0$ (amp. = .92) but contains other significant $T=0$ components, $0d_{5/2}-0p_{3/2}^{-1}$ (amp. = .30) and $0d_{3/2}-0p_{3/2}^{-1}$ (amp. = -.26). The largest $T=1$ component is the $0d_{5/2}-0p_{1/2}^{-1}$ (amp. = .028) which arises from Coulomb mixing. Including the monopole shift in the calculation decrease the $T=0$, 1 mixing, because of the increased separation of $T=0$ and $T=1$ levels. The $0d_{5/2}-0p_{1/2}^{-1}$, $T=1$ amplitude then becomes .019. Since the $B(E3)$ has been decreased slightly, the $T=1$ part of the vector seems to contribute constructively to the transition rate. To verify this a further calculation was done with the K-K interaction with the Coulomb mixing turned off such that there could be no $T=0$, 1 mixing. Another slight decrease was then observed in the $B(E3)$ down to 67.9 $e^2 f^6$. The results obtained with the bare Sussex interaction are similar to those with the K-K. Since it is a weaker interaction

then the K-K interaction, the energy of the lowest 3^- , $T=0$ state of the Sussex interaction (9.59 MeV) is displaced less from the centroid energy at 11.5 MeV and is therefore found higher in energy than the 3^- , $T=0$ (8.46 MeV) calculated from the K-K interaction.

The $B(E3)$ is also slightly larger, $72.8 e^2 f^6$ and is accompanied by a slightly larger admixture of the $T=1$ component of the vector, $0d_{5/2}-0p_{1/2}^{-1}$ (.036). The relative strengths of the weaker $T=0$ components have switched as compared to the K-K interaction, $0d_{5/2}-0p_{3/2}^{-1}$ (amp. = .26) and $0d_{3/2}-0p_{3/2}^{-1}$ (amp. = -.31). Adding the monopole shift to the Sussex interaction lowers the energy of the 3^- , $T=0$ state to 5.34 MeV and the $B(E3)$ is decreased to $69.5 e^2 f^6$. As before with the K-K interaction the $T=1$ part of the vector has decreased. The net effect of the shift for both interactions is to bring the 3^- level into better agreement with experiment. However, the effect of the shift on the transition rate is negligible. Looking at other 3^- , $T=0$ levels in the TDA one observes that all the transition strength is in the lowest 3^- , $T=0$ state. The ratios of the transition strength to the single particle transition strengths for the 3^- , $T=0$ states are

$$R_1 = 2.25, R_2 = .68, R_3 = .32$$

One expects the RPA to have a large effect on the lowest 3^- $T=0$ state. For the K-K interaction the energy of the state is lowered to 7.05 MeV (8.46 for TDA) and the $B(E3) = 147 e^2 f^6$. The large increase in the $B(E3)$ is due to the large Y components of the vector which add coherently to the X components. It should be pointed out that since normalization requires $X^2 - Y^2 = 1$, large Y's imply large X's. Results with the Sussex interaction are similar except that the 3^- , $T=0$ is at 8.80 MeV and the $B(E3) = 117 e^2 f^6$. The RPA moves both the transitions and the energies in the correct direction. In the case of the K-K interaction the RPA already over binds the lowest 3^- , $T=0$ state without increasing the $B(E3)$ enough. Similiar effects are observed for Ca^{40} . This point will be discussed further in the next section. Using the monopole shift in RPA, the 3^- $T=0$ is extremely over bound for both interactions, the K-K interaction places it at 2.12 MeV while the Sussex interaction places it 3.86 MeV. This is accompanied by a large increase in the transition rate, $367 e^2 f^6$ for the K-K and $180 e^2 f^6$ for the Sussex interaction. The large increase for the K-K interaction is due to the large diagonal matrix

elements in the B matrix, approximately 2 MeV coupled with the large reduction of the diagonal elements in the A-matrix, approximately 3 MeV. This results in producing Y components in the vector of the order of .6 which in turn leads to large X components of the order of 1. Since the Sussex interaction is weaker the results are similar but smaller. Second order diagrams, such as core polarization have not been used and since the major effect of these diagrams is to screen the interaction, one should not be surprised at the over binding. To simulate the screening the overall strengths of the interaction were reduced to 65% along with the potential contribution, α_{ph}^0 , to the monopole shift. This reduced the binding of the 3^- , T=0 to 5.68 MeV and decreased the B(E3) to $104 e^2 f^6$. Aside from changing the position of the 3^- , T=0 state the interaction reduction decreased the 1^- , T=0 and 2^- , T=0 splitting such that it was too small (Table 3.4).

TABLE 3.4.-- 1^- , 2^- T=0 Splitting.

	exp.	K-K-TDA MS	K-K-TDA MS	KK(65)-RPA MS
2^-	8.87	8.87	8.82	8.48
1^-	7.12	7.42	7.11	7.98
dif	1.75	1.45	1.71	.51

Within the RPA it is found that in order to reproduce correctly the energy of the 3^- , $T=0$ state the transition rate becomes too small and in order to obtain the correct transition rate for the state the energy becomes too small. Similar problems have been found in Ca^{40} (B169).

The 3^- , $T=0$ state is extremely sensitive to the shift and it is perhaps not a good idea to use this state as a criteria for the validity of the monopole shift.

Another approach to the 0^{16} problem that avoids the use of the monopole shift is to use a C^{12} core and consider 4-particle excitations where the single particle levels are obtained from C^{13} . Such a calculation was done by Zuker, et al. (Zu68). The particle levels outside the C^{12} core were limited to $0p_{1/2}$, $0d_{5/2}$, $1s_{1/2}$. With such a model space the positive parity levels can also easily be calculated. For the low-lying states (i.e. up to 8 MeV) Zuker et al. obtained very good agreement with experiment and quite reasonable agreement with experiment up through the low-lying $T=1$ quartet. The binding energies of 0^{15} , 0^{17} also came out quite well.

In summary the present calculation with "realistic" interactions and a monopole shift gives results for the 0^{16} p-h spectrum which are quite comparable to calculations like that of Gillet where the force is treated as a parameter. There is a correspondingly good identification with

many of the experimentally observed states. There are some significant differences from previous calculations, particularly in the estimates of isospin mixing, which is in general less in the present calculation and more in agreement with experiment as measured by transition rates. The position of the giant electric dipole (22-25 MeV) and magnetic quadrupole (~20 MeV) excitations is given quite well, i.e. from Table 3.6 $\bar{E}(1^-, T=1) = 22.93$ MeV and $\bar{E}(2^-, T=1) = 19.79$ MeV but their strength is overestimated by 50-100%, a feature common to all p-h excitation calculations.

TABLE 3.5.--Partial Summary of O^{16} for Explanation of Maj. Comp. see Appendix C.

Exp	BJ (Exp)	KK		KK-MS		Remarks
		E(maj. comp.) BJ	E(maj. comp.) BJ	E(maj. comp.) BJ	E(maj. comp.) BJ	
$3^-, 0$ 6.13	188	8.46 (4/3,3) 71	5.08 69.7	(4/3,3)		
$1^-, 0$ 7.12	1.24×10^{-4} 1.64×10^{-4}	10.62 3.49×10^{-4}	7.41 1.12×10^{-4}	(5/3,3)		
$2^-, 0$ 8.87	.0054	12.25 .042	8.87 .022	(4/3,3)		
$1^-, 0$ 9.60	2.38×10^{-5} 1.94×10^{-5}					Probably multiparticle- multi-hole state
$3^-, 0$ 11.44						
$3^-, 0$ 11.63						
$1^-, 0$ 12.44	.0064 .0035	16.77 .00016	13.60 .0045	(5/2,3)	(5/3,3)	
$2^-, 0$ 12.53	.084	16.73 .086	13.87 .091	(6/3,3)	(6/3,3)	
$3^-, 0$ 13.13		16.37 17	13.26 20	(4/2,3)	(4/2,3)	

TABLE 3.5.--Continued.

Exp	BJ (Exp)	KK		KK-MS		Remarks
		E (maj. comp.) BJ		E (maj. comp.) BJ		
<u>13 MeV compl.</u>						
0 ⁻ , 1 12.80		13.83	(5/3,5)	13.07	(5/3,5)	
2 ⁻ , 1 12.97	.26 .24	13.24 .36	(4/3,5)	12.31 .38	(4/3,5)	also seen in 156 MeV p p'
1 ⁻ , 1 13.09	.013 .021	13.85 .032	(5/3,5)	13.17 .027	(5/3,5)	
3 ⁻ , 1 13.20		13.23 19	(4/3,5)	12.31 18	(4/3,5)	
<u>17 MeV comp.</u>						
1 ⁻ , 1 17.20	.012	18.18 .010	(6/3,5)	17.16 .023	(6/3,5)	Levels from e,e' unresolved doublet one component 1 ⁻
(2 ⁻), 1 17.60	.051	17.99 .028	(6/3,5)	17.03 .054	(6/3,5)	
<u>18 MeV Comp.</u>						
3 ⁻ , 1		18.83 26	(4/2,5)	17.89 25	(4/2,5)	Levels from e,e' not seen
2(1 ⁻), 1 18.50		19.35 .015	(5/2,5)	18.64 .086	(5/2,5)	no parity or decay assignments

TABLE 3.5.--Continued.

Exp	BJ (Exp)	KK		KK-MS		Remarks
		E (maj. comp.) BJ	(4/2,5)	E (maj. comp.) BJ	(4/2,5)	
4^-		19.71 809	(4/2,5)	18.73 830	(4/2,5)	not seen
<u>20 MeV comp.</u>						
1^- , 1	19.50	.0052	(5/2,5)	19.55 .008	(5/2,5)	
2^- , 1	20.32	1.04	(4/2,5)	20.13 2.24	(4/2,5)	giant magnetic quadrupole
<u>22-26 MeV comp.</u>						
1^- , 1	22.8		(4/2,5)	22.62 1.12	(4/2,5)	giant dipole
$(2^-, 1)$	23.7		(6/2,5)	23.14 .71	(6/2,5)	
3^- , 1			(6/2,5)	24.19 45	(6/2,5)	not seen
1^- , 1	25.5		(6/2,5)	25.46 .31	(6/2,5)	
0^- , 1			(6/2,5)	26.25	(6/2,5)	not seen

TABLE 3.6.-- ^{16}O Centroid Energies, Energy Dispersions and Sum Rules for Representative Configurations of the K-K Interaction with the Monopole Shift (For Formulas See Appendix A).

	$1^-, T=1$	$2^-, T=1$	$3^-, T=0$	$3^-, T=0$.65RPA	$3^-, T=1$	$4^-, T=1$	$2^+, T=0$	$2^+, T=1$
$\bar{E}$	22.93	19.79	8.29	9.03	19.95	18.77	35.34	45.52
ΔE	1.92	2.95	4.99	4.87	4.73	0.0	3.58	2.50
S	34	69	840	1431	1765	15581	118	112

Observed $1^-, T=1$

$$\bar{E} = 23.5$$

S~15

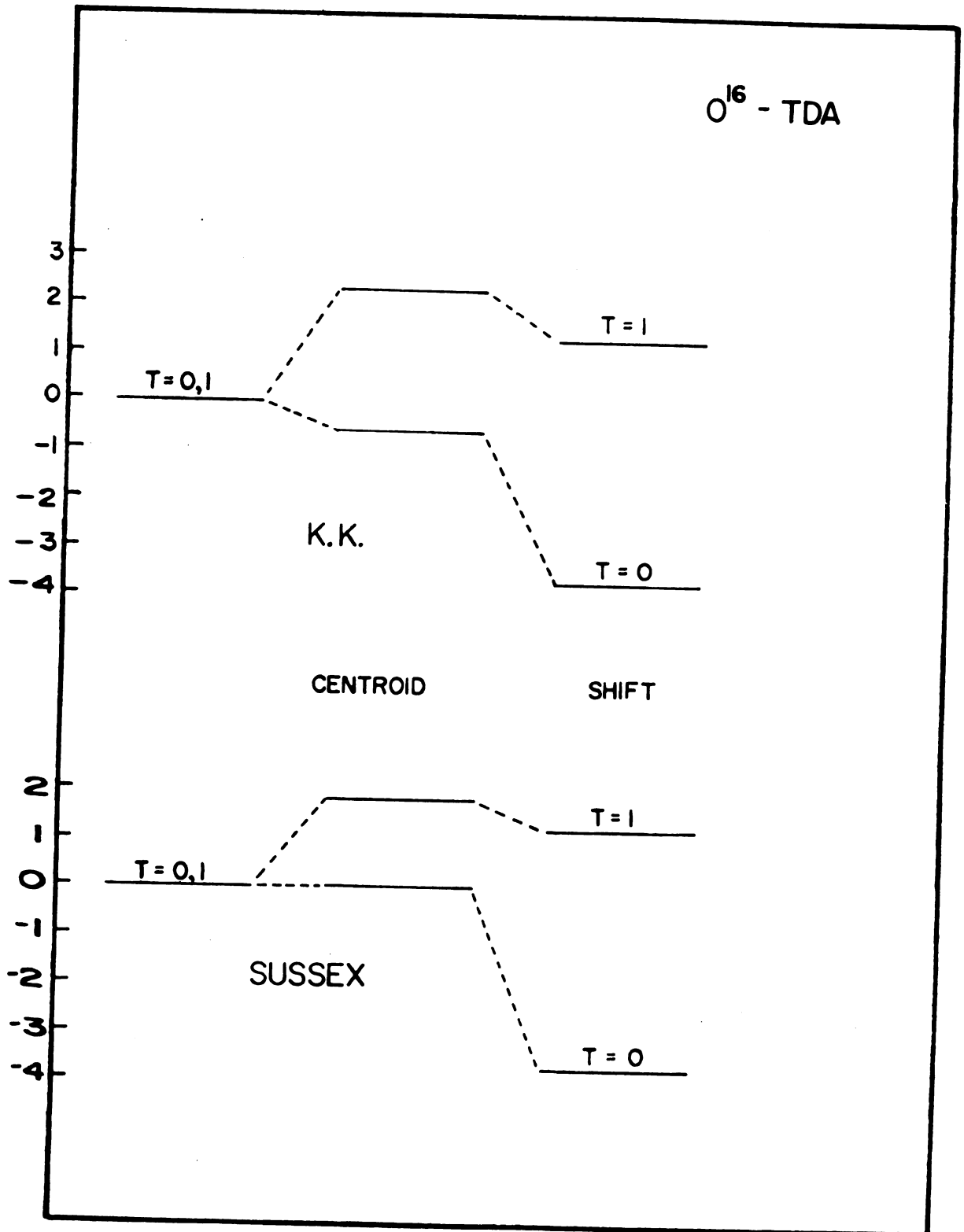


FIGURE 1.-- O^{16} Monopole Shifts.

FIGURE 2.--O¹⁶ K-K Energy Levels.

A = exp.

B = KK-TDA

C = KK-MSTDA

D = KK-RPA

E = KK-RPA Shift

F = KK-RPA Shift 65%

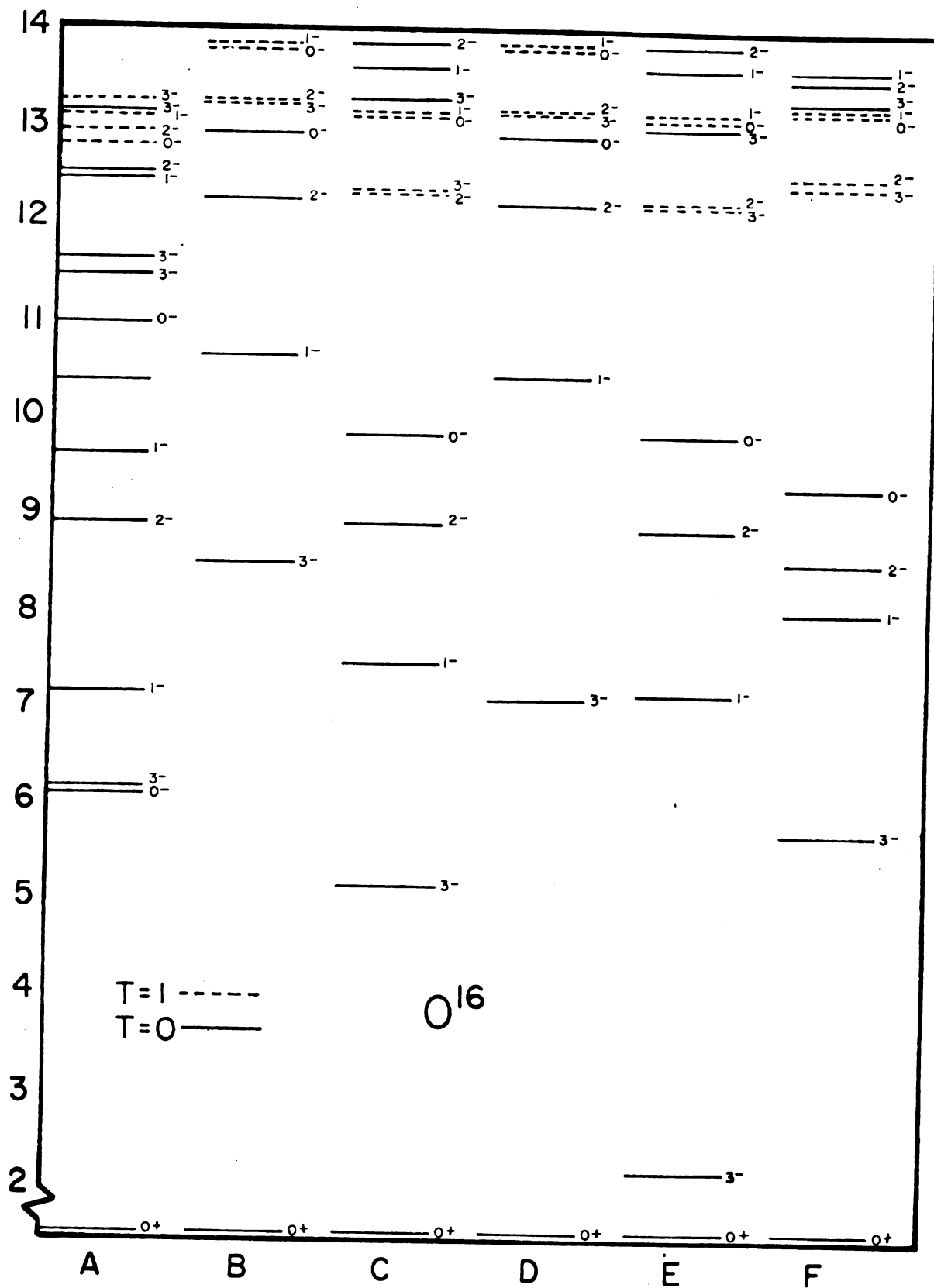


FIGURE 3.--O¹⁶ Sussex Energy Levels.

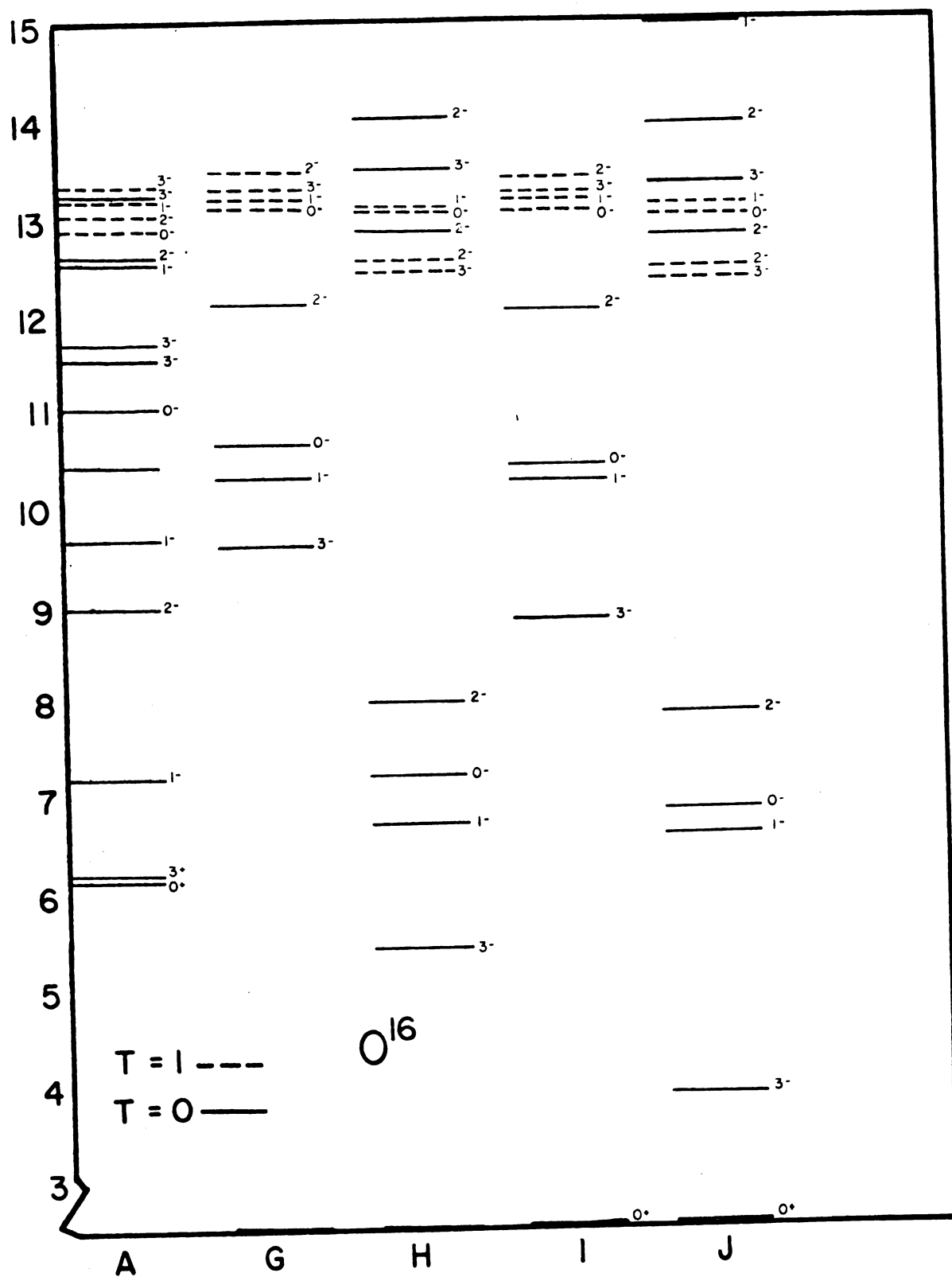
A = exp.

G = Sussex-TDA

H = Sussex-Shift TDA

I = Sussex RPA

J = Sussex MS - RPA



CHAPTER IV

Ca⁴⁰

4.1. Ca⁴⁰ General Discussion

A number of studies have been made of Ca⁴⁰. Gillet and Sanderson (Ge67) calculated the odd parity spectrum of Ca⁴⁰ within the framework of a lp-lh model. They used a parameterized interaction fitted to the lowest 3⁻, T=0 and 5⁻, T=0 levels. Correlations in the ground state were taken into account through the RPA which yielded a ground state wavefunction whose 0p-0h amplitude was only .6 or about 36% pure shell model. They also found the lowest 3⁻, T=0 state to be extremely sensitive to the interaction. This sensitivity for the lowest 3⁻ state has also been observed in O¹⁶, Ca⁴⁸, Sr⁸⁸ and Pb²⁰⁸. Gillet also reported strong T=0, 1 admixtures for the higher octopole states. This admixture is contrary to results found by Erskine (Er66) in the K³⁹(He³,d)Ca⁴⁰ reaction. In this reaction Erskine identified the major components of the configurations (0f_{7/2}-0d_{3/2}⁻¹)_{T=0}, (0f_{7/2}-0d_{3/2}⁻¹)_{T=1} and (1p_{3/2}-0d_{3/2}⁻¹)_{T=0} through a DWBA analysis of the 'd' transfer. T. Kuo (Ku71) recently did a Ca⁴⁰(p,p')Ca⁴⁰ experiment and confirmed some of Erskine's tentative level assignments and in

addition deduced a number of transition rates. Both the (He^3, d) and (p, p') reactions excite both $T=0$ and $T=1$ states in Ca^{40} . In order to locate the $T=1$ states by themselves one could use a charge transfer reaction $\text{Ca}^{40}(\text{He}^3, t)\text{Sc}^{40}$ to excite the $T=1$ states of Sc^{40} . This experiment does not seem to have been done.

The $T=1$ states from the $(0f_{7/2}-0d_{3/2}^{-1})$ multiplet in Ca^{40} are the isobaric analog of the Sc^{40} states. The energy of the analog states can be obtained from the average Coulomb shift. The energy differences $\text{Sc}^{40}-\text{Ca}^{40}$ and $\text{K}^{40}-\text{Ca}^{40}$ are mainly due to the difference in the Coulomb energies of the nuclei. A slightly more accurate description would also include the proton-neutron mass difference. The average Coulomb shift is

$$V_c = \frac{(\text{Sc}^{40}-\text{Ca}^{40}) + (\text{K}^{40}-\text{Ca}^{40})}{2} = 7.8$$

The first $T=1$ state seen in Ca^{40} is the 4^- at 7.69 MeV which is the analog of the 4^- ground state of K^{40} or Sc^{40} .

4.2. Discussion of States in Ca^{40}

In order to simplify the discussion, each of the previous three multiplets will be discussed separately. The reader is urged to make use of Table 4.3 found at the end of this section which is organized by multiplet. A

complete summary of the calculation will be found in Appendices D.2 and E.2.

There exists a large number of low-lying states of both parities in Ca^{40} which can not be explained from a simple lp-lh shell model calculation. The low-lying positive parity states have been explained microscopically as multiparticle-multihole states calculated on a deformed basis. Gerace and Green (Ge67) constructed these deformed states from 2p-2h states and 4p-4h states where they placed the 4p-4h states below the 2p-2h states. They found the 0^+ vectors to be

$$|0^+_1(0.00)\rangle = .90|0p-0h\rangle + .41|2p-2h\rangle + .11|4p-4h\rangle$$

$$|0^+_2(3.55)\rangle = .20|0p-0h\rangle - .18|2p-2h\rangle - .96|4p-4h\rangle$$

i.e. the ground state is mainly 0p-0h but contains 16% 2p-2h while the second 0^+ is mainly 4p-4h.

Four 3^- states are observed between the ground state and the first T=1 state at 7.69 MeV, three of these 3^- states are below 7 MeV. The low-lying lp-lh configurations are $(0f_{7/2}-0d_{3/2}^{-1})$, $(1p_{3/2}-0d_{3/2}^{-1})$, $(0f_{7/2}-1s_{1/2}^{-1})$, the latter two being almost degenerate, all of which have their centroid energies above 7 MeV. Using realistic interactions and the particle-hole gap of 7.2 MeV obtained from the mass table it is difficult to position more than one of the 3^- states arising from those configurations below 7 MeV. The monopole shift however places two levels below 7 MeV. Gerace

and Green (Ge68) described the negative parity states by coupling shell model states on to the deformed states or microscopically as mixtures of lp-lh states and 3p-3h states. They also used a different value of the particle-hole gap by calculating it with shell model state energies and found it to be 5.4 MeV.

In the present calculation the particle-hole gap was obtained from the mass tables and the single particle levels used were chosen from neighboring nuclei.

Coulomb mixing was accomplished as in O^{16} by mixing the $T=0,1$ states through the off diagonal matrix elements $1/2(\epsilon_p^p - \epsilon_h^p + \epsilon_p^n - \epsilon_n^n)$ and the proton particle hole gap was reduced by .3 MeV to simulate the Coulomb shift of the single excited proton.

4.2.1. $(0f_{7/2} - 0d_{3/2}^{-1})$ Multiplet

Erskine (Er66) observed $\ell=3$ transfers in the $K^{39}(\text{He}^3, d)\text{Ca}^{40}$ reaction to states at 3.72 MeV, 4.49 MeV, 5.61 MeV, a mixed $\ell=1,3$ transfer to the state at 6.03 MeV and a $\ell=1$ transfer to the state at 6.75 MeV. Upon the basis of the $\ell=3$ transfer Erskine identified the first four levels as belonging to the $(0f_{7/2} - 0d_{3/2}^{-1})_{T=0}$ multiplet. His identifications were $3^-(3.72)$, $5^-(4.49)$, $4^-(5.61)$, $2^-(6.03)$.

T. Kuo (Ku71) agreed with Erskines first three ' ℓ ' transfers. However he could not assign an ' ℓ ' transfer to the state at 6.03 MeV but assigned an $\ell=3$ transfer to a state at 6.75 MeV.

TABLE 4.1.--Ca⁴⁰ Single Particle Levels.

	0d _{5/2}	1s _{1/2}	0d _{3/2}	0f _{7/2}	1p _{3/2}	1p _{1/2}	0g _{9/2}	1d _{5/2}	0f _{5/2}
p	-14.23	-11.13	- 9.33	-1.09	0.81	3.01	4.51	4.91	5.31
n	-21.82	-18.72	-15.92	-8.36	-6.42	-4.41	-2.76	-2.36	-1.96

Experimentally both the 6.03 MeV (2^-_1) and the 6.75 MeV (2^-_2) states have been identified as 2^- T=0 states, but the two experiments quoted disagree as to which is the state to be assigned to the configuration. The present calculation with the K-K interaction and without the monopole shift places the energy of the $(0f_{7/2}-0d_{3/2}^{-1})_{T=0}$ multiplet too high, i.e. 3^- (5.6), 5^- (5.83), 4^- (7.15), 2^- (8.10). With the monopole shift the states are at 3^- (4.34), 5^- (4.48), 4^- (5.91), 2^- (6.81). The monopole shift is needed in order to bring the 5^- and 4^- states into good agreement with experiment. The results with the Sussex interaction using the monopole shift for the 5^- (6.35) and 4^- (7.11) are also in good agreement with experiment. However, the K-K interaction with the monopole shift places the 2^- at 6.80 MeV which is in better agreement with the 2^-_2 than the 2^-_1 , on the other hand the Sussex interaction with the shift places the 2^- at 6.23 MeV which is in better agreement with the 2^-_1 than the 2^-_2 .

Gerace and Green have calculated that the 5^-_1 and 4^-_1 states are almost pure shell model while the 2^-_1 level is mostly deformed, being 67% 3p-3h. They found the 2^-_2 level to be 29% 3p-3h. The major shell model component was $0f_{7/2}-0d_{3/2}^{-1}$. These admixtures of the 3p-3h states in the 2^- vectors could explain the ambiguities between Erskine's results and Kuo's results in the ' ℓ ' transfers. Gerace's

identification of the 2^-_2 being mostly shell model tends to favor the K-K calculation with monopole shift over the similar Sussex calculation.

For the 5^- member of the multiplet the experimental $B(E5)=2.43 \times 10^5 e^2 f^{10}$, the K-K interaction without the shift has $B(E5)=1.75 \times 10^5 e^2 f^{10}$ while with the monopole shift $B(E5)=1.69 \times 10^5 e^2 f^{10}$, a slight decrease.

For the 4^- , $T=0$ level of the multiplet the values of $B(E4)$ for the K-K potential with and without the shift are $92 e^2 f^8$ and $35 e^2 f^8$ respectively. The decrease in the $B(M4)$ with the monopole shift is due to the decrease in the $T=1$ admixture. The Gillet vector for this state is very similar to the K-K interaction vector when the monopole shift is used, i.e. about 10% of the vector is $T=1$.

The screened RPA (65% K-K with the monopole shift) places the 5^- (4.80) and the 4^- (5.84) states close to the right values, the $B(E5)=2.12 \times 10^5 e^2 f^{10}$ which is a slight improvement over the TDA results while $B(E4)=31 e^2 f^8$.

The 3^- , $T=0$ state of the $(0f_{7/2}-0d_{3/2}^{-1})$ multiplet is quite collective, its largest component, as expected is $(0f_{7/2}-0d_{3/2}^{-1})$ but it represents less than 40% of the vector, the $(0f_{7/2}-1s_{1/2}^{-1})$ configuration contains about 18% while the $(1p_{3/2}-0d_{3/2}^{-1})$ and the $(0f_{7/2}-0d_{5/2}^{-1})$ each contain about 10% of the vector. This structure for the vector along with a negligible $T=1$ admixture is independent of whether or not the monopole shift is used. The calculated $B(E3)=869 e^2 f^6$

for the KK-TDA no shift, this is an order of magnitude higher than the single configuration value of $66 e^2 f^6$ and is a factor of 3 smaller than the experimental value of $2410 e^2 f^6$. The KK-RPA without the monopole shift gives a $B(E3)=3\ 190 e^2 f^6$. These results are quite similar to the results obtained by J. Blomqvist and T. T. S. Kuo (Be69) with the bare G-matrix.

The K-K interaction in the RPA with monopole shift drives the 3^- level imaginary. The screened RPA has $B(E3)=1120 e^2 f^6$ (6.62 MeV). A slightly smaller value for the screening, say 70% of full strength for the matrix elements might have given an almost perfect fit to the energies of the $0f_{7/2}-0d_{3/2}^{-1}$ quartet. The problem of fitting the 3^- energies and the $B(E3)$'s has been discussed by J. Blomqvist (Bl69). They used various combinations of second order graphs in the RPA to try and fit both the energy of the 3^- state and the relative transition strengths.

Their best fit to the relative transition rates resulted in the 3^- energy being too low, 1.33 MeV, while their best fit to the energy (using a different combination of graphs than with the relative transition rates) resulted in all the 3^- strength being put into the lowest state whereas experimentally the 3^-_2 has about .28 the strength of the 3^-_1 .

TABLE 4.2.--Relative Strengths of the 3^- , $T=0$ States in Ca^{40} .

Exp.		Blomqvist	K-K	KK-Shift
3^-_1	1.00	1.00	1.00	1.00
3^-_2	.28	.12	.03	.19
3^-_3	.16	.15	.17	.06

The same problem exists in the bootstrap theory (Go70). Attempts to find self consistent solutions of the equations for Ca^{40} resulted in the phonon energy of the 3^- state being driven to zero if an attempt was made to stabilize the transition rate near the experimental value. A first order solution to the bootstrap equations confirmed Gerace and Green's choice of 5.4 MeV for the particle-hole gap. If one inputs a 5.4 MeV particle-hole gap in the Hartree-Fock levels into the bootstrap equations then the first order solution to the observed particle-hole splitting is 7.2 MeV in agreement with the value obtained from the mass table.

The $(0f_{7/2}-0d_{3/2}^{-1})$, $T=1$ levels were also identified by Erskine through $\ell=3$ transfers in the $\text{K}^{39}(\text{He}^3, d)\text{Ca}^{40}$ reaction. He found them at, $4^- (7.66)$, $3^- (7.70)$, $2^- (8.47)$ and $5^- (8.55)$. They were however mainly identified through their position in relationship to their being analogs of the $(0f_{7/2}-0d_{7/2}^{-1})$ multiplet in Sc^{40} and K^{40} . The K-K interaction without the shift places the levels slightly high, at $4^- (7.82)$, $3^- (7.75)$, $5^- (8.43)$, $2^- (8.99)$ while with the monopole shift they are

found slightly low, at 4^- (7.15), 3^- (7.47), 5^- (7.87), 2^- (8.42). In both cases it should be noted that the 2^- , 5^- splitting has been reversed by the K-K interaction. The results for the Sussex interaction are similar except that the levels come a little lower and closer together.

The monopole shift also provides the correct separation between the $T=0,1$ parts of the multiplet. Without the shift the two sets of levels intermix (Fig. 4).

R. Schaeffer (Sc71a) calculated the position of the $(0f_{7/2}-0d_{3/2}^{-1})$ $T=1$ configuration states in Ca^{40} from the experimental levels of K^{40} and Sc^{40} by taking into account the Coulomb shifts. The results of this calculation agree much better with the results obtained from the K-K interaction with the shift than they do with experiment.

4.2.2. $(1p_{3/2}-0d_{3/2}^{-1})_{T=0}$ and $(0f_{7/2}-1s_{1/2})_{T=0}$ Multiplets

Erskine also observed a number of $\ell=1$ transfers along with the $\ell=3$ transfers. The lowest $1p-1h$ configuration which would exhibit an $\ell=1$ transfer in the $\text{K}^{39}(\text{He}^3, d)\text{Ca}^{40}$ reaction is the $(1p_{3/2}-0d_{3/2}^{-1})$. The allowed values of J for this multiplet are $J=0^-, 1^-, 2^-, 3^-$. The $(1p_{3/2}-0d_{3/2}^{-1})$ is almost degenerate with the $(0f_{7/2}-1s_{1/2}^{-1})$ whose allowed J values are $J=3^-, 4^-$. (Fig. 5). Since the two configurations are almost degenerate one should expect a lot of configuration mixing for the 3^- states.

The 1^- , $T=0$ state from the $(1p_{3/2}-0d_{3/2}^{-1})$ multiplet for the K-K interaction with the monopole shift is at 7.19 MeV (8.45 without the shift). There are two observed 1^- , $T=0$ states at 5.90 MeV (1^-_1) and at 6.94 MeV (1^-_2). Gerace and Green find that the 1^-_1 is mostly deformed and has a 3p-3h amplitude of .98. On the other hand they assign the 1^-_2 to be practically pure shell mode (4% deformed) with the major component the $(1p_{3/2}-0d_{3/2}^{-1})$. This is in good agreement with the present calculation.

Nobody has yet reported seeing the 0^- level or the 2^- level from this multiplet.

The 3^- state from the $(1p_{3/2}-0d_{3/2}^{-1})$ multiplet mixes quite strongly with the 3^- state from the $(0f_{7/2}-1s_{1/2}^{-1})$ multiplet as expected. The K-K interaction with the monopole shift predicts two 3^- , $T=0$ states with major components,

$$|3^-_2(6.56)\rangle = .65|1p_{3/2}-0d_{3/2}^{-1}\rangle - .60|0f_{7/2}-1s_{1/2}^{-1}\rangle$$

$$|3^-_3(7.75)\rangle = -.51|1p_{3/2}-0d_{3/2}^{-1}\rangle + .64|0f_{7/2}-1s_{1/2}^{-1}\rangle$$

the 3^-_3 state has a significant $T=1$ component from $(0f_{7/2}-0d_{3/2}^{-1})$, Gerace and Green calculate that the 3^-_2 state is about 50% deformed with major shell model configurations of $(1p_{3/2}-0d_{3/2}^{-1})$ and $(0f_{7/2}-1s_{1/2}^{-1})$ while the 3^-_3 is pure shell model with major configuration of $(0f_{7/2}-1s_{1/2}^{-1})$. Experimentally there are two 3^- , $T=0$ states near 3^-_2 , at 6.28 MeV and 6.58 MeV. Erskine found a $\ell=1$

transfer to both the states. It doesn't seem that one can make a firm identification for the theoretical $3^-_2(6.56)$ with either the 6.28 MeV or 6.58 MeV level, but that the strength is split between both levels.

A third 3^- , $T=0$ level is seen at 7.53 MeV. Erskine assigned it to the $(1p_{3/2}-0d_{3/2}^{-1})$ multiplet on the basis of an $\ell=1$ transfer. Gerace and Green calculate a 3^- , $T=0$ level at 8.05 MeV which is 36% deformed and whose major shell model configuration is a $(1p_{3/2}-0d_{3/2}^{-1})$. Part of the $3^-_3(7.75)$ strength may be contained in this level.

There appears to be seen experimentally much more 3^- strength than can be accounted for in a $1p$ - $1h$ calculation. Most of the 3^- levels in the 7 MeV region are probably mixtures of $3p$ - $3h$ states and the above two multiplets. The effect of the monopole shift is to decrease the $T=0,1$ mixing for some of the levels but to increase the mixing for other levels. This is due to the large size (18×18) of the 3^- matrix (i.e. accidental degeneracies occur). The 4^- , $T=0$ state from the $(0f_{7/2}-1s_{1/2}^{-1})$ multiplet is found at 9.08 MeV with the K-K interaction and the monopole shift. The effect of the monopole shift on the state is to remove the $T=1$ components, greatly reducing the theoretical transition rate. No 4^- , $T=0$ state has yet been identified in that region. There is however a 4^- , $T=0$ level seen at 7.11 MeV. Gerace and Green have calculated a total of three 4^- states, $4^-_2(7.27)$ which is 83% deformed and $4^-_3(9.70)$ which is

mainly ($0f_{7/2}^{-1}s_{1/2}^{-1}$). The state seen is probably the deformed state and not the shell model state.

As in the case of O^{16} one notices that the Sussex interaction is much more attractive for the 0^{-}_1 level than K-K interaction.

The giant dipole resonance is found through the photo nuclear reactions (γ, p) , (γ, n) and is centered about 19 MeV. The K-K interaction with the monopole shift predicts it to be at 18.0 MeV and without the shift at 18.5 MeV (see Table 4.4).

TABLE 4.3.--Partial Summary of Ca⁴⁰ for Explanation of (Maj. Comp.) See Appendix C.

Exp.	BJ(Exp.)	KK		KK-MS		Remarks
		E(maj. comp.) BJ	E(maj. comp.) BJ	E(maj. comp.) BJ		
<u>(0f_{7/2}-0d_{3/2}⁻¹)_{T=0}</u>						
3 ⁻ , 3.731	2410	5.64 869	(7/6,3)	4.43 846	(7/6,3)	Collective
5 ⁻ , 4.487	2.43x10 ⁵	5.83 1.75x10 ⁵	(7/6,3)	4.48 1.69x10 ⁵	(7/6,3)	
4 ⁻ 5.609		7.15 92	(7/6,3)	5.91 35	(7/6,3)	no B(M4) reported
2 ⁻ , 6.025						67% 3p-3h (Ge68)
2 ⁻ , 6.750		8.10 .29	(7/6,3)	6.80 .15	(7/6,3)	29% 3p-3h (Ge68)
<u>(0f_{7/2}-0d_{3/2}⁻¹)_{T=1}</u>						
4 ⁻ , 1 7.66		7.82 1.07	(7/6,5)	7.15 1.85	(7/6,5)	
3 ⁻ , 1 7.67		7.75 82	(7/6,5)	7.45 83	(7/6,5)	
2 ⁻ , 1 8.47		8.99 .44	(7/6,5)	8.42 .48	(7/6,5)	

TABLE 4.3.--Continued.

Exp.	BJ (Exp.)	KK E (maj. comp.) BJ	KK-MS E (maj. comp.) BJ	Remarks
5 ⁻ , 1 8.54		8.43 6x10 ⁴	(7/6,5) 7.87 6.5x10 ⁴	(7/6,5)
<u>(1p_{3/2}-0d_{3/2}⁻¹)_{T=0}</u>				
<u>(0f_{7/2}-1s_{1/2})_{T=0}</u>				
1 ⁻ , 5.90				98% 3p-3h (Ge68)
1 ⁻ , 6.94		8.45 1.73x10 ⁻⁴	(8/6,3) 7.19 6.02x10 ⁻⁵	(8/6,3) 4% 3p-3h (Ge68)
0 ⁻		9.8	8.6	not seen
2 ⁻		9.08 .42	(8/6,3) 7.85 .78	(8/6,3) not seen
3 ⁻ 6.28	227			Large 3p-3h components shell model states very mixed, see text.
3 ⁻ 6.58	139	can't make assign- ment due to mixing	6.56 157	
3 ⁻ 7.53	31.3	8.98 24	(7/5,3) 7.75 47	(7/5,3)
4 ⁻ 7.11				83% 3p-3h (Ge68) calculated to be at 7.27 MeV
4 ⁻		10.28 733	(7/5,3) 9.08 4.62	(7/5,3) Not seen. Large difference due to M.S. removing T=1 components from the state.

TABLE 4.4.--Ca⁴⁰ Centroid Energies, Energy Dispersions and Sum Rules for Representative Configuration of the KK Interaction with the Monopole Shift (for formulas see Appendix A).

	1 ⁻ T=1	1 ⁻ T=1 .65RPA	2 ⁻ T=1	3 ⁻ T=0	3 ⁻ T=0 .65RPA	3 ⁻ T=1	4 ⁻ T=1	2 ⁺ T=0	2 ⁺ T=1
$\bar{E}$	18.00	16.47	14.89	6.80	7.23	15.15	13.34	13.98	20.26
ΔE	1.65	1.40	3.00	4.48	3.97	3.46	2.70	1.17	1.76
S	85	61	255	8643	14270	15868	1.96x10 ⁵	583	701

Observed 1⁻, T=1

$$\bar{E} = 19.8$$

$$S = 44$$

FIGURE 4.--Ca⁴⁰ ($0f_{7/2}-0d_{3/2}^{-1}$) Multiplet.

A = exp.

B = KK

C = KK-MS

D = Sussex

E = Sussex-MS

F = .65 KK-RPA MS

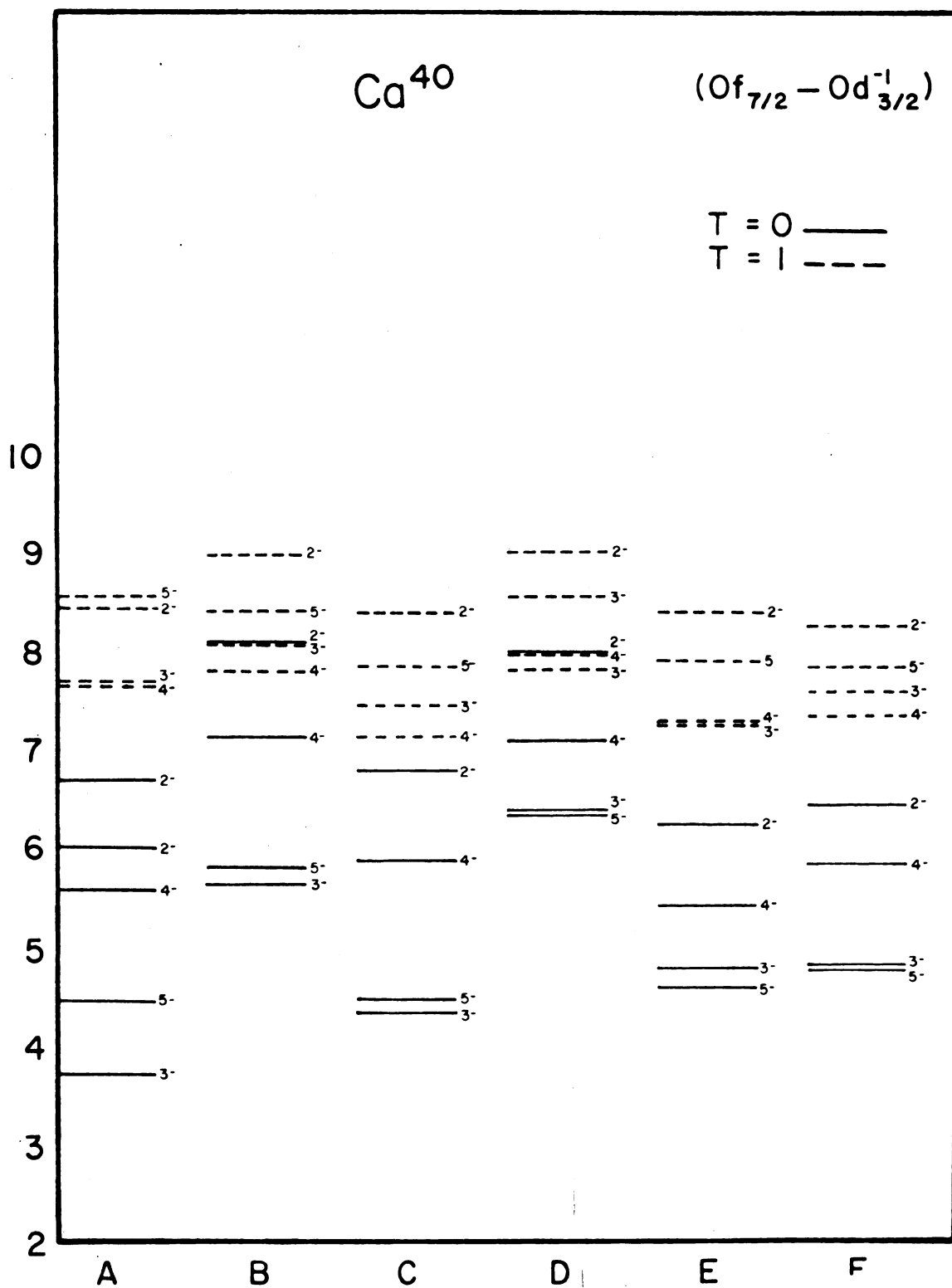


FIGURE 5.--Ca⁴⁰ ($1p_{3/2}^{-1}0d_{3/2}^{-1}$), ($0f_{7/2}^{-1}s_{1/2}^{-1}$) Multiplets.

A = exp.

B = KK

C = KK-MS

D = Sussex

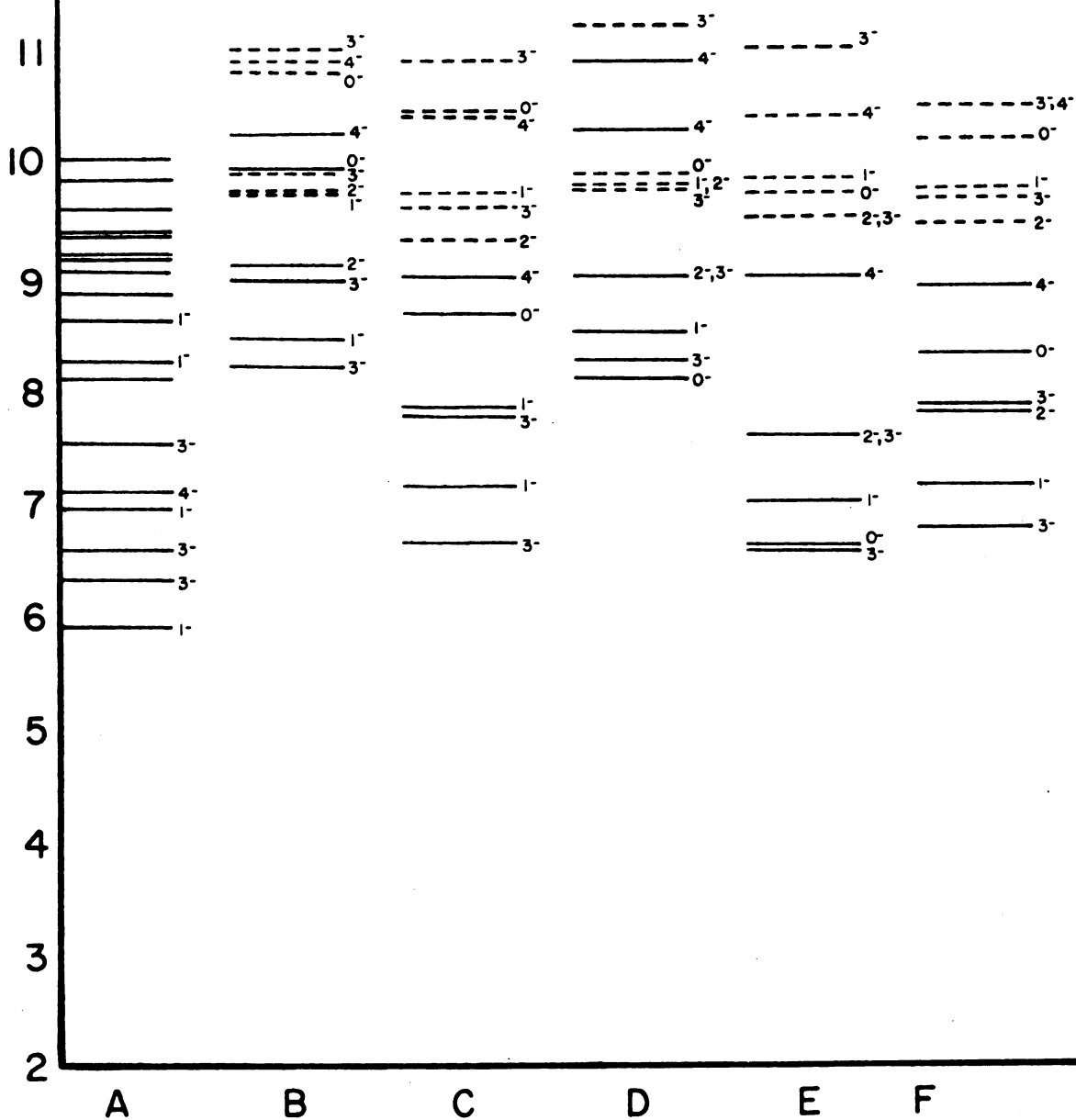
E = Sussex-MS

F = .65 KK-RPA MS

Ca⁴⁰ $(1p_{3/2} - 0d_{3/2}^{-1})$ $(0f_{7/2} - 1s_{1/2}^{-1})$

T = 1 - - - -

T = 0 ————



CHAPTER V

Ca^{48}

The reader is urged to make use of Table 5.3 at the end of this section which briefly summarizes the levels of Ca^{48} . For a more complete summary of the Ca^{48} calculation the reader is referred to Appendices D.3 and E.3.

Ca^{48} differs from the previous two nuclei in that N is greater than Z and that the isospin of the ground state is no longer zero but $T=4$. The experimental levels (Fig. 7) were obtained from various experiments (p, p') (Pe65, Le67) and transition rates for the $2^+(3.830)$ $B(E2)=45.7 \text{ e}^2\text{f}^4$, $3^-(4.50)$ $B(E3)=1.05 \times 10^3 \text{ e}^2\text{f}^6$ and the $5^-(4.49)$ $B(E5)=7.77 \times 10^5 \text{ e}^2\text{f}^{10}$ were obtained from C. Gruhn (Gr72). The single particle levels used were obtained from the neighboring nuclei.

TABLE 5.1.-- Ca^{48} Single Particle Levels.

	$0d_{5/2}$	$1s_{1/2}$	$0d_{3/2}$	$0f_{7/2}$	$1p_{3/2}$	$0f_{5/2}$	$1p_{1/2}$	$0g_{9/2}$
P	-18.73	-15.32	-14.95	-9.62	-5.20	-3.74	-2.75	0.00
N	-16.63	-13.64	-13.63	-9.94	-5.14	-1.18	-3.12	-1.12

The zero point energies of the $T=0, 1$ excitations are no longer equal for $N \neq Z$ nuclei due to the admixture of the $2p-2h$ configurations to the $T=1$ excitations which are necessary in order to form states of good total T . Coulomb mixing was obtained in the usual way by adding off diagonal matrix elements between the $T=0$ and the $T=1$ matrix elements. The proton particle-hole gap was also reduced by .3 MeV to take into account the Coulomb shift. It should be emphasized that despite the references to $T=0$ and $T=1$ excitations the isospin of the states calculated is equal to the ground state isospin of the nucleus, $T_0=4$, i.e. only $T=4$ states are calculated.

From Fig. 6 one can see that the main effect of the monopole shift is to move all the centroids down by roughly the same amount. For Ca^{48} , $\frac{\epsilon_1}{A} = 5/12$.

In O^{16} and Ca^{40} the way to obtain low lying positive parity states was to use a deformed basis consisting of multiparticle-multi-hole states. This is not necessary in Ca^{48} since lowest nn^{-1} configuration is $(1p_{3/2}-0f_{7/2}^{-1})$ which can yield a low lying 2^+ state. There is however a low lying 0^+ at 4.28 MeV which can not be accounted for by $1p-1h$ shell model excitations. As in O^{16} or Ca^{40} this is probably a $2p-2h$ state on a deformed basis. Since this state has been excited through (p,p') it implies that the ground state contains multiparticle-multi-hole excitations which could also contaminate the 2^+ state.

The three low lying configurations in Ca^{48} have as their zero point energies (energy before the switching on of the interaction).

TABLE 5.2.--Zero Point Energies of the 3 Low Lying Multiplets in Ca^{48} .

pp^{-1}	$(0f_{7/2}-0d_{3/2}^{-1})$	5.33 MeV
pp^{-1}	$(0f_{7/2}-1s_{1/2}^{-1})$	5.70 MeV
nn^{-1}	$(1p_{7/2}-0f_{7/2}^{-1})$	4.80 MeV

Since the two pp^{-1} configurations are less than .4 MeV apart one expects a lot of mixing of the 3^{-} and 4^{-} states originating from these configurations. This is in fact the case and the lowest calculated 3^{-} state comes from the higher of the two pp^{-1} configurations.

The lowest excited state in Ca^{48} is a 2^{+} at 3.830 MeV with a $B(E2)=45.7 e^2 f^4$. The $nn^{-1} (1p_{3/2}-0f_{7/2}^{-1})$ configuration with the K-K interaction and no monopole shift places the 2^{+} energy at 4.52 with a $B(E2)=.34 e^2 f^4$ the same interaction with the monopole shift lowers the 2^{+} energy to 3.88 MeV however the $B(E2)=.37$. Energies calculated from the Sussex interaction are slightly higher and the transition rates are about one third the size. The large discrepancy between theory and experiment for the $B(E2)$ is due to the fact that the vector is more than 99% nn^{-1} which does not contribute to a $B(EJ)$. An effective charge of 1 would give

a $B(E2)=30 e^2 f^4$. More serious is what the other members of the $nn^{-1} (1p_{3/2}-0f_{7/2}^{-1})$ multiplet have not been seen in the region of 4-5 MeV with the possible exception of the 4^+ state. Gruhn (Gr72) has reported a possible 4^+ at 4.62 MeV. Two other 4^+ states have been seen (Pe65) but at a higher energies, 6.35 MeV and 6.65 MeV. The 3^+ and 5^+ members of the multiplet have not been reported. The Sussex interaction without the monopole shift places a 4^+ state with the above configuration at 4.91 MeV. The K-K interaction places the level at 4.69 MeV without the shift and at 4.06 MeV with the shift.

One notes that in Ca^{40} there is a possibility of a 0^+ , 2^+ and 4^+ rotational band, where there is no such candidate in Ca^{48} at present. Multishell calculations predict large numbers of positive parity states (Mc70) which do not form a rotational band. Again very few of these states have been identified in the experimental spectrum.

One should be able to account for low lying negative parity states by mostly the $(0f_{7/2}-0d_{3/2}^{-1})$ and $(0f_{7/2}-1s_{1/2}^{-1})$ proton configurations which are almost degenerate. The lowest observed negative parity state is the 3^- at 4.50 MeV with an observed $B(E3)=1.05 \times 10^3 e^2 f^6$. The calculated TDA levels with or without the monopole shift using the K-K interaction are too low. For the TDA with the Sussex interaction the 3^- level is almost correct with no monopole shift

and is too low with the monopole shift. All the TDA $B(E3)$'s are the same, $B(E3)=1.27 \times 10^3 e^2 f^6$ which is slightly higher than the experimental value of $1.05 \times 10^3 e^2 f^6$. The RPA with the K-K interaction and the monopole shift gives an imaginary 3^- state. Reducing the K-K interaction and monopole shift to 65% still places the 3^- too low by about .8 MeV but at the same time it doubles the transition rate, $B(E3)=2.16 \times 10^3 e^2 f^6$. As can be seen from Appendix D.3, most of the 3^- transition strength is placed into 2 levels, the lowest 3^- state which is mainly pp^{-1} and the highest 3^- state near 15 MeV which is mainly a $T=1$ excitation.

Due to the near degeneracy of the low pp^{-1} configurations the lowest 3^- (3.14 MeV) vector does not have as its main component the lowest energy particle-hole configuration, $(0f_{7/2}-0d_{3/2}^{-1})$ but instead its main component (50%) is the 2nd lowest configuration $(0f_{7/2}-1s_{1/2}^{-1})$. This lowest 3^- state vector also has significant nn^{-1} (14%) and $T=0$ (23%) excitations.

Three other 3^- excitations have been observed below 8 MeV at 5.15 MeV, 5.37 MeV and at 7.65 MeV. The K-K interaction with the monopole shift predicts three such 3^- states (Fig. 7) below 8 MeV at 4.79 MeV (mainly pp^{-1}), at 6.61 MeV (significant pp^{-1} , nn^{-1} , $T=0$) and at 7.39 MeV (significant pp^{-1} , nn^{-1} , $T=0$). All three states have $B(E3)$'s less than the single configuration values.

At the present there is insufficient information (such as ℓ transfer), on the experimental levels to be able to match the theoretical states with the experimental states. As in Ca^{40} there are probably deformed contributions to the negative parity states.

The other state namely the 4^- , from the $(0f_{7/2}-1s_{1/2})^{-1}$ configuration has not been seen. This is predicted at 5.49 MeV with the K-K and no shift and at 4.62 with the K-K and the monopole shift. There is however a possible candidate at 5.26 MeV.

The 5^- state seen at 5.723 MeV has a theoretical $B(E5)=2.9 \times 10^5 e^2 f^{10}$ which is approximately four times bigger than the reported experimental value of $7.74 \times 10^4 e^2 f^{10}$. The calculated 5^- level even without the shift is too low. One possible reason for the large calculated $B(E5)$ is that the wavefunction is most pp^{-1} , $(0f_{7/2}-0p_{3/2})^{-1}$ if however the level was slightly higher it would mix more with the nn^{-1} excitation and the pp^{-1} strength would then be weakened.

In summary there are not too many conclusions one can draw about Ca^{48} . The predicted multiplets are not observed experimentally. The theoretical results are very similar to those of Ripka who used a force fitted to the 3^- and 5^- states. The monopole shift has virtually no effect on transition rates or on the composition of state vectors (Appendices D.3, E.3). While there is not too much experimental evidence, there is a definite discrepancy between

experiment and this and other simple theoretical calculations. The discrepancy is that experimentally a 2^+ level is the lowest state with the 3^- state above it. The 3^- state is also less collective than the 3^- state in Ca^{40} . The theory predicts both the 3^- and 5^- states too low in energy and too collective, with the 3^- below the 2^+ . The 2^+ state is predicted to be too high and almost degenerate with the 4^+ , where experimentally the 2^+ and 4^+ are well separated, the tentative assignment for the 4^+ being accepted.

Though there is no experimental evidence it seems unlikely that the dipole excitation lies at the predicted value of 14 MeV, below that observed in the Strontium region (16.5 MeV) and far below that observed in Ca^{40} (19 MeV).

TABLE 5.3.--Partial Summary of Ca⁴⁸ for Explanation of (Maj Comp See Appendices C and D).

Exp.	BJ(Exp)	KK-MS		Remarks
		E (maj comp) BJ	E (Maj comp) BJ	
2 ⁺	3.83	45.7	4.51	(8/7,2) 3.88 (8/7,2) 90% neutron configuration. Effective charge of 1 gives BE2~30.
0 ⁺	4.28			deformed, not seen
3 ⁻	4.50	1050	3.94 1270	(7/5,1) 3.141 1280 (7/5,1) collective
(4 ⁺)	4.62		4.69	4.09 spin-parity identification not found
3 ⁻	5.15		5.62	(7/6,1) 4.79 (7/6,1) no information to be able to make identification.
3 ⁻	5.37		.23	3.2
(4 ⁻)	5.26		5.49	4.62 spin-parity identification not found
0 ⁺	5.46			probably deformed, not seen
5 ⁻	5.72	7.7x10 ⁴	5.04 2.91x10 ⁵	(7/6,1) 4.16 (7/6,1) 2.92x10 ⁵
(2 ⁺)	6.10			probably deformed, not seen
3 ⁻	7.65		836 .096	(8/6,3) 7.39 (8/6,3) T=0 excitation 9.05

TABLE 5.4.--Ca⁴⁸ Centroid Energies, Energy Dispersions and Sum Rules for Representative T₂ Configurations of the K-K Interaction with the Monopole Shift (for Formulas See Appendix A).

	1 ⁻	2 ⁻	3 ⁻	3 ⁻ .65RPA	4 ⁻	2 ⁺	4 ⁺	6 ⁺
$\bar{E}$	14.08	10.62	7.10	6.40	9.74	16.81	14.86	14.49
ΔE	1.53	2.59	4.68	3.87	2.54	2.95	2.50	2.15
S	67	155	1.7x10 ⁴	2.2x10 ⁴	9.5x10 ⁴	886	3.9x10 ⁵	1.6x10 ⁸

Observed 1⁻

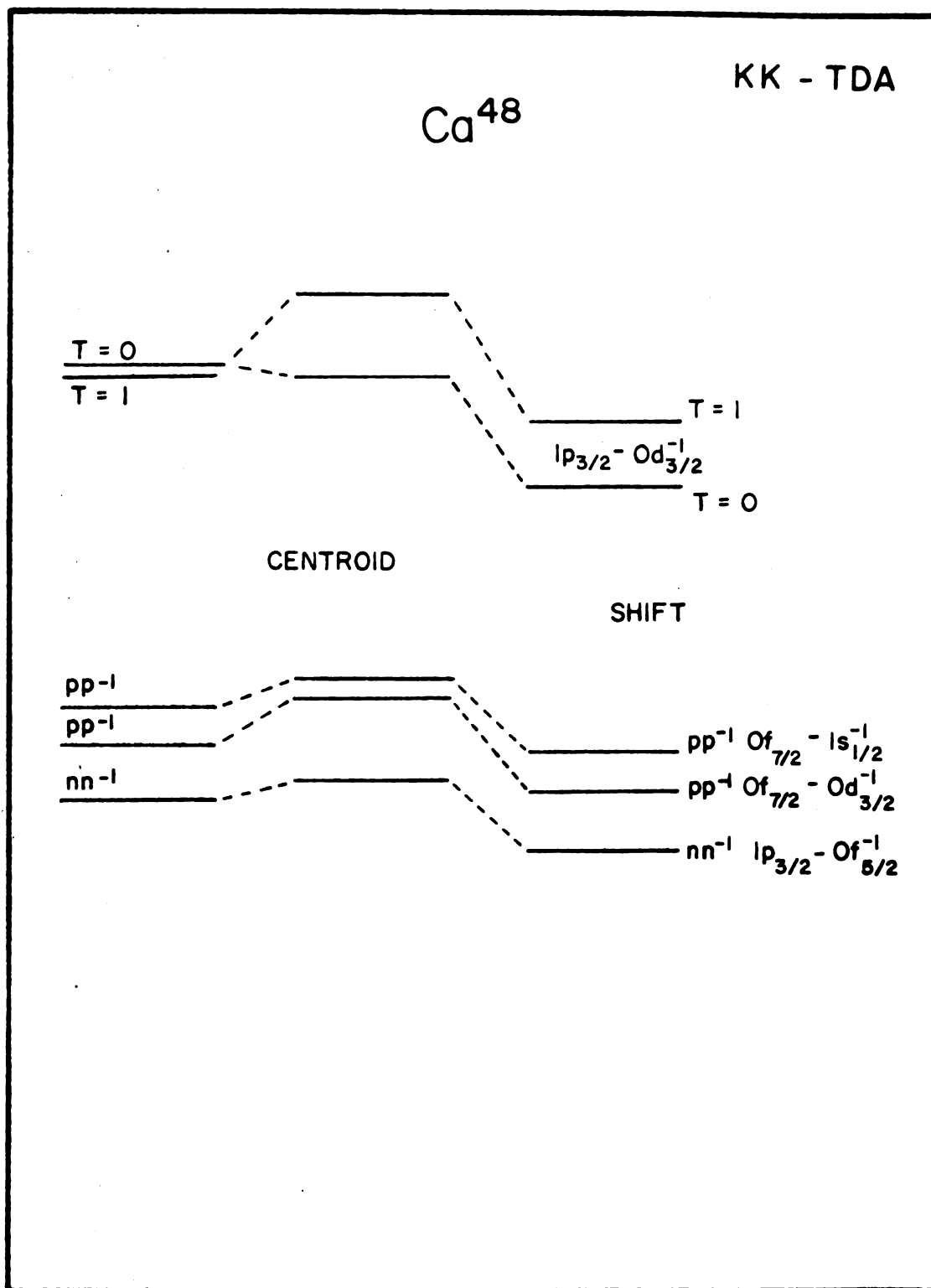


FIGURE 6.-- Ca^{48} Monopole Shifts.

FIGURE 7.--Ca⁴⁸ Energy Levels.

A = exp.

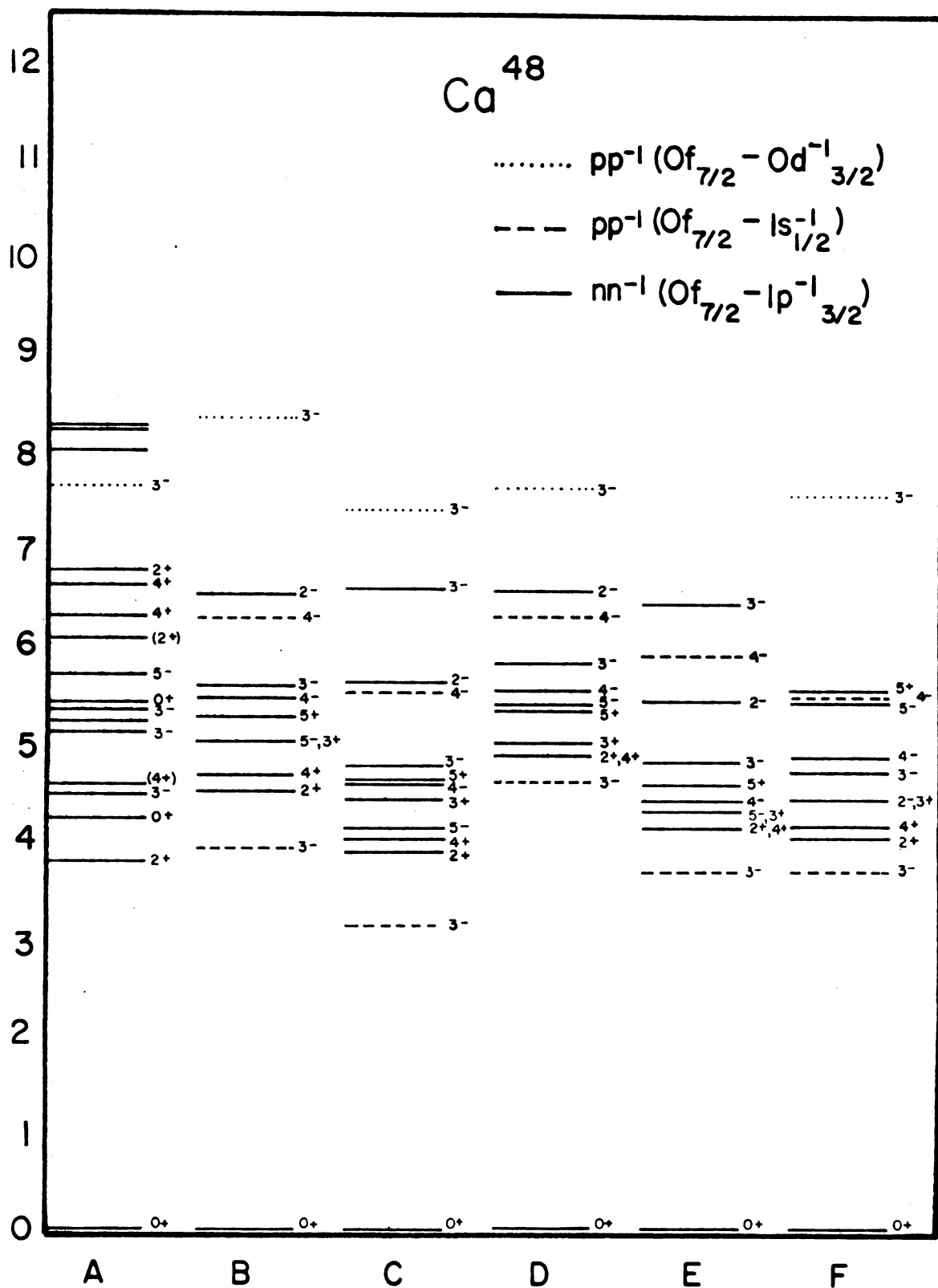
B = KK

C = KK-MS

D = Sussex

E = Sussex-MS

F = 65% KK-MS RPA



CHAPTER VI

Sr^{88}

Sr^{88} is similar to Ca^{48} in that there is a neutron excess. In this case both the $0g_{9/2}$ and $1p_{1/2}$ levels are filled for neutrons and empty for protons. Several experiments (Go70a) have been performed to study the levels of Sr^{88} . Proton lp-lh states incorporating a $1p_{1/2}$ proton have been observed in the $Y^{89}(\text{He}^3, d)\text{Sr}^{88}$ reaction and the $Y^{89}(t, \alpha)\text{Sr}^{88}$ reaction. Neutron lp-lh states based on a $0g_{9/2}$ hole have been studied by the $\text{Sr}^{87}(d, p)\text{Sr}^{88}$ reaction. The neutron 2p-2h and lp-lh components of the levels have been studied by the $\text{Sr}^{86}(t, p)\text{Sr}^{88}$ reaction. Since the Sr^{86} target is largely a mixture of the neutron components $(0g_{9/2})^{-2}$, $(1p_{3/2})^{-2}$, etc. the t, p reaction populates states which have neutron components $(1d_{5/2})^2(0g_{9/2})^{-2}$, etc. The collective properties of some of the levels have been investigated by inelastic scattering of protons, deuterons, alphas and electrons. The experimentally observed levels along with the present calculation are in Fig. 8.

The results from the $Y^{89}(\text{He}^3, d)\text{Sr}^{88}$ reaction and the $Y^{89}(t, \alpha)\text{Sr}^{88}$ reaction have shown that the low lying

states are mostly proton-proton hole. The single particle energies used were again obtained from neighboring nuclei.

The neutron particle-hole gap is seen to be 4.71 MeV while the proton particle-hole gap after deducting the .3 MeV due to the Coulomb shift is 3.22 MeV. This leads one to expect, as has been confirmed experimentally, that the low lying levels in Sr^{88} would have mainly proton-proton hole components. The value of the oscillator parameter used was $\hbar\omega=9.0$ MeV.

The size parameter for the monopole shift $\epsilon_{1/A}=.23$. As in the other closed shell nuclei a low lying 0^+ level is observed. Again there is no explanation for this state in terms of lp-lh excitations and one must go to multiparticle-multihole states for the explanation. These multiparticle-multihole states can also contaminate the other positive parity states.

The lowest observed state in Sr^{88} is the 2^+ at 1.84 MeV with a $B(E2)=199 e^2 f^4$. The calculated 2_1^+ is too high in energy for the K-K interaction. In the TDA the monopole shift lowers the energy from 2.76 MeV to 2.26 MeV. The transition rate changes very little, $B(E2)=62 e^2 f^4$ and is about twice the single configuration value. The RPA increases the transition rate to $B(E2)=83 e^2 f^4$. A calculation of Sr^{88} by T. A. Hughes (Hu69) using a two proton hole basis (i.e. the core would be Zr^{90}) places the 2_1^+ close to the right energy, with a $B(E2)=66 e^2 f^4$. So while the two hole basis does slightly better for the

TABLE 6.1.--Sr⁸⁸ Single Particle Levels.

	0f _{7/2}	0f _{5/2}	1p _{3/2}	1p _{1/2}	0g _{9/2}	1d _{5/2}	1s _{1/2}	1d _{3/2}	0g _{7/2}	0h _{11/2}
P	-13.25	-11.00	-10.59	- 7.07	- 6.17	-2.69	-1.65	-0.67	0.01	0.34
N	-15.75	-13.48	-13.12	-11.69	-11.10	-6.39	-5.36	-4.39	-3.72	-3.39

energy of the state it does not improve the transition rate. The cross section in the $\text{Sr}^{86}(\text{t},\text{p})\text{Sr}^{88}$ reaction is much smaller for 2_1^+ than the cross section for the higher lying 2^+ states which would indicate a very small 2p-2h neutron component to the state. From the $\text{Y}^{89}(\text{d},\text{He}^3)\text{Sr}^{88}$ reaction Kavalaske (Ka67) et al. concluded that the $(1p_{1/2}-1p_{3/2}^{-1})$ and $(1p_{1/2}-0f_{5/2}^{-1})$ proton configuration made up 80% of the 2_1^+ state. The present calculation shows that these two configurations form 83% of the state when the monopole shift is used and 96% of the state without the monopole shift. Most of the $B(E2)$ strength is predicted to be concentrated in the lowest 2^+ state (2.26 MeV) and in the highest 2^+ state at 14.8 MeV.

The 2_2^+ is seen experimentally at 3.22 MeV, the K-K interaction with and without the shift yields energies of 3.55 MeV and 3.04 MeV, so the monopole shift moves the 2_2^+ state down too far but still closer than before. The $B(E2)=1.0e^{2f^4}$ without the monopole shift and $.037 e^{2f^4}$ with the monopole shift. The experimental $B(E2)$ obtained from inelastic scattering (α,α') is $.08 e^{2f^4}$. The present calculation with the monopole shift indicates that the state is 90% pp^{-1} . This 2_2^+ state is also observed to have a small cross section (Ra70) in $\text{Sr}^{86}(\text{t},\text{p})\text{Sr}^{88}$.

The next calculated 2_3^+ with the K-K interaction and the monopole shift is at 4.55 MeV and is 79% neutron-neutron hole with the main component ($1d_{5/2}-0g_{9/2}^{-1}$). The higher 2^+ states between 4 MeV and 5 MeV all have significant cross sections in the t,p reaction. Some of these states are possibly deformed since a simple lp-lh shell model calculation can't generate the number of states required. The two proton hole calculations by Hughes yields one more level but this is still about 6 or 7 levels short.

The K-K interaction with the monopole shift yields levels 1_1^+ (3.39), 3_1^+ (3.56), 3_2^- (3.05), and 6_1^+ (4.32). These levels seem to correspond to the experimental levels 1^+ (3.48), 3^+ (3.64), 3^- (3.99), 6^+ (4.41). In addition there is a 4^+ doublet seen at 4.23 MeV and 4.30 MeV. The K-K interaction with shift puts the 4_1^+ at 4.07 MeV which could be split by coupling to a deformed state.

The lp-lh shell model breaks down in other ways besides not being able to deduce the correct number of 2^+ states. The lp-lh model predicts a low lying 5^- state at 3.36 MeV (K-K interaction with monopole shift) whose major component is a ($0g_{9/2}-1p_{3/2}^{-1}$) proton-proton hole. This state as of now has not been seen. Since it should be a proton configuration the state should be seen in a $^{87}\text{Rb} (^{3}\text{He}, d) ^{88}\text{Sr}$ reaction. This state carries most of the E5 transition strength, its B(E5) is an order of magnitude greater than the single configuration B(E5). The lp-lh

model also predicts a 5_2^- (4.00) and 7_1^- (3.84) both of which are mainly proton configuration and are not seen. In the lp-lh model the 3^- state comes too low in energy. The K-K interaction with monopole shift places it about .75 MeV too low. The RPA makes it imaginary, by reducing the strength of the K-K interaction to 65% of its strength the RPA with the monopole shift places the state at 2.10 MeV. The Sussex interaction without the monopole shift in the TDA places the state at the correct energy but no real meaning can be attributed to this. The 3^- state carries most of the 3^- transition rate $B(E3) \text{ (exp)} = 8960e^2f^6$. $B(E3) \text{ (K-K)} = 4850e^2f^6$ and $B(E3) = 12500e^2f^6$ for the 65% K-K interaction in the RPA.

In summary the calculations do predict a collective 3^- and a fairly collective 2^+ state corresponding roughly to experiment along with a set of positive parity levels in the region 3.50 to 5.50 MeV. However there are many extra positive parity states observed which are not accounted for by simple particle-hole calculations. The theory also predicts a collective 5^- state which is not seen and as in Ca^{48} the 2^+ and 3^- states are inverted. The dipole centroid is much too low at 12.3 MeV as compared with 16.5 MeV experimentally.

TABLE 6.2.--Partial Summary of Sr^{88} for Explanation of (Maj. Comp. See Appendices C and D).

Exp.	BJ (Exp)	KK		KK-MS		Remarks
		E (maj comp) BJ		E (maj comp) BJ		
2^+	1.836 199	2.76 62	(10/9,1)	2.26 63	(10/8,1)	Too high might be pushed down by 2p-2h contribution, see Ca48
3^-	2.73 8960	2.29 4850	(11/8,1) 4870	1.86	(11/8,1)	collective
0^+	3.15					probably deformed
2^+	3.22 .08	3.55 1.02	(10/8,1)	3.03 .04	(10/8,1)	
1^+	3.49	4.025 .024	(10,8,1)	3.39 .024	(10/8,1)	
3^+	3.64	3.95 .040	(10/9,1)	3.55 .040	(10/9,1)	
$4^+, 3^-$	3.99	4.51(3 ⁻) 4.89	(11/9,1)	4.047(3 ⁻) 1.25	(11/9,1)	
4^+	4.23					can't identify as to particular 4^+ state theory does
4^+	4.30	4.44 8.13x10 ³	(12/11,2)	4.08 9.24x10 ²	(12/11,2)	not predict enough 4^+ states, possibility of deformed state
$2^+ 6^+$	4.41	4.67(6 ⁺) 1.6x10 ⁵	(11/11,2)	4.316(6 ⁺) 1.8x10 ⁵	(12/11,2)	

TABLE 6.2.--Continued.

Exp.	BJ (Exp)	KK E (Maj comp) BJ	KK-MS E (maj comp) BJ	Remarks
0 ⁺	4.48			probably deformed
2 ⁺	4.67			
2 ⁺	4.74	4.91 6.1	(12/11,2) 4.55 5.3	
			(12/11,2) same problem as previous 4 ⁺	

TABLE 6.3.--Sr⁸⁸ Centroid Energies, Energy Dispersions and Sum Rules for Representative T₂ Configurations of the K-K Interaction with Monopole Shift (for Formulas See Appendix A).

	1 ⁻	2 ⁻	3 ⁻	3 ⁻ .65RPA	4 ⁻	2 ⁺
$\bar{E}$	12.27	9.03	5.66	8.16	8.65	9.31
ΔE	1.22	2.41	4.12	3.44	2.51	5.38
S	122	272	5.4x10 ⁴	5.8x10 ⁴	4.0x10 ⁵	1834

Observed 1⁻ (in Zr⁹⁰)

$$\bar{E} = 16.5 \text{ MeV}$$

$$S \approx 100 \text{ MeV } f^2$$

FIGURE 8.--Sr⁸⁸ Energy Levels.

A = exp.

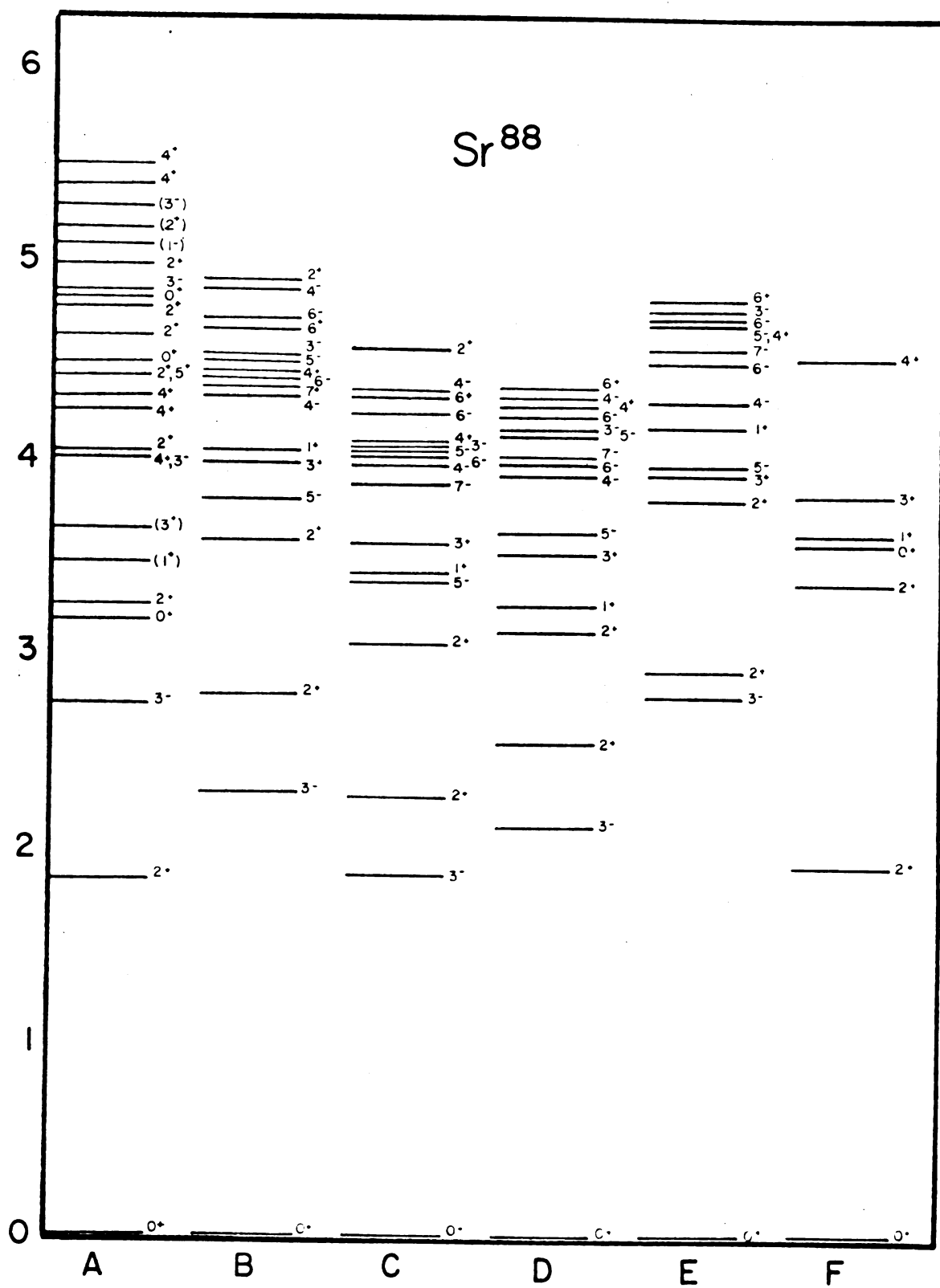
B = KK-TDA

C = KK-TPA MS

D = 65% KK-RPA MS

E = Sussex-TDA

F = Hughes $2p^{-1}$



CHAPTER VII

SUMMARY AND CONCLUSIONS

It is felt that the results of this work demonstrate a number of things. First that the corrections provided by the monopole term of the particle-hole interaction are inadequate. This inadequacy is reflected in that the calculated centroid energies of the identified multiplets are too high in energy and that for the two $N=Z$ nuclei, O^{16} and Ca^{40} the $T=0, 1$ splitting is too small.

The inclusion of the monopole shift in the calculation significantly improves the position of the centroids and of the $T=0, 1$ splitting for the $N=Z$ nuclei. The improvement reflects the $1/A$ dependence of the isovector part of the monopole term.

The relative $T=0, 1$ mixing of the vectors in O^{16} has also been improved. The $B(E1)$'s which are particularly sensitive to the $T=1$ component, since the $T=0$ component does not contribute to the transition rate, are also significantly improved, at times by an order of magnitude. The $B(M2)$'s from all but the lowest 2^- state are within

an order of magnitude of the experimental transition rate. In addition both the giant dipole and quadrupole states are correctly predicted in energy when the monopole shift is used.

In Ca^{40} only the transition rates from the lowest 3^- and 5^- levels are known. There is however a net improvement of both the $T=0,1$ splitting and of the centroid energies for the lowest multiplets. The giant dipole state is however placed about 1 MeV too low by the monopole shift. There is a good correspondence between the states calculated with the monopole shift and the shell model states from the deformed basis calculation of Gerace and Green. It should be emphasized that this however is a comparison between mathematical models.

Much less is known about structure of the two $N \neq Z$ nuclei Ca^{48} and Sr^{88} . The only transitions rates reported are the $B(E3)$'s from the lowest 3^- state. In both cases the use of the monopole shift does little to improve the agreement between the observed and calculated levels. It also has virtually no effect on either the transition rates or on the composition of the state vectors of these two nuclei. O^{16} and Ca^{40} have proved to be a much better test of the monopole shift.

The two interactions used, the Sussex and the K-K, are with one exception similar in behavior. The exception is the 0^- states in O^{16} and Ca^{40} , where the K-K and the Sussex matrix elements have opposite sign due to the large attractive nature of the p and d wave contributions in the Sussex matrix element. Other than this it is generally observed that the Sussex interaction is weaker than the K-K interaction and therefore the levels of a given multiplet are closer to the centroid energy when using the Sussex interaction.

The RPA and TDA yield almost identical results except for the lowest 3^- state with the same isospin as that of the ground state. For this state the binding increases such that the level is over bound for O^{16} and Ca^{40} and driven imaginary for Ca^{48} and Sr^{88} . If the strength of the interaction is reduced by 35% to simulate screening then there is fairly good agreement between the experimental and calculated results when the monopole shift is used for this lowest 3^- state.

For the $N \neq Z$ nuclei, Ca^{48} and Sr^{88} , the theoretical calculation inverts the order of the lowest states, the 2^+ and 3^- , and tends to overestimate in the RPA the collectivity of the 3^- state. Also in Sr^{88} a low lying collective 5^- state is predicted but up to now has not been seen. The dipole centroid is also predicted much too low, though the strength is approximately correct.

Particle-hole calculations in lead, such as those of Gillet and Sanderson give similar results. They predict a very collective 3^- state below a weakly collective 2^+ , 4^+ , etc. band of states. In lead this happens to agree with the observed spectrum. The prediction for the dipole state, however is 3-4 MeV too low. This points to a persistent failure of the model for $N \neq Z$ nuclei, which can not be corrected by a simple monopole shift dependant on the symmetry potential. Some systematic effects of neutron excess are missing from the model. As has been noted (Fi70) the TDA calculation systematically overestimates sum rule strengths.

Only the electric dipole and quadrupole excitations have a narrow enough width to show a "giant" multipole excitation character. For other excitations, remembering that we have not looked at the monopole, the strength is widely distributed, though in a different fashion for different excitations.

REFERENCES

REFERENCES

- Aj71 F. Ajzenberg-Selove, Nucl. Phys. A166(1971)
- Be71 E. M. Bernstein, et al., Phys. Rev. C3(1971)422.
- Bl69 J. Blomqvist and T. T. S. Kuo, Phys. Lett. 29B
(1969)544.
- Bo69 Bohne, et al., Nucl. Phys. A128(1969)537.
- Br66 G. E. Brown and A. M. Green, Nucl. Phys. 75(1966)
401.
- Ca64 Carter, Mitchell, Davis, Phys. Rev. 133(1964)B1421.
- El68 J. P. Elliot, A. D. Jackson, H. A. Mavromatis,
E. A. Sanderson and B. Singh, Nucl. Phys. A121
(1968)241.
- Er66 J. R. Erskine, Phys. Rev. 149(1966)854.
- Fi70 F. W. Fink, Ann. Rev. Nucl. Sci. 20(1970)39.
- Fu67 Fuchs, Grabisch, Kraaz, Roschert, Nucl. Phys. A105
(1967)590.
- Ge64 V. Gillet and N. Vinh-Mau, Nucl. Phys. 54(1964)321.
- Ge67 W. J. Gerace, A. M. Green, Nucl. Phys. A93(1967)110.
- Ge67 V. Gillet and E. Sanderson, Nucl. Phys. 93(1967)296.
- Ge68 W. J. Gerace, A. M. Green, Nucl. Phys. A113(1968)641.
- Go70 A. Goswami, O. Nalcioğlu, A. Sherwood, Nucl. Phys.
A153(1970)445.
- Go70a C. D. Goodman, T. A. Hughes, M. W. Johns, K. Way,
Nuclear Data Tables A8(1970)323.
- Gr72 G. R. Gruhn, T. Y. T. Kuo, C. J. Maggiore, B. M.
Preedom, Phys. Rev. C6(1972)

- Hu69 T. A. Hughes, Phys. Rev. 181(1969)1586.
- Ka64 A. Kallio and K. Kolltveit, Nucl. Phys. 53(1964)87.
- Ka67 C. D. Kavaloski, J. J. Tilley, D. C. Shreve and N. Stern, Phys. Rev. 161(1967)1107.
- Ku71 T. T. Kuo, Thesis Unpublished.
- Li67 E. P. Lippincott, A. M. Bernstein, Phys. Rev. 163(1967)1170.
- La64 A. M. Lane, Nuclear Theory (New York: W. A. Benjamin, Inc., 1964).
- Ma69 Proc. Inter. School of Physics 40(1969)457.
- Mc70 J. B. McGrory, B. H. Wildenthal and E. C. Halbert, Phys. Rev. C2(1970)186.
- Mu70 Murphy and Ritter, Bull. Am. Phys. Soc. 15(1970)483.
- Mo60 S. Moszkowski and B. Scott, Annals of Phys. 11(1960)65.
- Pe65 R. J. Peterson, Phys. Rev. 140(1965)B1479.
- Ra70 R. C. Ragaini, J. D. Knight, W. T. Leland, Phys. Rev. 2(1970)C1020.
- Sc71 R. Schaeffer, F. Petrovich, Phys. Rev. Letts. 26(1971)1380.
- Sc71a R. Schaeffer, Private communication.
- Si69 I. Sick, E. B. Hughes, T. W. Donnelly, J. D. Walecka, G. E. Walker, Phys. Rev. Letters 23(1969)1117.
- St70 Stroetzel, Goldmann,
- Wa65 Walecka, et al., Nucl. Phys. 67(1965)1.
- Zu68 A. P. Zuker, B. Buck, J. B. McGrory, Phys. Rev. Letts. 21(1968)39.
- Zu68 A. P. Zuker, B. Buck and J. B. McGrory, Phys. Rev. Letts. 21(1968)39.

APPENDIX A
RPA PHASE CONVENTIONS
AND
TRANSITION FORMULAS

Part a) Iso-spin Independent

Part b) with Iso-spin Formalism

1. Particle-Hole Creation Operator

$$a) \quad A^+(ph^{-1}, JM) = \sum_{m_p m_h} \langle p m_p h - m_h | JM \rangle a_{p m_p}^+ a_{h m_h} (-1)^{h - m_h}$$

$$b) \quad A^+(ph^{-1}, JMTM_T) = \sum_{m_p m_h} \langle p m_p h - m_h | JM \rangle \langle \frac{1}{2} t_p \frac{1}{2} - t_h | TM_T \rangle a_{p m_p}^+ a_{h m_h} (-1)^{h - m_h + \frac{1}{2} - t_h} x (-1)^{\frac{1}{2} t_p \frac{1}{2} t_h}$$

2. RPA Basis Vector

$$a) \quad Q^{+JM}(n) = \sum_{ph} [X_J^n(ph) A^+(ph^{-1}, JM) - (-1)^{J-M} Y_J^n(ph) A(ph^{-1}, JM)]$$

$$b) \quad Q_{TM_T}^{+JM}(n) = \sum_{ph} [X_{JT}^n(ph) A^+(ph^{-1}, JMTM_T) - (-1)^{J+T-M-M_T} Y_{JT}^n(ph) A(ph^{-1}, JMTM_T)]$$

3. RPA Matrices

$$a) \quad \langle ph^{-1}, J | A | p'h'^{-1}, J \rangle = (\epsilon_p - \epsilon_h) \delta_{pp'} \delta_{hh'} + \langle ph^{-1}, J | V | p'h'^{-1}, J \rangle$$

$$\langle ph^{-1}, J | B | p'h'^{-1}, J \rangle = (-1)^{p+h+J+1} \langle ph^{-1}, J | V | hp^{-1}, J \rangle$$

$$b) \quad \langle ph^{-1}, JT | A | p'h'^{-1}, JT \rangle = (\epsilon_p - \epsilon_h) \delta_{pp'} \delta_{hh'} + \langle ph^{-1}, JT | V | p'h'^{-1}, JT \rangle$$

$$\langle p h^{-1}, J T | B | p' h'^{-1}, J T \rangle = (-1)^{p+h+J+T+1} \langle p h^{-1}, J T | V | h' p'^{-1}, J T \rangle$$

4. Transitions

The phase relation between the X and Y amplitudes is

$$a) \quad X + (-1)^J Y$$

$$b) \quad X + (-1)^{J+T} Y$$

5. Single Particle Transition Operators

$$M(EJ, M) = \sum_k e^{i(k \cdot t_z(k))} r_k^J Y_{JM}(\Omega_k)$$

$$M(MJ, M) = \frac{e\hbar}{2Mc} \sqrt{J(2J+1)} \sum_k r_k^{J-1} \left[\left(g_s - \frac{2g_\ell}{J+1} (Y_{J-1}^s) + \frac{2g_\ell}{J+1} (Y_{J-1}^j) \right) \right]_{(J-1, 1) JM}$$

6. Centroid Energies, Dispersions and Sum Rule Formulas

$$\bar{E} = \frac{\sum_i t_i E_i}{\sum_i t_i} \quad \Delta E = \sqrt{\frac{\sum_i t_i (E_i - \bar{E})^2}{\sum_i t_i}}$$

$$s = \sum_i t_i E_i$$

APPENDIX B
MONOPOLE SHIFT

1. Equivalence between the monopole term and a single particle moving in a spherical potential

$$\langle j_1 j_2^{-1}, J | V | j_1 j_2^{-1}, J \rangle = \sum_L \langle j_1 j_2^{-1}, J | v_L(r_1, r_2) C_L(1) \cdot C_L(2) | j_1 j_2^{-1}, J \rangle$$

ignoring exchange terms

$$= \sum_L (-1)^{j_1 + j_2 - J} \hat{j}_1 \hat{j}_2 W(j_1 j_2 j_1 j_2; JL) M_{j_1 j_1}^L M_{j_2 j_2}^L I_L$$

where

$$M_{j_1 j_1}^L = \langle j_1 || C_L(1) || j_1 \rangle$$

$$\text{and } I_L = \int \phi^*(j_1) \phi^*(j_2) v_L(r_1, r_2) \phi(j_1) \phi(j_2) d^3 r_1 d^3 r_2$$

therefore

$$\alpha_{j_1 j_2}^L = \frac{1}{\hat{L}} M_{j_1 j_1}^L M_{j_2 j_2}^L I_L$$

the monopole component is

$$\alpha_{j_1 j_2}^0 = M_{j_1 j_1}^0 M_{j_2 j_2}^0 I_0 = I_0 = \int \phi^*(j_1) U(r_1) \phi(j_1) d^3 r_1$$

where $U(r_1) = \int \phi^*(j_2) v_0(r_1, r_2) \phi(j_2) d^2 r_2$ and is spherical.

2. Symmetry Energy

The symmetry energy is the difference between neutron and proton energies where the Coulomb energy has been added to the neutron energy.

$$E_s = \epsilon_n + \Delta - \epsilon_p$$

$$\epsilon_h = \epsilon_o + \frac{4\epsilon_1}{A} \langle \begin{array}{|c|} \hline \text{ } \\ \hline \end{array}^x | \vec{t}_n \cdot \vec{T}_A | \begin{array}{|c|} \hline \text{ } \\ \hline \end{array}^x \rangle = \epsilon_o + \frac{2\epsilon_1}{A}$$

$$[(T_o + 1/2) (T_o + 3/2) - \frac{3}{4} T_o (T_o + 1)]$$

$$= \epsilon_o + \frac{2\epsilon_1}{A} T_o$$

$$\epsilon_p = \Delta + \epsilon_o + 4 \frac{\epsilon_1}{A} \langle \begin{array}{|c|} \hline \text{ } \\ \hline \end{array}^x | \vec{t}_p \cdot \vec{T}_A | \begin{array}{|c|} \hline \text{ } \\ \hline \end{array}^x \rangle$$

$$= \Delta + \epsilon_o + 4 \frac{\epsilon_1}{A} \left[\frac{2T_o}{2T_o + 1} \langle (\frac{1}{2}, T_o) T_o - \frac{1}{2}, T_o - \frac{1}{2} | \vec{t}_p \cdot \vec{T}_A | (\frac{1}{2}, T_o) T_o - \frac{1}{2}, T_o - \frac{1}{2} \rangle \right.$$

$$\left. + \frac{1}{2T_o + 1} \langle (\frac{1}{2}, T_o) T_o + \frac{1}{2}, T_o - \frac{1}{2} | \vec{t}_p \cdot \vec{T}_A | (\frac{1}{2}, T_o) T_o + \frac{1}{2}, T_o - \frac{1}{2} \rangle \right]$$

upon resolving $\begin{array}{|c|} \hline \text{ } \\ \hline \end{array}^x$ into state of good T_A i.e. $T_o \pm \frac{1}{2}$

$$= \Delta + \epsilon_o - \frac{2\epsilon_1}{A} T_o$$

The symmetry energy is therefore

$$E_s = E_h + \Delta - \epsilon_p = 4 \frac{\epsilon_1}{A} T_o$$

3. $N=Z$ nucleus ($T_0=0$) $T=1$ excitation

$$\epsilon_A - \epsilon_{A+1} = \frac{4\epsilon_1}{A} [\langle A | \vec{t}_p \cdot \vec{T}_{A-1} | A \rangle - \langle A+1 | \vec{t}_p \cdot \vec{T}_A | A+1 \rangle]$$

where $|A\rangle$ is a $T=1$ state

$$\vec{T}_A = \vec{T}_0$$

$$|\vec{T} + \vec{t}_p| = 1$$

$$\epsilon_A - \epsilon_{A+1} = \frac{4\epsilon_1}{2A} (2 - 3/4 - 3/4 - 3/4 - 3/4) = \frac{\epsilon_1}{A}$$

4. $N \neq Z$ pp^{-1} excitation

$$\begin{array}{c} \text{X} \\ \text{O} \end{array} \quad \epsilon_A = \epsilon_0 - \frac{2\epsilon_1}{A} (T_0 + 3/2)$$

$$\epsilon_{A+1} = \epsilon_0 - \frac{2\epsilon_1}{A} (T_0 + 1)$$

$$\epsilon - \epsilon_{A+1} = -\epsilon_1/A$$

5. $N \neq Z$, $T=0$ excitation

$$|A\rangle = \frac{1}{\sqrt{2}} \left[\begin{array}{c} \text{X} \\ \text{O} \end{array} + \begin{array}{c} \text{X} \\ \text{O} \end{array} \right]$$

$$\epsilon_{A+1} = \frac{1}{2} (\epsilon_p + \epsilon_n)$$

$$\epsilon_n = \epsilon_0 + \frac{4\epsilon_1}{A} \langle \begin{array}{c} \text{X} \\ \text{O} \end{array} | \vec{t} \cdot \vec{T}_A | \begin{array}{c} \text{X} \\ \text{O} \end{array} \rangle \quad \vec{T}_{A+1} = \vec{T}_0 + \frac{1}{2}$$

$$= \epsilon_0 + 2T_0 \frac{\epsilon_1}{A}$$

$$\epsilon_p = \epsilon_o + \frac{4\epsilon_1}{A} \langle \begin{array}{|c|} \hline \times \\ \hline \end{array} | \vec{t} \cdot \vec{T}_A | \begin{array}{|c|} \hline \times \\ \hline \end{array} \rangle$$

expanding with Clebsch-Gordon coefficients

$$| \begin{array}{|c|} \hline \times \\ \hline \end{array} \rangle = -\sqrt{\frac{2T_o}{2T_o+1}} |T_o-\frac{1}{2}, T_o-\frac{1}{2}\rangle + \frac{1}{2T_o+1} |T_o+\frac{1}{2}, T_o-\frac{1}{2}\rangle$$

$$\epsilon_p = \epsilon_o - 2T_o \frac{\epsilon_1}{A}$$

Therefore $\epsilon_{A+1} = \epsilon_o$

ϵ_A evaluation

$$| \begin{array}{|c|} \hline \times \\ \hline \end{array} \rangle = -\sqrt{\frac{2T_o}{2T_o+1}} |T_o-\frac{1}{2}, T_o-\frac{1}{2}\rangle + \sqrt{\frac{1}{2T_o+1}} |T_o+\frac{1}{2}, T_o-\frac{1}{2}\rangle$$

The expansion of $|A\rangle$ in terms of states of good T is therefore

$$\begin{aligned} |A\rangle &= \frac{1}{\sqrt{2}} |(\frac{1}{2}, T_o+p) T_o\rangle - \frac{1}{\sqrt{2}} \sqrt{\frac{2T_o}{2T_o+1}} |(\frac{1}{2}, T_o-\frac{1}{2}) T_o\rangle \\ &\quad + \frac{1}{\sqrt{2}} \sqrt{\frac{1}{2T_o+1}} |(\frac{1}{2}, T_o+\frac{1}{2}) T_o\rangle \end{aligned}$$

then

$$\epsilon_A = \epsilon_o - \frac{3\epsilon_1}{A}$$

and

$$\epsilon_A - \epsilon_{A+1} = -\frac{3\epsilon_1}{A}$$

6. $N \neq Z$ nucleus

$T=1$ excitation coupled to T_0 to form a state of T_0 , i.e. $(1T_0)^{T_0}$. Expand $|A\rangle$ by using 6-J symbols in a basis of $|A-1\rangle$ states coupled to a good T .

i.e.

$$|A\rangle = |(t_p t_h)^{1T_0}; T_0\rangle = \sqrt{3} \sum_{\tau} \sqrt{2\tau+1} \left\{ \begin{matrix} \frac{1}{2} & \frac{1}{2} & 1 \\ T_0 & T_0 & \tau \end{matrix} \right\} |t_p (t_h T_0)^{\tau}; T_0\rangle$$

$$\text{where } \vec{\tau} = \vec{T}_{A-1}$$

therefore

$$\begin{aligned} \epsilon_A &= \epsilon_0 + \frac{4\epsilon_1}{A} \langle A | \vec{t}_p \cdot \vec{T}_{A-1} | A \rangle \\ &= \epsilon_0 + \frac{2\epsilon_1}{A} [T_0(T_0+1) - 3/4 - 3 \sum_{\tau} (2\tau+1) \left\{ \begin{matrix} T_0 & T_0 & 1 \\ \frac{1}{2} & \frac{1}{2} & \tau \end{matrix} \right\} \tau(\tau+1)] \end{aligned}$$

$$\text{for } \tau = T_0 - \frac{1}{2}, \quad 6-J = \frac{T_0+1}{6T_0(2T_0+1)}$$

$$\tau = T_0 + \frac{1}{2}, \quad 6-J = \frac{T_0}{6(T_0+1)(2T_0+1)}$$

and

$$\epsilon_A = \epsilon_0 - \frac{\epsilon_1}{A}$$

$$\epsilon_{A+1} = \epsilon_0 \text{ see } N \neq Z, T=0 \text{ excitation}$$

therefore

$$\epsilon_A - \epsilon_{A+1} = - \frac{\epsilon_1}{A}$$

APPENDIX C
SINGLE PARTICLE IDENTIFICATION CODE

TABLE C.1.--Single Particle Identification Code.

1	$0s_{1/2}$	18	$0h_{9/2}$
2	$0p_{3/2}$	19	$0i_{13/2}$
3	$0p_{1/2}$	20	$2p_{3/2}$
4	$0d_{5/2}$	21	$1f_{5/2}$
5	$1s_{1/2}$	22	$2p_{1/2}$
6	$0d_{3/2}$	23	$1g_{9/2}$
7	$0f_{7/2}$	24	$0i_{11/2}$
8	$1p_{3/2}$	25	$0j_{15/2}$
9	$0f_{5/2}$	26	$2d_{5/2}$
10	$1p_{1/2}$	27	$1g_{7/2}$
11	$0g_{9/2}$	28	$3s_{1/2}$
12	$1d_{5/2}$	29	$2d_{3/2}$
13	$0g_{7/2}$	30	$1h_{11/2}$
14	$2s_{1/2}$	31	$0k_{17/2}$
15	$1d_{3/2}$	32	$0j_{13/2}$
16	$0h_{11/2}$	33	$2f_{7/2}$
17	$1f_{7/2}$	34	$1h_{9/2}$
		35	$0l_{19/2}$

APPENDIX D
ENERGY AND TRANSITION SUMMARY

This appendix consists of four sections, summarizing the theoretical calculations.

1. Summary of O^{16}
2. Summary of Ca^{40}
3. Summary of Ca^{48}
4. Summary of Sr^{88}

Each section consists of several columns, where each column represents a specific interaction and approximation, the headings of which are found before each of the sections of Appendix D.

Each entry in a column consists of four lines:

line 1 -- Transition rate of that state to the ground state.

line 2 -- Transition rate of that state to the ground state where the state consists solely of its major configuration.

line 3 -- Major p-h configuration of that state (see Appendix C). If last number after comma is

- | | | | |
|---|-----------|------------|------------|
| 1 | pp^{-1} | excitation | |
| 2 | nn^{-1} | excitation | |
| 3 | T=0 | excitation | |
| 4 | T=1 | excitation | $N \neq Z$ |
| 5 | T=1 | excitation | $N = Z$ |

line 4 -- Energy of that state.

TABLE D.1.--

Column				
a	O ¹⁶ -TDA	K-K		
b	O ¹⁶ -TDA	K-K	M.S.	
c	O ¹⁶ -TDA	K-K	M.S.	E.M. Off.
d	O ¹⁶ -RPA	K-K		
e	O ¹⁶ -RPA	K-K	M.S.	
f	O ¹⁶ -RPA	K-K	M.S.	65% Strength
g	O ¹⁶ -TDA	Sussex		
h	O ¹⁶ -TDA	Sussex	M.S.	
i	O ¹⁶ -RPA	Sussex		
j	O ¹⁶ -RPA	Sussex	M.S.	

	a	b	c	d	e	f	g	h	i	j
1-	3.09E-C4 8.27E-C2 5/ 3/3 10.624	1.12E-C4 8.27E-C2 5/ 3/3 7.416	0.0E-C0 8.27E-C2 5/ 3/3 7.431	4.16E-C4 8.27E-C2 5/ 3/3 10.413	2.08E-C4 8.27E-C2 5/ 3/3 7.112	2.03E-C4 8.27E-C2 5/ 3/3 7.075	3.15E-C4 8.27E-C2 5/ 3/3 10.13	7.44E-C3 8.27E-C2 5/ 3/3 6.064	4.01E-C4 8.27E-C2 5/ 3/3 10.12	1.77E-C3 8.27E-C2 5/ 3/3 6.534
1-	1.67E-C4 1.65E-C1 5/ 2/3 16.768	4.84E-C3 1.65E-C1 5/ 2/3 13.597	0.0E-C0 1.65E-C1 5/ 2/3 13.592	1.81E-C4 1.65E-C1 5/ 2/3 16.750	4.87E-C3 1.65E-C1 5/ 2/3 13.579	4.04E-C3 1.65E-C1 5/ 2/3 13.522	1.63E-C5 1.65E-C1 5/ 2/3 15.073	4.44E-C4 1.65E-C1 5/ 2/3 15.022	1.15E-C6 1.65E-C1 5/ 2/3 18.793	5.19E-C4 1.65E-C1 5/ 2/3 14.982
1-	1.12E-C2 0.14E-C1 6/ 2/3 17.567	2.00E-C4 0.14E-C1 6/ 2/3 15.131	0.0E-C0 0.14E-C1 6/ 2/3 15.137	1.07E-C2 0.14E-C1 6/ 2/3 17.945	1.07E-C2 0.14E-C1 6/ 2/3 15.036	2.94E-C4 0.14E-C1 6/ 2/3 14.518	4.84E-C4 0.14E-C1 6/ 2/3 20.761	2.77E-C4 0.14E-C1 6/ 2/3 17.111	9.76E-C4 0.14E-C1 6/ 2/3 20.461	2.00E-C4 0.14E-C1 6/ 2/3 16.033
1-	1.90E-C3 8.27E-C2 6/ 2/3 24.022	7.69E-C5 8.27E-C2 6/ 2/3 21.032	2.24E-C2 0.14E-C1 6/ 2/3 17.149	1.17E-C3 8.27E-C2 6/ 2/3 24.359	1.65E-C4 8.27E-C2 6/ 2/3 21.019	2.27E-C4 8.27E-C2 6/ 2/3 20.183	1.24E-C4 8.27E-C2 6/ 2/3 27.123	3.79E-C4 8.27E-C2 6/ 2/3 23.437	7.65E-C5 8.27E-C2 6/ 2/3 27.100	5.12E-C4 8.27E-C2 6/ 2/3 23.409
1-	3.22E-C2 8.27E-C2 5/ 3/5 13.846	2.69E-C2 8.27E-C2 5/ 3/5 13.169	0.0E-C0 8.27E-C2 6/ 2/3 21.093	3.01E-C2 8.27E-C2 5/ 3/5 13.926	2.44E-C2 8.27E-C2 5/ 3/5 13.141	3.52E-C2 8.27E-C2 5/ 3/5 13.245	2.52E-C2 8.27E-C2 5/ 3/5 13.183	2.23E-C2 8.27E-C2 5/ 3/5 13.117	2.24E-C2 8.27E-C2 5/ 3/5 13.145	2.11E-C2 8.27E-C2 5/ 3/5 13.076
1-	1.03E-C2 0.14E-C1 6/ 3/5 18.179	2.30E-C2 0.14E-C1 6/ 3/5 17.156	3.14E-C2 8.27E-C2 5/ 3/5 13.266	8.53E-C3 0.14E-C1 6/ 3/5 18.142	2.05E-C2 0.14E-C1 6/ 3/5 17.107	4.20E-C2 0.14E-C1 6/ 3/5 17.473	4.50E-C2 0.14E-C1 6/ 3/5 17.836	2.64E-C2 0.14E-C1 6/ 3/5 17.944	3.82E-C2 0.14E-C1 6/ 3/5 17.724	2.24E-C2 0.14E-C1 6/ 3/5 17.740
1-	1.46E-C2 1.65E-C1 5/ 2/5 20.211	8.33E-C3 1.65E-C1 5/ 2/5 19.554	8.45E-C3 1.65E-C1 5/ 2/5 19.545	1.30E-C2 1.65E-C1 5/ 2/5 20.187	6.37E-C3 1.65E-C1 5/ 2/5 17.527	2.55E-C3 1.65E-C1 5/ 2/5 19.547	5.02E-C4 1.65E-C1 5/ 2/5 20.444	8.02E-C5 1.65E-C1 5/ 2/5 20.131	6.86E-C5 1.65E-C1 5/ 2/5 20.364	8.44E-C4 1.65E-C1 5/ 2/5 20.683
1-	1.11E-C0 7.44E-C1 4/ 2/5 23.537	1.12E-C0 7.44E-C1 4/ 2/5 22.623	1.12E-C0 7.44E-C1 4/ 2/5 22.622	9.55E-C1 7.44E-C1 4/ 2/5 23.161	9.52E-C1 7.44E-C1 4/ 2/5 22.235	1.06E-C0 7.44E-C1 4/ 2/5 21.111	1.35E-C0 7.44E-C1 4/ 2/5 22.451	1.36E-C0 7.44E-C1 4/ 2/5 22.091	1.19E-C0 7.44E-C1 4/ 2/5 22.276	1.22E-C0 7.44E-C1 4/ 2/5 21.915
1-	3.03E-C1 8.27E-C2 6/ 2/5 26.368	3.04E-C1 8.27E-C2 6/ 2/5 25.458	3.06E-C1 8.27E-C2 6/ 2/5 25.457	2.20E-C1 8.27E-C2 6/ 2/5 26.156	2.21E-C1 8.27E-C2 6/ 2/5 25.239	1.55E-C1 8.27E-C2 6/ 2/5 24.687	6.71E-C2 8.27E-C2 6/ 2/5 26.105	7.93E-C2 8.27E-C2 6/ 2/5 25.496	7.93E-C2 8.27E-C2 6/ 2/5 25.496	7.92E-C2 8.27E-C2 6/ 2/5 25.469

2-	115E-02 197E-02 4/ 3/3 121250	218E-02 197E-02 4/ 3/3 8.869	140E-02 197E-02 4/ 3/3 8.875	342E-02 197E-02 4/ 3/3 121211	146E-02 197E-02 4/ 3/3 8.821	274E-02 197E-02 4/ 3/3 8.488	225E-02 197E-02 4/ 3/3 121122	128E-02 197E-02 4/ 3/3 7.963	138E-02 197E-02 4/ 3/3 121200	637E-03 197E-02 4/ 3/3 7.794
2-	863E-02 344E-03 6/ 3/3 161734	912E-02 344E-03 6/ 3/3 131868	924E-02 344E-03 6/ 3/3 131873	871E-02 344E-03 6/ 3/3 161705	924E-02 344E-03 6/ 3/3 131833	634E-02 344E-03 6/ 3/3 131534	113E-01 344E-03 6/ 3/3 161429	104E-01 103E-01 4/ 2/3 121861	123E-01 103E-01 6/ 3/3 161367	121E-01 103E-01 4/ 2/3 121762
2-	106E-01 138E-01 4/ 2/3 181563	690E-02 138E-01 4/ 2/3 151505	792E-02 138E-01 4/ 2/3 151515	102E-01 138E-01 4/ 2/3 181531	694E-02 138E-01 4/ 2/3 151474	124E-01 138E-01 4/ 2/3 141893	611E-02 138E-01 4/ 2/3 171534	244E-02 344E-03 6/ 3/3 141015	544E-02 138E-01 4/ 2/3 171551	198E-02 344E-03 6/ 3/3 131329
2-	194E-01 212E-02 5/ 2/3 191698	100E-01 212E-02 5/ 2/3 161449	709E-02 212E-02 5/ 2/3 161463	197E-01 212E-02 5/ 2/3 191659	842E-02 212E-02 5/ 2/3 161405	569E-02 212E-02 5/ 2/3 151677	293E-01 212E-02 5/ 2/3 201559	767E-02 212E-02 5/ 2/3 161320	263E-01 212E-02 5/ 2/3 201514	630E-02 212E-02 5/ 2/3 161264
2-	199E-02 159E-04 6/ 2/3 231276	260E-02 159E-04 6/ 2/3 191335	785E-03 159E-04 6/ 2/3 191336	154E-02 159E-04 6/ 2/3 231253	350E-02 159E-04 6/ 2/3 151907	653E-03 159E-04 6/ 2/3 151527	201E-02 159E-04 6/ 2/3 231271	343E-03 159E-04 6/ 2/3 191582	148E-02 159E-04 6/ 2/3 231147	912E-04 159E-04 6/ 2/3 191428
2-	355E-01 126E 00 4/ 3/5 131236	342E-01 126E 00 4/ 3/5 121312	344E-01 126E 00 4/ 3/5 121306	297E-01 126E 00 4/ 3/5 131162	317E-01 126E 00 4/ 3/5 121231	484E-01 126E 00 4/ 3/5 121487	584E-01 126E 00 4/ 3/5 131479	624E-01 126E 00 4/ 3/5 121533	502E-01 126E 00 4/ 3/5 131375	591E-01 126E 00 4/ 3/5 121422
2-	277E-02 201E-02 6/ 3/5 171588	538E-02 201E-02 6/ 3/5 171033	475E-02 201E-02 6/ 3/5 171026	223E-02 201E-02 6/ 3/5 171936	448E-02 201E-02 6/ 3/5 161978	203E-02 201E-02 6/ 3/5 171285	342E-02 201E-02 6/ 3/5 161832	714E-03 201E-02 6/ 3/5 161881	310E-02 201E-02 6/ 3/5 161807	571E-03 201E-02 6/ 3/5 161855
2-	1451E-02 608E-01 5/ 2/5 191351	863E-02 608E-01 5/ 2/5 181642	816E-02 608E-01 5/ 2/5 181629	731E-03 608E-01 5/ 2/5 191314	101E-01 166E 00 4/ 2/5 181584	292E-01 166E 00 4/ 2/5 181745	323E-02 608E-01 5/ 2/5 181319	110E-01 166E 00 4/ 2/5 181567	292E-02 166E 00 4/ 2/5 181477	994E-02 166E 00 4/ 2/5 181520
2-	212E 00 166E 00 4/ 2/5 201539	2124E 00 608E-01 5/ 2/5 201131	230E 00 608E-01 5/ 2/5 201122	193E 00 608E-01 5/ 2/5 201819	196E 00 608E-01 5/ 2/5 201019	201E 00 608E-01 5/ 2/5 151770	222E 00 166E 00 4/ 2/5 201134	2434E 00 608E-01 5/ 2/5 191844	2102E 00 166E 00 4/ 2/5 201074	213E 00 608E-01 5/ 2/5 191788

2-	678E-01 1551E-01 6/2,5 24057	705E-01 1551E-01 6/2,5 23114	708E-01 1551E-01 6/2,5 23985	532E-01 1551E-01 6/2,5 23985	546E-01 1551E-01 6/2,5 23068	340E-01 1551E-01 6/2,5 23320	403E-01 1551E-01 6/2,5 24292	419E-01 1551E-01 6/2,5 23630	319E-01 1551E-01 6/2,5 24210	342E-01 1551E-01 6/2,5 23545
3-	713E 01 317E 01 4/3,3 8444	679E 01 317E 01 4/3,3 5082	679E 01 317E 01 4/3,3 5085	147E 02 317E 01 4/3,3 7051	347E 02 317E 01 4/3,3 2120	104E 02 317E 01 4/3,3 5478	728E 01 317E 01 4/3,3 9021	695E 01 317E 01 4/3,3 5352	117E 02 317E 01 4/3,3 5755	188E 02 317E 01 4/3,3 3454
3-	1470E 01 253E 01 4/2,3 16368	147E 01 253E 01 4/2,3 13264	147E 01 253E 01 4/2,3 13260	247E 01 253E 01 4/2,3 16198	246E 01 253E 01 4/2,3 13028	321E 01 253E 01 4/2,3 13252	214E 01 253E 01 4/2,3 17424	239E 01 253E 01 4/2,3 13487	242E 01 253E 01 4/2,3 17206	248E 01 253E 01 4/2,3 19327
3-	1420E 01 380E 01 6/2,3 22114	1420E 01 380E 01 6/2,3 18786	1420E 01 380E 01 6/2,3 18786	1420E 01 380E 01 6/2,3 22004	144E 01 380E 01 6/2,3 18660	242E 01 380E 01 6/2,3 18549	812E 02 380E 01 6/2,3 23519	749E 02 380E 01 6/2,3 19409	947E 02 380E 01 6/2,3 23443	381E 02 380E 01 6/2,3 19713
3-	1493E 01 317E 01 4/3,5 13225	148E 01 317E 01 4/3,5 12312	148E 01 317E 01 4/3,5 12314	148E 01 317E 01 4/3,5 13140	149E 01 317E 01 4/3,5 12319	147E 01 317E 01 4/3,5 12419	149E 01 317E 01 4/3,5 13308	149E 01 317E 01 4/3,5 12371	147E 01 317E 01 4/3,5 13238	146E 01 317E 01 4/3,5 17296
3-	2457E 01 253E 01 4/2,5 18829	247E 01 253E 01 4/2,5 17892	247E 01 253E 01 4/2,5 17893	247E 01 253E 01 4/2,5 19769	2414E 01 253E 01 4/2,5 17830	242E 01 253E 01 4/2,5 13185	2451E 01 253E 01 4/2,5 18308	247E 01 253E 01 4/2,5 18447	2418E 01 253E 01 4/2,5 13448	2412E 01 253E 01 4/2,5 18389
3-	447E 01 380E 01 6/2,5 25105	445E 01 380E 01 6/2,5 24191	445E 01 380E 01 6/2,5 24191	348E 01 380E 01 6/2,5 24578	348E 01 380E 01 6/2,5 24058	348E 01 380E 01 6/2,5 24041	432E 01 380E 01 6/2,5 24704	447E 01 380E 01 6/2,5 24045	348E 01 380E 01 6/2,5 24584	349E 01 380E 01 6/2,5 23920
4-	572E 01 292E 01 4/2,3 18833	345E 01 292E 01 4/2,3 15793	345E 01 292E 01 4/2,3 15794	545E 01 292E 01 4/2,3 18803	347E 01 292E 01 4/2,3 15758	347E 01 292E 01 4/2,3 15104	246E 02 292E 01 4/2,3 19312	346E 01 292E 01 4/2,3 15454	144E 02 292E 01 4/2,3 19246	342E 01 292E 01 4/2,3 15422
4-	809E 02 837E 02 4/2,5 19713	830E 02 837E 02 4/2,5 18773	830E 02 837E 02 4/2,5 18772	734E 02 837E 02 4/2,5 19625	745E 02 837E 02 4/2,5 18681	748E 02 837E 02 4/2,5 18768	846E 02 837E 02 4/2,5 18787	830E 02 837E 02 4/2,5 18356	831E 02 837E 02 4/2,5 13772	799E 02 837E 02 4/2,5 13431


```

3+  1.33E C1 1.46E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1 1.49E C1
    4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5 4/ 1.5
    43.335 42.451 42.444 43.322 42.438 42.507 43.002 42.187 42.184
*STOP 0

```

TABLE D.2.--

Column				
a	Ca ⁴⁰ -TDA	K-K		
b	Ca ⁴⁰ -TDA	K-K	M.S.	
c	Ca ⁴⁰ -RPA	K-K		
d	Ca ⁴⁰ -RPA	K-K	M.S.	
e	Ca ⁴⁰ -RPA	K-K	M.S.	65% Strength
f	Ca ⁴⁰ -TDA	Sussex		
g	Ca ⁴⁰ -TDA	Sussex	M.S.	
h	Ca ⁴⁰ -RPA	Sussex		
i	Ca ⁴⁰ -RPA	Sussex	M.S.	

1-	3.29E-03 1.32E 00 9/ 6,5 14.661	1.01E-01 5.24E-01 8/ 5,5 12.380	7.41E-02 5.24E-01 8/ 5,5 13.146	9.87E-02 5.24E-01 8/ 5,5 12.367	1.06E-01 5.24E-01 8/ 5,5 12.412	4.09E-02 5.24E-01 8/ 5,5 13.232	5.59E-02 5.24E-01 8/ 5,5 12.651	3.99E-02 5.24E-01 8/ 5,5 13.209	5.46E-02 5.24E-01 8/ 5,5 12.625
1-	5.91E-03 2.62E-01 10/ 5,5 14.380	1.44E-02 2.62E-01 10/ 5,5 14.083	6.45E-03 2.62E-01 10/ 5,5 14.858	1.45E-02 2.62E-01 10/ 5,5 14.065	2.17E-02 1.32E 00 9/ 6,5 14.153	1.94E-02 2.62E-01 10/ 5,5 14.398	3.44E-02 2.62E-01 10/ 5,5 14.166	2.15E-02 1.32E 00 9/ 6,5 14.340	3.23E-02 1.32E 00 9/ 6,5 14.124
1-	8.82E-05 2.62E-01 10/ 5,5 15.571	4.74E-06 2.62E-01 10/ 5,5 14.855	1.79E-04 2.62E-01 10/ 5,5 15.521	1.75E-06 2.62E-01 10/ 5,5 14.797	7.24E-03 2.62E-01 10/ 5,5 14.682	5.47E-03 2.62E-01 10/ 5,5 15.235	2.24E-03 2.62E-01 10/ 5,5 15.049	2.61E-03 2.62E-01 10/ 5,5 15.086	5.80E-04 2.62E-01 10/ 5,5 14.939
1-	3.05E-02 3.77E-01 8/ 4,5 16.608	8.81E-02 3.77E-01 8/ 4,5 16.271	5.23E-02 3.77E-01 8/ 4,5 16.542	1.45E-01 3.77E-01 8/ 4,5 16.189	8.45E-01 3.77E-01 8/ 4,5 15.765	4.03E-01 3.77E-01 8/ 4,5 16.330	6.29E-01 3.77E-01 8/ 4,5 16.135	4.20E-01 3.77E-01 8/ 4,5 16.228	6.54E-01 3.77E-01 8/ 4,5 16.053
1-	4.14E 00 1.89E 00 7/ 4,5 18.568	4.06E 00 1.89E 00 7/ 4,5 18.024	3.40E 00 1.89E 00 7/ 4,5 18.234	3.28E 00 1.89E 00 7/ 4,5 17.695	2.84E 00 3.77E-01 8/ 4,5 16.653	3.85E 00 3.77E-01 8/ 4,5 17.581	3.81E 00 3.77E-01 8/ 4,5 17.343	3.28E 00 3.77E-01 8/ 4,5 17.467	3.25E 00 3.77E-01 8/ 4,5 17.229
1-	3.70E-01 9.43E-02 9/ 4,5 22.179	3.87E-01 9.43E-02 9/ 4,5 21.599	2.63E-01 9.43E-02 9/ 4,5 22.041	2.74E-01 9.43E-02 9/ 4,5 21.452	1.93E-01 9.43E-02 9/ 4,5 20.900	1.17E-01 9.43E-02 9/ 4,5 22.072	9.29E-02 9.43E-02 9/ 4,5 21.840	1.10E-01 9.43E-02 9/ 4,5 21.789	5.70E-02 9.43E-02 9/ 4,5 21.656
2-	2.94E-01 5.97E-02 7/ 6,3 8.102	1.50E-01 5.97E-02 7/ 6,3 6.804	2.29E-01 5.97E-02 7/ 6,3 8.045	1.07E-01 5.97E-02 7/ 6,3 6.746	1.71E-01 5.97E-02 7/ 6,3 6.453	2.70E-01 5.97E-02 7/ 6,3 7.922	1.64E-01 5.97E-02 7/ 6,3 6.255	2.07E-01 5.97E-02 7/ 6,3 7.828	1.17E-01 5.97E-02 7/ 6,3 6.135
2-	4.24E-01 8.07E-05 8/ 6,3 9.084	7.82E-04 8.07E-05 8/ 6,3 7.847	1.34E-01 8.07E-05 8/ 6,3 9.053	1.44E-03 8.07E-05 8/ 6,3 7.838	7.46E-04 8.07E-05 8/ 6,3 7.776	5.17E-01 8.07E-05 8/ 6,3 8.985	1.81E-03 8.07E-05 8/ 6,3 7.585	2.02E-01 8.07E-05 8/ 6,3 9.047	6.82E-05 8.07E-05 8/ 6,3 7.543
2-	9.27E-03 1.75E-03 10/ 6,3 11.427	1.32E-02 1.75E-03 10/ 6,3 10.315	8.14E-03 1.75E-03 10/ 6,3 11.418	1.22E-02 1.75E-03 10/ 6,3 10.308	1.21E-02 1.75E-03 10/ 6,3 10.121	1.55E-03 1.75E-03 10/ 6,3 11.236	6.72E-03 1.75E-03 10/ 6,3 9.873	3.08E-04 1.75E-03 10/ 6,3 11.211	8.38E-03 1.75E-03 10/ 6,3 9.841

2-	5.03E-01 6.72E-02 8/ 5/3 12.248	7.21E-01 6.72E-02 8/ 5/3 11.159	5.88E-01 5.51E-01 7/ 4/3 12.220	8.13E-01 5.51E-01 7/ 4/3 11.130	4.28E-01 6.72E-02 8/ 5/3 11.025	5.32E-01 5.51E-01 7/ 4/3 12.083	8.71E-01 5.51E-01 7/ 4/3 10.674	6.11E-01 5.51E-01 7/ 4/3 12.018	9.38E-01 5.51E-01 7/ 4/3 10.600
2-	9.30E-01 6.72E-02 8/ 5/3 12.662	4.11E-01 6.72E-02 8/ 5/3 11.596	7.08E-01 6.72E-02 8/ 5/3 12.622	3.27E-01 6.72E-02 8/ 5/3 11.552	7.29E-01 5.51E-01 7/ 4/3 11.525	2.35E-02 6.72E-02 8/ 5/3 13.186	8.18E-03 6.72E-02 8/ 5/3 11.158	2.44E-02 6.72E-02 8/ 5/3 13.156	1.77E-06 6.72E-02 8/ 5/3 11.113
2-	1.34E-00 5.99E-02 9/ 6/3 14.421	8.68E-02 5.99E-02 9/ 6/3 13.335	1.33E-00 5.99E-02 9/ 6/3 14.371	8.74E-02 5.99E-02 9/ 6/3 13.304	1.84E-01 5.99E-02 9/ 6/3 12.057	9.97E-01 5.99E-02 9/ 6/3 13.717	1.41E-00 5.99E-02 9/ 6/3 12.441	9.17E-01 5.99E-02 9/ 6/3 13.683	1.21E-00 5.99E-02 9/ 6/3 12.401
2-	2.62E-02 6.98E-02 8/ 4/3 15.124	3.17E-01 6.98E-02 8/ 4/3 13.984	1.73E-03 6.98E-02 8/ 4/3 15.105	2.71E-01 6.98E-02 8/ 4/3 13.969	3.46E-01 6.98E-02 8/ 4/3 13.616	6.84E-01 6.98E-02 8/ 4/3 15.130	2.10E-02 6.98E-02 8/ 4/3 13.582	5.14E-01 6.98E-02 8/ 4/3 15.104	1.88E-02 6.98E-02 8/ 4/3 13.552
2-	1.63E-01 COE CO 9/ 5/3 16.781	7.21E-01 COE CO 9/ 5/3 15.600	1.18E-01 COE CO 9/ 5/3 16.751	4.85E-01 COE CO 9/ 5/3 15.574	1.85E-03 COE CO 9/ 5/3 15.325	1.87E-02 COE CO 9/ 5/3 16.634	1.42E-02 COE CO 9/ 5/3 15.224	3.84E-02 COE CO 9/ 5/3 15.608	4.17E-03 COE CO 9/ 5/3 15.245
2-	3.15E-01 9.95E-03 10/ 4/3 17.659	1.05E-03 9.95E-03 10/ 4/3 16.350	2.49E-01 9.95E-03 10/ 4/3 17.648	8.57E-06 9.95E-03 10/ 4/3 16.342	1.83E-03 9.95E-03 10/ 4/3 16.074	3.16E-01 4.84E-04 9/ 4/3 20.053	7.81E-04 9.95E-03 10/ 4/3 16.333	2.67E-01 4.84E-04 9/ 4/3 19.994	1.64E-06 9.95E-03 10/ 4/3 16.305
2-	2.72E-01 4.84E-04 9/ 4/3 19.995	8.78E-02 4.84E-04 9/ 4/3 18.722	2.16E-01 4.84E-04 9/ 4/3 19.966	6.12E-02 4.84E-04 9/ 4/3 18.696	2.70E-02 4.84E-04 9/ 4/3 18.436	4.95E-01 3.83E-00 7/ 6/5 9.113	1.45E-01 4.84E-04 9/ 4/3 18.576	6.04E-01 3.83E-00 7/ 6/5 8.909	1.36E-01 4.84E-04 9/ 4/3 18.512
2-	4.43E-01 3.83E-00 7/ 6/5 8.993	9.76E-01 3.83E-00 7/ 6/5 8.419	5.32E-01 3.83E-00 7/ 6/5 8.936	7.50E-01 3.83E-00 7/ 6/5 8.332	1.35E-00 3.83E-00 7/ 6/5 8.238	2.12E-01 7.64E-02 8/ 6/5 2.798	1.24E-00 3.83E-00 7/ 6/5 8.400	1.78E-01 7.64E-02 8/ 6/5 9.770	9.79E-01 3.83E-00 7/ 6/5 8.279
2-	1.12E-01 7.64E-02 8/ 6/5 9.746	9.70E-02 7.64E-02 8/ 6/5 9.327	8.83E-02 7.64E-02 8/ 6/5 9.736	7.57E-02 7.64E-02 8/ 6/5 9.316	9.29E-02 7.64E-02 8/ 6/5 9.467	9.64E-02 1.02E-02 10/ 6/5 11.769	1.46E-01 7.64E-02 8/ 6/5 9.521	1.24E-01 1.02E-02 10/ 6/5 11.747	1.30E-01 7.64E-02 8/ 6/5 9.502

2-	4.45E-C3 1.02E-C2 10/ 6.5 11.989	3.99E-C3 1.02E-C2 10/ 6.5 11.639	4.80E-C3 1.02E-C2 10/ 6.5 11.980	5.83E-C6 1.02E-C2 10/ 6.5 11.627	9.13E-C4 1.02E-C2 10/ 6.5 11.636	2.33E-C0 1.92E-C0 8/ 5.5 12.539	2.06E-C1 1.92E-C2 10/ 6.5 11.636	2.08E-C0 1.92E-C2 8/ 5.5 12.508	2.40E-C1 1.02E-C2 10/ 6.5 11.585
2-	3.51E-C0 1.92E-C0 8/ 5.5 13.189	4.23E-C0 1.92E-C0 8/ 5.5 12.330	3.45E-C0 1.92E-C0 8/ 5.5 13.175	4.08E-C0 1.92E-C0 8/ 5.5 12.310	4.50E-C0 1.92E-C0 8/ 5.5 12.339	6.52E-C1 7.80E-C2 9/ 6.5 14.302	4.09E-C0 1.92E-C0 8/ 5.5 12.200	6.12E-C1 7.80E-C2 9/ 6.5 14.286	3.93E-C0 1.92E-C0 8/ 5.5 12.176
2-	8.53E-C1 7.80E-C2 9/ 6.5 14.234	1.67E-C0 7.80E-C2 9/ 6.5 13.675	7.57E-C1 7.80E-C2 9/ 6.5 14.213	1.55E-C0 7.80E-C2 9/ 6.5 13.669	2.01E-C0 4.11E-C0 7/ 4.5 13.747	3.87E-C0 4.11E-C0 7/ 4.5 14.700	7.11E-C1 7.80E-C2 9/ 6.5 14.119	3.21E-C0 4.11E-C0 7/ 4.5 14.622	8.75E-C1 7.80E-C2 9/ 6.5 14.101
2-	3.58E-C0 4.11E-C0 7/ 4.5 15.306	3.71E-C0 4.11E-C0 7/ 4.5 14.705	3.08E-C0 4.11E-C0 7/ 4.5 15.229	3.07E-C0 4.11E-C0 7/ 4.5 14.606	2.92E-C0 7.80E-C2 9/ 6.5 14.405	2.13E-C0 8.43E-C1 8/ 4.5 15.977	4.10E-C0 4.11E-C0 7/ 4.5 14.384	1.78E-C0 8.43E-C1 8/ 4.5 15.956	3.12E-C0 4.11E-C0 7/ 4.5 14.284
2-	1.99E-C0 8.43E-C1 8/ 4.5 15.548	1.29E-C0 8.43E-C1 8/ 4.5 15.547	1.53E-C0 8.43E-C1 8/ 4.5 15.924	1.10E-C0 8.43E-C1 8/ 4.5 15.528	1.32E-C0 8.43E-C1 8/ 4.5 15.586	6.32E-C3 0.00E-C0 9/ 5.5 17.205	2.22E-C0 8.43E-C1 8/ 4.5 15.707	4.46E-C3 0.00E-C0 9/ 5.5 17.167	1.93E-C0 8.43E-C1 8/ 4.5 15.687
2-	2.02E-C1 0.00E-C0 9/ 5.5 17.494	3.04E-C1 0.00E-C0 9/ 5.5 17.092	1.56E-C1 0.00E-C0 9/ 5.5 17.452	2.17E-C1 0.00E-C0 9/ 5.5 17.042	9.97E-C2 0.00E-C0 9/ 5.5 17.000	1.16E-C0 6.38E-C1 10/ 4.5 17.866	7.27E-C3 0.00E-C0 9/ 5.5 16.809	1.00E-C0 6.38E-C1 10/ 4.5 17.837	2.08E-C3 0.00E-C0 9/ 5.5 16.791
2-	3.18E-C0 6.38E-C1 10/ 4.5 18.319	3.16E-C0 6.38E-C1 10/ 4.5 17.985	2.85E-C0 6.38E-C1 10/ 4.5 18.300	2.83E-C0 6.38E-C1 10/ 4.5 17.964	2.28E-C0 6.38E-C1 10/ 4.5 17.829	1.82E-C0 6.38E-C1 10/ 4.5 18.322	2.93E-C0 6.38E-C1 10/ 4.5 17.862	1.65E-C0 6.38E-C1 10/ 4.5 18.293	2.60E-C0 6.38E-C1 10/ 4.5 17.827
2-	1.49E-C0 4.58E-C1 9/ 4.5 20.813	1.71E-C0 4.58E-C1 9/ 4.5 20.197	1.17E-C0 4.58E-C1 9/ 4.5 20.763	1.35E-C0 4.58E-C1 9/ 4.5 20.139	9.97E-C1 4.58E-C1 9/ 4.5 20.090	1.15E-C0 4.58E-C1 9/ 4.5 20.847	1.36E-C0 4.58E-C1 9/ 4.5 20.230	8.12E-C1 4.58E-C1 9/ 4.5 20.769	9.75E-C1 4.58E-C1 9/ 4.5 20.146
3-	8.69E-C2 6.62E-C1 7/ 6.3 5.640	8.46E-C2 6.62E-C1 7/ 6.3 4.340	3.19E-C3 6.62E-C1 7/ 6.3 3.309	0.00E-C0 0.00E-C0 0/ 0.0 0.000	1.12E-C3 6.62E-C1 7/ 6.3 4.838	8.38E-C2 6.62E-C1 7/ 6.3 6.416	7.83E-C2 6.62E-C1 7/ 6.3 4.785	1.97E-C3 6.62E-C1 7/ 6.3 5.173	2.87E-C3 6.62E-C1 7/ 6.3 2.975

3°	2.46E C1 2.21E C2 7/ 5.3 8.984	1.57E C2 1.24E C2 8/ 6.3 6.56C	1.55E C1 1.24E C2 9/ 6.3 8.914	1.25E C2 6.62E C1 7/ 6.3 6.419	4.10E C2 1.24E C2 8/ 6.3 6.76C	1.43E C2 1.24E C2 8/ 6.3 8.271	1.99E C2 1.24E C2 2/ 6.3 6.533	1.21E C2 1.24E C2 8/ 6.3 8.212	1.63E C2 1.24E C2 8/ 6.3 6.437
3°	1.44E C2 1.99E C2 7/ 4.3 11.636	4.70E C1 2.21E C2 7/ 5.3 7.747	1.51E C2 1.99E C2 7/ 4.3 11.723	3.74E C1 2.21E C2 7/ 5.3 7.676	1.08E C2 2.21E C2 7/ 5.3 7.842	5.89E C1 2.21E C2 7/ 5.3 9.046	7.84E C1 2.21E C2 7/ 5.3 7.373	4.95E C1 2.21E C2 7/ 5.3 8.976	7.00E C1 2.21E C2 7/ 5.3 7.507
3°	5.38E-C1 1.19E C2 9/ 6.3 13.415	4.61E-C2 1.99E C2 7/ 4.3 10.471	4.83E-C1 1.19E C2 9/ 6.3 13.407	2.67E C0 1.99E C2 7/ 4.3 10.322	4.04E C0 1.19E C2 9/ 6.3 12.334	2.15E C2 1.99E C2 7/ 4.3 12.27	1.58E C1 1.99E C2 7/ 4.3 10.670	2.25E C2 1.99E C2 7/ 4.3 12.165	2.38E C1 1.99E C2 7/ 4.3 10.531
3°	1.08E C1 1.19E C2 9/ 6.3 14.014	1.94E-C1 1.19E C2 9/ 6.3 12.50C	1.14E C1 1.19E C2 9/ 6.3 14.004	2.58E-C1 1.19E C2 9/ 6.3 12.492	5.60E C1 8.24E C1 8/ 4.3 13.328	6.19E C1 1.19E C2 9/ 6.3 14.307	4.08E C0 1.19E C2 9/ 6.3 12.725	8.01E C1 1.19E C2 9/ 6.3 14.275	5.17E C0 1.19E C2 9/ 6.3 12.678
3°	1.85E C0 8.24F C1 8/ 4.3 14.453	2.60E C1 8.24E C1 8/ 4.3 13.273	1.36E-C1 8.24E C1 8/ 4.3 14.417	3.61E C1 8.24E C1 8/ 4.3 13.246	1.05E C2 1.65E C2 9/ 5.3 14.345	1.38E C2 8.24E C1 8/ 4.3 15.147	5.21E C1 8.24E C1 8/ 4.3 13.580	1.24E C2 8.24E C1 8/ 4.3 15.121	5.31E C1 8.24E C1 8/ 4.3 13.560
3°	1.12E C2 1.65E C2 9/ 5.3 16.225	4.71E C1 1.65E C2 9/ 5.3 14.946	1.17E C2 1.65E C2 9/ 5.3 16.19C	5.63E C1 1.65E C2 9/ 5.3 14.904	7.83E C1 1.03E C2 10/ 4.3 15.559	1.09E C2 1.65E C2 9/ 5.3 16.676	2.91E C0 8.24E C1 8/ 4.3 13.483	1.09E C2 1.65E C2 9/ 5.3 16.626	2.59E C0 8.24E C1 8/ 4.3 13.648
3°	2.40E C1 1.03E C2 10/ 4.3 16.882	5.95E C1 1.03E C2 10/ 4.3 15.583	2.38E C1 1.03E C2 10/ 4.3 16.865	5.74E C1 1.03E C2 10/ 4.3 15.57C	9.14E C1 7.94E C1 9/ 4.3 18.119	7.77E C1 1.03E C2 10/ 4.3 17.675	1.13E C1 1.65E C2 9/ 5.3 15.156	7.67E C1 1.03E C2 10/ 4.3 17.652	2.32E C1 1.65E C2 9/ 5.3 15.103
3°	8.01E C1 7.94E C1 9/ 4.3 19.596	8.74E C1 7.94E C1 9/ 4.3 18.292	8.14E C1 7.94E C1 9/ 4.3 19.555	8.76E C1 7.94E C1 9/ 4.3 18.25C	9.39E C0 6.62E C1 7/ 6.5 7.601	1.45E C2 7.94E C1 9/ 4.3 20.303	1.03E C1 1.03E C2 10/ 4.3 15.949	1.45E C2 7.94E C1 9/ 4.3 20.227	1.26E C1 1.03E C2 10/ 4.3 15.927
3°	8.18E C1 6.62E C1 7/ 6.5 7.749	8.28E C0 6.62E C1 7/ 6.5 7.466	6.88E C1 6.62E C1 7/ 6.5 7.644	8.17E C0 6.62E C1 7/ 6.5 7.413	3.31E C1 1.24E C2 8/ 6.5 9.686	4.11E C1 6.62E C1 7/ 6.5 7.824	6.72E C1 7.94E C1 9/ 4.3 18.942	2.97E C1 6.62E C1 7/ 6.5 7.742	7.10E C1 7.94E C1 9/ 4.3 18.876

3*	9.63E C1 6.62E C1 7/ 6,5 8.199	2.06E C1 1.24E C2 8/ 6,5 9.617	8.19E C1 6.62E C1 7/ 6,5 8.151	2.05E C1 1.24E C2 8/ 6,5 9.604	4.50E-01 2.21E C2 7/ 5,5 10.506	2.36E C1 1.24E C2 8/ 6,5 9.744	1.70E C0 6.62E C1 7/ 6,5 7.257	2.35E C1 1.24E C2 8/ 6,5 9.734	2.38E C0 6.62E C1 7/ 6,5 7.201
3*	2.36E C1 1.24E C2 8/ 6,5 9.930	2.44E C2 2.21E C2 7/ 5,5 10.898	2.29E C1 1.24E C2 8/ 6,5 9.915	2.23E C2 2.21E C2 7/ 5,5 10.823	3.57E C2 2.21E C2 7/ 5,5 10.838	1.21E C2 2.21E C2 7/ 5,5 11.193	1.50E C1 1.24E C2 8/ 6,5 9.504	9.83E C1 2.21E C2 7/ 5,5 11.114	1.51E C1 1.24E C2 8/ 6,5 9.491
3*	9.78E C1 2.21E C2 7/ 5,5 10.990	2.93E C1 1.19E C2 9/ 6,5 13.310	7.48E C1 2.21E C2 7/ 5,5 10.906	2.65E C1 1.19E C2 9/ 6,5 13.297	4.32E C1 1.99E C2 7/ 4,5 13.486	1.28E C0 1.19E C2 9/ 6,5 13.593	3.22E C2 2.21E C2 7/ 5,5 11.070	8.32E-01 1.19E C2 9/ 6,5 13.562	2.96E C2 2.21E C2 7/ 5,5 11.002
3*	2.97E C2 1.99E C2 7/ 4,5 14.695	2.55E C2 1.99E C2 7/ 4,5 14.096	2.67E C2 1.99E C2 7/ 4,5 14.624	2.07E C2 1.99E C2 7/ 4,5 14.304	1.88E C2 1.13E C2 9/ 6,5 14.007	1.59E C2 1.13E C2 9/ 6,5 14.432	2.63E C2 1.13E C2 9/ 6,5 14.266	1.06E C2 1.13E C2 9/ 6,5 14.382	2.24E C2 1.13E C2 9/ 6,5 14.216
3*	3.14E C1 8.24E C1 8/ 4,5 15.518	7.72E C1 8.24E C1 8/ 4,5 15.212	1.94E C1 8.24E C1 8/ 4,5 15.496	6.44E C1 8.24E C1 8/ 4,5 15.197	3.14E C1 8.24E C1 8/ 4,5 15.339	4.62E C0 8.24E C1 8/ 4,5 15.693	1.06E C2 8.24E C1 8/ 4,5 15.468	1.77E C0 8.24E C1 8/ 4,5 15.675	9.15E C1 8.24E C1 8/ 4,5 15.451
3*	7.84E C1 1.65E C2 9/ 5,5 17.185	6.93E C1 1.65E C2 9/ 5,5 16.819	6.93E C1 1.65E C2 9/ 5,5 17.161	5.39E C1 1.65E C2 9/ 5,5 16.792	6.89E C1 1.65E C2 9/ 5,5 16.908	5.98E C0 1.65E C2 9/ 5,5 17.199	6.25E C1 1.65E C2 9/ 5,5 16.731	4.38E C0 1.65E C2 9/ 5,5 17.174	5.61E C1 1.65E C2 9/ 5,5 16.908
3*	1.72E C2 1.03E C2 10/ 4,5 18.091	1.55E C2 1.03E C2 10/ 4,5 17.787	1.39E C2 1.03E C2 10/ 4,5 18.054	1.22E C2 1.03E C2 10/ 4,5 17.753	1.24E C2 1.03E C2 10/ 4,5 17.733	1.23E C2 1.03E C2 10/ 4,5 18.216	1.77E C2 1.03E C2 10/ 4,5 17.384	1.19E C2 1.03E C2 10/ 4,5 18.183	1.53E C2 1.03E C2 10/ 4,5 17.850
3*	1.70E C2 7.94E C1 9/ 4,5 20.863	2.01E C2 7.94E C1 9/ 4,5 20.304	1.28E C2 7.94E C1 9/ 4,5 20.780	1.55E C2 7.94E C1 9/ 4,5 20.215	1.16E C2 7.94E C1 9/ 4,5 20.129	4.25E C1 7.94E C1 9/ 4,5 20.878	1.40E C2 7.94E C1 9/ 4,5 20.174	2.53E C1 7.94E C1 9/ 4,5 20.810	1.08E C2 7.94E C1 9/ 4,5 20.086
4*	9.16E C1 3.43E C0 7/ 6,3 7.150	3.54E C1 3.43E C0 7/ 6,3 5.905	7.25E C1 3.43E C0 7/ 6,3 7.130	2.71E C1 3.43E C0 7/ 6,3 5.887	3.11E C1 3.43E C0 7/ 6,3 5.844	5.54E C1 3.43E C0 7/ 6,3 7.114	1.82E C1 3.43E C0 7/ 6,3 5.437	4.35E C1 3.43E C0 7/ 6,3 7.082	1.24E C1 3.43E C0 7/ 6,3 5.396

7.33E 02	4.62E 00	6.35E 02	1.44E 01	1.84E 01	4.81E 03	2.77E 00	4.72E 03	1.20E 01
1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02
7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3	7/ 5.3
10.228	9.079	10.224	9.059	8.385	10.223	9.031	10.893	8.993
1.14E 03	7.28E 02	1.06E 03	6.69E 02	6.16E 02	1.04E 03	4.21E 02	9.63E 02	4.06E 02
1.98E 02	1.98E 02	1.98E 02	1.98E 02	1.98E 02	1.98E 02	1.98E 02	1.98E 02	1.98E 02
7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3	7/ 4.3
13.326	12.265	13.257	12.238	12.035	12.933	11.520	12.902	11.484
1.50E 02	3.85E 01	1.76E 02	3.43E 01	1.62E 01	2.45E 02	6.19E 01	2.34E 02	5.63E 01
2.76E 00	2.76E 00	2.76E 00	2.76E 00	2.76E 00	2.76E 00	2.76E 00	2.76E 00	2.76E 00
9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3	9/ 6.3
14.055	13.078	14.030	13.056	12.730	14.033	12.709	14.036	12.684
1.81E 03	6.06E 02	1.60E 03	4.09E 02	2.62E 02	1.41E 03	4.10E 02	1.35E 03	3.73E 02
9.51E 01	9.51E 01	9.51E 01	9.51E 01	9.51E 01	9.51E 01	9.51E 01	9.51E 01	9.51E 01
8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3	8/ 4.3
15.372	14.227	15.352	14.210	13.958	16.172	14.268	16.145	14.238
1.39E 02	2.45E 01	1.11E 02	1.81E 01	7.17E 00	3.94E 01	8.36E 00	2.60E 01	4.45E 00
2.55E-01	2.55E-01	2.55E-01	2.55E-01	2.55E-01	2.55E-01	2.55E-01	2.55E-01	2.55E-01
9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3	9/ 4.3
19.455	18.222	19.444	18.213	18.141	19.413	17.029	19.376	17.885
1.07E 02	1.85E 02	8.29E 01	1.44E 02	2.54E 02	2.27E 02	3.10E 02	2.05E 02	2.72E 02
7.40E 02	7.40E 02	7.40E 02	7.40E 02	7.40E 02	7.40E 02	7.40E 02	7.40E 02	7.40E 02
7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5	7/ 6.5
7.818	7.151	7.804	7.133	7.378	7.993	7.252	7.966	7.254
5.01E 03	5.55E 03	4.67E 03	5.13E 03	6.01E 03	2.07E 03	6.81E 03	1.78E 03	6.42E 03
3.40E 03	3.40E 03	3.40E 03	3.40E 03	3.40E 03	3.40E 03	3.40E 03	3.40E 03	3.40E 03
7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5	7/ 5.5
10.867	10.429	10.842	10.399	10.500	10.318	10.421	10.294	10.399
1.88E 03	2.65E 03	1.58E 03	2.32E 03	2.60E 03	5.94E 02	2.22E 03	5.88E 02	2.03E 03
3.15E 03	3.15E 03	3.15E 03	3.15E 03	3.15E 03	3.15E 03	3.15E 03	3.15E 03	3.15E 03
7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5	7/ 4.5
14.141	13.528	14.106	13.485	13.363	13.487	13.345	13.474	13.322
2.14E 02	2.12E 02	1.78E 02	2.50E 02	2.43E 02	1.45E 03	7.12E 02	1.24E 03	6.00E 02
1.61E 01	1.61E 01	1.61E 01	1.61E 01	1.61E 01	3.15E 03	1.61E 01	3.15E 03	1.61E 01
9/ 6.5	9/ 6.5	9/ 6.5	9/ 6.5	9/ 6.5	7/ 4.5	9/ 6.5	7/ 4.5	9/ 6.5
14.822	14.190	14.791	14.154	14.160	13.979	13.970	13.952	13.947

4-	4.41E 03 2.72E 03 8/4.5 16.116	5.54E 03 2.72E 03 8/4.5 15.723	3.81E 03 2.72E 03 8/4.5 16.091	4.85E 03 2.72E 03 8/4.5 15.693	4.44E 03 2.72E 03 8/4.5 15.658	3.79E 03 2.72E 03 8/4.5 15.455	4.72E 03 2.72E 03 8/4.5 15.565	3.51E 03 2.72E 03 8/4.5 15.438	4.46E 03 2.72E 03 8/4.5 15.547
4-	4.42E 02 2.41E 02 9/4.5 20.129	5.62E 02 2.41E 02 9/4.5 19.463	3.71E 02 2.41E 02 9/4.5 20.117	4.63E 02 2.41E 02 9/4.5 19.449	3.94E 02 2.41E 02 9/4.5 19.666	4.07E 02 2.41E 02 9/4.5 20.348	4.45E 02 2.41E 02 9/4.5 19.743	3.53E 02 2.41E 02 9/4.5 20.322	3.80E 02 2.41E 02 9/4.5 19.719
5-	1.75E 05 9.94E 04 7/6.3 5.826	1.69E 05 9.94E 04 7/6.3 4.478	2.77E 05 9.94E 04 7/6.3 5.353	3.14E 05 9.94E 04 7/6.3 3.853	2.12E 05 9.94E 04 7/6.3 4.796	1.84E 05 9.94E 04 7/6.3 6.352	1.73E 05 9.94E 04 7/6.3 4.621	2.63E 05 9.94E 04 7/6.3 5.973	2.94E 05 9.94E 04 7/6.3 4.094
5-	6.17E 04 4.26E 04 7/4.3 12.607	5.57E 04 4.26E 04 7/4.3 11.507	7.02E 04 4.26E 04 7/4.3 12.550	6.70E 04 4.26E 04 7/4.3 11.436	6.50E 04 4.26E 04 7/4.3 11.499	8.60E 04 4.26E 04 7/4.3 13.165	6.34E 04 4.26E 04 7/4.3 11.805	8.86E 04 4.26E 04 7/4.3 13.123	7.13E 04 4.26E 04 7/4.3 11.747
5-	9.14E 04 1.06E 05 9/4.3 18.758	8.42E 04 1.06E 05 9/4.3 17.428	1.02E 05 1.06E 05 9/4.3 18.671	9.70E 04 1.06E 05 9/4.3 17.333	1.10E 05 1.06E 05 9/4.3 17.510	8.93E 04 1.06E 05 9/4.3 19.309	7.61E 04 1.06E 05 9/4.3 17.786	9.77E 04 1.06E 05 9/4.3 19.243	8.65E 04 1.06E 05 9/4.3 17.712
5-	6.03E 04 9.94E 04 7/6.5 8.430	6.51E 04 9.94E 04 7/6.5 7.869	5.06E 04 9.94E 04 7/6.5 8.364	5.34E 04 9.94E 04 7/6.5 7.802	5.97E 04 9.94E 04 7/6.5 7.829	5.48E 04 9.94E 04 7/6.5 8.547	6.46E 04 9.94E 04 7/6.5 7.891	4.83E 04 9.94E 04 7/6.5 8.483	5.48E 04 9.94E 04 7/6.5 7.826
5-	2.06E 04 4.26E 04 7/4.5 13.650	2.80E 04 4.26E 04 7/4.5 13.048	1.64E 04 4.26E 04 7/4.5 13.621	2.23E 04 4.26E 04 7/4.5 13.021	2.51E 04 4.26E 04 7/4.5 13.262	3.51E 03 4.26E 04 7/4.5 13.796	2.63E 04 4.26E 04 7/4.5 13.353	1.92E 03 4.26E 04 7/4.5 13.763	2.05E 04 4.26E 04 7/4.5 13.327
5-	8.83E 04 1.06E 05 9/4.5 20.670	9.53E 04 1.06E 05 9/4.5 20.304	7.72E 04 1.06E 05 9/4.5 20.810	8.30E 04 1.06E 05 9/4.5 20.243	8.03E 04 1.06E 05 9/4.5 20.202	7.94E 04 1.06E 05 9/4.5 20.785	9.37E 04 1.06E 05 9/4.5 20.214	6.89E 04 1.06E 05 9/4.5 20.724	8.19E 04 1.06E 05 9/4.5 20.151
6-	1.75E 06 1.66E 05 7/4.3 13.640	9.34E 05 1.66E 05 7/4.3 12.583	1.66E 06 1.66E 05 7/4.3 13.615	8.70E 05 1.66E 05 7/4.3 12.561	7.00E 05 1.66E 05 7/4.3 12.240	3.08E 05 1.66E 05 7/4.3 14.353	1.35E 06 1.66E 05 7/4.3 12.609	3.59E 05 1.66E 05 7/4.3 14.316	1.17E 06 1.66E 05 7/4.3 12.576

6+	3.16E C6 4.74E C6 7/ 4,5 14.411	3.97E C6 4.74E C6 7/ 4,5 13.776	2.90E C6 4.74E C6 7/ 4,5 14.378	3.68E C6 4.74E C6 7/ 4,5 13.736	3.97E C6 4.74E C6 7/ 4,5 13.726	4.61E C6 4.74E C6 7/ 4,5 13.562	3.56E C6 4.74E C6 7/ 4,5 13.315	4.42E C6 4.74E C6 7/ 4,5 13.553	3.59E C6 4.74E C6 7/ 4,5 13.497
1+	1.18E-15 7.40E-17 12/ 6,3 13.8C5	2.94E-14 7.40E-17 12/ 6,3 12.48C	1.18E-15 7.40E-17 12/ 6,3 13.796	1.07E-14 7.40E-17 12/ 6,3 12.469	.00E C0 7.40E-17 12/ 6,3 12.228	1.18E-15 7.40E-17 12/ 6,3 13.289	1.07E-14 7.40E-17 12/ 6,3 11.78C	1.07E-14 7.40E-17 12/ 6,3 13.280	1.90E-14 7.40E-17 12/ 6,3 11.759
1+	4.27E-13 7.11E-15 12/ 4,3 18.985	2.32E-13 7.11E-15 12/ 4,3 17.748	9.59E-14 7.11E-15 12/ 4,3 18.977	2.00E-13 7.11E-15 12/ 4,3 17.739	1.18E-13 7.11E-15 12/ 4,3 17.672	4.26E-14 7.11E-15 12/ 4,3 18.915	5.80E-14 7.11E-15 12/ 4,3 17.379	7.59E-14 7.11E-15 12/ 4,3 15.895	2.00E-13 7.11E-15 12/ 4,3 17.360
1+	2.00E-13 4.74E-15 12/ 6,5 14.661	9.59E-14 4.74E-15 12/ 6,5 14.413	2.00E-13 4.74E-15 12/ 6,5 14.643	4.26E-14 4.74E-15 12/ 6,5 14.395	2.32E-13 4.74E-15 12/ 6,5 14.209	7.58E-14 4.74E-15 12/ 6,5 14.557	1.18E-13 4.74E-15 12/ 6,5 14.389	2.94E-14 4.74E-15 12/ 6,5 14.547	3.42E-13 4.74E-15 12/ 6,5 14.379
1+	.00E C0 2.84E-14 12/ 4,5 20.634	3.03E-13 2.84E-14 12/ 4,5 20.429	3.03E-13 2.84E-14 12/ 4,5 20.598	3.03E-13 2.84E-14 12/ 4,5 20.393	3.03E-13 2.84E-14 12/ 4,5 20.140	3.03E-13 2.84E-14 12/ 4,5 20.754	.00E C0 2.84E-14 12/ 4,5 20.588	.00E C0 2.84E-14 12/ 4,5 20.705	.00E C0 2.84E-14 12/ 4,5 20.637
2+	2.76E C0 7.45E C1 12/ 6,3 13.071	2.55E C0 7.45E C1 12/ 6,3 11.729	2.77E C0 7.45E C1 12/ 6,3 13.051	2.56E C0 7.45E C1 12/ 6,3 11.707	1.65E C0 7.45E C1 12/ 6,3 11.745	1.07E C0 7.45E C1 12/ 6,3 13.485	8.11E C1 7.45E C1 12/ 6,3 12.144	9.74E C1 7.45E C1 12/ 6,3 13.471	6.78E C1 7.45E C1 12/ 6,3 12.122
2+	2.72E C1 6.52E C0 12/ 5,3 14.728	2.42E C1 6.52E C0 12/ 5,3 13.419	3.20E C1 6.52E C0 12/ 5,3 14.657	2.93E C1 6.52E C0 12/ 5,3 13.348	1.83E C1 6.52E C0 12/ 5,3 13.913	1.55E C1 6.52E C0 12/ 5,3 15.667	1.36E C1 6.52E C0 12/ 5,3 13.912	1.66E C1 6.52E C0 12/ 5,3 15.655	1.46E C1 6.52E C0 12/ 5,3 13.900
2+	9.61E C0 2.79E C1 11/ 4,3 16.022	1.18E C1 2.79E C1 11/ 4,3 14.799	9.43E C0 2.79E C1 11/ 4,3 15.927	1.14E C1 2.79E C1 11/ 4,3 14.691	2.32E C1 2.79E C1 11/ 4,3 15.482	2.50E C1 2.79E C1 11/ 4,3 17.103	2.67E C1 2.79E C1 11/ 4,3 15.509	2.39E C1 2.79E C1 11/ 4,3 17.087	2.79E C1 2.79E C1 11/ 4,3 15.473
2+	2.78E C0 2.98E C0 12/ 4,3 18.215	3.18E C0 2.98E C0 12/ 4,3 16.980	2.94E C0 2.98E C0 12/ 4,3 18.192	3.39E C0 2.98E C0 12/ 4,3 16.957	3.25E C0 2.98E C0 12/ 4,3 17.153	2.51E C0 2.98E C0 12/ 4,3 18.903	2.31E C0 2.98E C0 12/ 4,3 17.394	2.63E C0 2.98E C0 12/ 4,3 18.886	2.45E C0 2.98E C0 12/ 4,3 17.379

2+	6.91E-02 7.45E-01 12/ 6,5 14.022	1.41E-00 7.45E-01 12/ 6,5 13.804	9.93E-02 7.45E-01 12/ 6,5 14.018	1.31E-00 7.45E-01 12/ 6,5 13.799	3.64E-01 7.45E-01 12/ 6,5 13.793	5.75E-04 7.45E-01 12/ 6,5 14.074	1.87E-02 7.45E-01 12/ 6,5 13.724	1.11E-03 7.45E-01 12/ 6,5 14.060	1.13E-02 7.45E-01 12/ 6,5 13.716
2+	4.08E-00 6.52E-00 12/ 5,5 16.807	2.57E-00 6.52E-00 12/ 5,5 16.611	3.04E-00 6.52E-00 12/ 5,5 16.803	2.43E-00 6.52E-00 12/ 5,5 16.607	3.72E-00 6.52E-00 12/ 5,5 16.617	4.03E-00 6.52E-00 12/ 5,5 16.735	2.03E-00 6.52E-00 12/ 5,5 16.735	6.15E-00 6.52E-00 12/ 5,5 16.923	2.95E-00 6.52E-00 12/ 5,5 16.922
2+	2.21E-00 2.98E-00 12/ 4,5 19.958	2.50E-00 2.98E-00 12/ 4,5 19.797	2.16E-00 2.50E-00 12/ 4,5 19.990	2.46E-00 2.98E-00 12/ 4,5 19.788	2.28E-00 2.98E-00 12/ 4,5 19.754	7.82E-01 2.98E-00 12/ 4,5 19.940	1.24E-00 2.98E-00 12/ 4,5 19.841	7.23E-01 2.98E-00 12/ 4,5 15.935	1.18E-00 2.98E-00 12/ 4,5 19.835
2+	2.76E-01 2.79E-01 11/ 4,5 21.022	2.81E-01 2.79E-01 11/ 4,5 20.965	2.70E-01 2.79E-01 11/ 4,5 21.215	2.77E-01 2.79E-01 11/ 4,5 20.958	2.62E-01 2.79E-01 11/ 4,5 20.764	2.74E-01 2.79E-01 11/ 4,5 20.960	2.84E-01 2.79E-01 11/ 4,5 20.862	2.81E-01 2.79E-01 11/ 4,5 20.756	2.94E-01 2.79E-01 11/ 4,5 20.957
3+	6.71E-01 4.42E-03 12/ 6,3 13.103	7.34E-04 4.42E-03 12/ 6,3 11.850	6.56E-01 4.42E-03 12/ 6,3 13.100	2.18E-03 4.42E-03 12/ 6,3 11.846	1.64E-01 4.42E-03 12/ 6,3 11.801	1.17E-00 4.42E-03 12/ 6,3 12.894	2.26E-00 4.42E-03 12/ 6,3 11.364	1.13E-00 4.42E-03 12/ 6,3 12.885	2.28E-00 4.42E-03 12/ 6,3 11.353
3+	2.83E-01 2.94E-00 11/ 6,3 13.480	1.01E-01 2.94E-00 11/ 6,3 12.154	2.75E-01 2.94E-00 11/ 6,3 13.470	1.01E-01 2.94E-00 11/ 6,3 12.143	1.02E-01 2.94E-00 11/ 6,3 11.877	1.12E-02 2.94E-00 12/ 5,3 16.222	1.14E-01 2.94E-00 11/ 6,3 12.245	1.00E-02 2.94E-00 12/ 5,3 16.913	1.13E-01 2.94E-00 11/ 6,3 12.229
3+	1.40E-01 1.95E-00 12/ 5,3 16.212	2.81E-00 1.95E-00 12/ 5,3 15.028	1.43E-01 1.95E-00 12/ 5,3 16.209	2.49E-00 1.95E-00 12/ 5,3 15.025	3.74E-00 1.95E-00 12/ 5,3 14.848	3.48E-01 1.20E-01 12/ 4,3 18.350	2.48E-00 1.95E-00 12/ 5,3 14.866	3.44E-01 1.20E-01 11/ 4,3 14.345	2.14E-00 1.95E-00 12/ 5,3 14.860
3+	4.74E-01 1.20E-01 11/ 4,3 18.621	2.75E-01 1.20E-01 11/ 4,3 17.645	4.68E-01 1.20E-01 11/ 4,3 18.815	2.74E-01 1.20E-01 11/ 4,3 17.638	2.69E-01 1.20E-01 11/ 4,3 17.471	1.94E-01 1.69E-00 12/ 4,3 19.050	2.59E-01 1.20E-01 11/ 4,3 16.846	2.03E-01 1.69E-00 12/ 4,3 19.047	2.64E-01 1.20E-01 11/ 4,3 16.839
3+	2.46E-01 1.69E-00 12/ 4,3 19.208	8.05E-00 1.69E-00 12/ 4,3 18.058	2.44E-01 1.69E-00 12/ 4,3 19.205	8.32E-00 1.69E-00 12/ 4,3 18.055	5.35E-00 1.69E-00 12/ 4,3 17.893	5.33E-01 4.12E-00 12/ 6,5 13.658	5.23E-00 4.12E-00 12/ 6,5 17.591	5.26E-01 4.12E-00 12/ 6,5 13.645	5.66E-00 4.12E-00 12/ 6,5 17.586

3+	1.50E C0 4.12E C0 12/ 6,5 13.749	3.67E C0 4.12E C0 12/ 6,5 13.424	1.38E C0 4.12E C0 12/ 6,5 13.744	3.46E C0 4.12E C0 12/ 6,5 13.419	4.64E C0 4.12E C0 12/ 6,5 13.555	1.51E C1 4.12E C0 12/ 6,5 13.734	1.65E C1 4.12E C0 12/ 6,5 13.551	1.29E C1 4.12E C0 12/ 6,5 13.930	1.77E C1 4.12E C0 12/ 6,5 13.616
3+	5.69E C1 1.47E C2 11/ 6,5 14.294	7.45E C1 1.47E C2 11/ 6,5 13.970	5.19E C1 1.47E C2 11/ 6,5 14.272	6.83E C1 1.47E C2 11/ 6,5 13.946	9.07E C1 1.47E C2 11/ 6,5 13.792	4.11E C1 1.47E C2 11/ 6,5 14.356	8.24E C1 1.47E C2 11/ 6,5 13.839	3.65E C1 1.47E C2 11/ 6,5 14.337	7.42E C1 1.47E C2 11/ 6,5 13.518
3+	1.72E C2 5.59E C1 12/ 5,5 16.860	1.81E C2 5.59E C1 12/ 5,5 16.556	1.68E C2 5.59E C1 12/ 5,5 16.555	1.72E C2 5.59E C1 12/ 5,5 16.551	1.83E C2 5.59E C1 12/ 5,5 16.570	7.34E C1 5.59E C1 12/ 5,5 16.261	1.79E C2 5.59E C1 12/ 5,5 16.370	7.33E C1 5.59E C1 12/ 5,5 16.255	1.75E C2 5.59E C1 12/ 5,5 16.385
3+	9.17E C1 1.11E C2 11/ 4,5 19.526	1.24E C2 1.11E C2 11/ 4,5 19.523	8.44E C1 1.11E C2 11/ 4,5 19.836	1.14E C2 1.11E C2 11/ 4,5 19.503	1.23E C2 1.11E C2 11/ 4,5 19.408	5.03E C1 1.11E C2 11/ 4,5 19.579	5.20E C1 1.11E C2 11/ 4,5 19.445	4.65E C1 1.11E C2 11/ 4,5 19.564	4.87E C1 1.11E C2 11/ 4,5 19.432
3+	6.44E C1 2.41E C1 12/ 4,5 19.928	7.02E C1 2.41E C1 12/ 4,5 19.636	6.15E C1 2.41E C1 12/ 4,5 19.920	6.96E C1 2.41E C1 12/ 4,5 19.629	3.95E C1 2.41E C1 12/ 4,5 19.647	1.00E C2 2.41E C1 12/ 4,5 19.844	1.34E C2 2.41E C1 12/ 4,5 19.693	9.52E C1 2.41E C1 12/ 4,5 15.836	1.18E C2 2.41E C1 12/ 4,5 19.686
4+	1.04E C4 1.86E C3 11/ 6,3 12.432	1.02E C4 1.86E C3 11/ 6,3 11.073	1.19E C4 1.86E C3 11/ 6,3 12.377	1.15E C4 1.86E C3 11/ 6,3 11.005	6.18E C3 1.86E C3 11/ 6,3 11.200	1.24E C3 3.14E C3 12/ 6,3 12.696	3.21E C2 3.14E C3 12/ 6,3 11.167	1.22E C3 3.14E C3 12/ 6,3 12.668	2.77E C2 3.14E C3 12/ 6,3 11.135
4+	6.35E C2 3.14E C3 12/ 6,3 12.553	2.21E C2 3.14E C3 12/ 6,3 11.187	9.92E C2 3.14E C3 12/ 6,3 12.518	5.79E C2 3.14E C3 12/ 6,3 11.147	3.36E C3 3.14E C3 12/ 6,3 11.351	6.33E C3 1.86E C3 11/ 6,3 12.970	6.34E C3 1.86E C3 11/ 6,3 11.375	7.17E C3 1.86E C3 11/ 6,3 12.944	7.94E C3 1.86E C3 11/ 6,3 11.337
4+	8.71E C3 6.78E C3 11/ 5,3 14.765	6.88E C3 6.78E C3 11/ 5,3 13.473	9.25E C3 6.78E C3 11/ 5,3 14.714	7.41E C3 6.78E C3 11/ 5,3 13.424	8.04E C3 6.78E C3 11/ 5,3 13.654	9.99E C3 6.78E C3 11/ 5,3 15.392	7.34E C3 6.78E C3 11/ 5,3 13.571	1.03E C4 6.78E C3 11/ 5,3 15.070	8.03E C3 6.78E C3 11/ 5,3 13.547
4+	4.18E C3 4.79E C3 11/ 4,3 18.109	4.40E C3 4.79E C3 11/ 4,3 16.914	4.28E C3 4.79E C3 11/ 4,3 18.084	4.57E C3 4.79E C3 11/ 4,3 16.887	5.24E C3 4.79E C3 11/ 4,3 16.950	8.27E C3 4.79E C3 11/ 4,3 18.522	7.14E C3 4.79E C3 11/ 4,3 17.033	8.32E C3 4.79E C3 11/ 4,3 18.509	7.23E C3 4.79E C3 11/ 4,3 17.019

44	2.04E C3 1.57E C3 12/ 4,3 18.745	1.49E C3 1.57E C3 12/ 4,3 17.564	2.09E C3 1.57E C3 12/ 4,3 18.736	1.53E C3 1.57E C3 12/ 4,3 17.555	1.63E C3 1.57E C3 12/ 4,3 17.564	1.01E C3 1.57E C3 12/ 4,3 19.204	7.07E C2 1.57E C3 12/ 4,3 17.872	1.02E C3 1.57E C3 12/ 4,3 19.199	7.25E C2 1.57E C3 12/ 4,3 17.865
44	3.27E C0 1.86E C3 11/ 6,5 13.424	1.27E C2 1.86E C3 11/ 6,5 13.105	6.27E C0 1.86E C3 11/ 6,5 13.415	3.10E C2 1.86E C3 11/ 6,5 13.092	2.48E C1 1.86E C3 11/ 6,5 13.240	9.81E C2 1.86E C3 11/ 6,5 13.519	3.39E C1 1.86E C3 11/ 6,5 13.054	9.76E C2 1.86E C3 11/ 6,5 13.506	3.84E C1 1.86E C3 11/ 6,5 13.048
44	8.92E C2 3.14E C3 12/ 6,5 14.012	2.54E C3 3.14E C3 12/ 6,5 13.819	8.69E C2 3.14E C3 12/ 6,5 14.010	2.45E C3 3.14E C3 12/ 6,5 13.815	3.45E C3 3.14E C3 12/ 6,5 13.817	4.77E C2 3.14E C3 12/ 6,5 13.987	3.02E C3 3.14E C3 12/ 6,5 13.706	4.77E C2 3.14E C3 12/ 6,5 13.814	2.73E C3 3.14E C3 12/ 6,5 13.702
44	3.05E C3 6.78E C3 11/ 5,5 16.367	2.96E C3 6.78E C3 11/ 5,5 16.203	2.95E C3 6.78E C3 11/ 5,5 16.365	2.85E C3 6.78E C3 11/ 5,5 16.200	3.48E C3 6.78E C3 11/ 5,5 16.213	3.21E C3 6.78E C3 11/ 5,5 16.315	3.65E C3 6.78E C3 11/ 5,5 16.327	3.25E C3 6.78E C3 11/ 5,5 16.512	3.73E C3 6.78E C3 11/ 5,5 16.394
44	3.34E C3 4.79E C3 11/ 4,5 19.560	4.33E C3 4.79E C3 11/ 4,5 19.286	3.67E C3 4.79E C3 11/ 4,5 19.555	4.34E C3 4.79E C3 11/ 4,5 19.279	4.52E C3 4.79E C3 11/ 4,5 19.260	4.54E C3 4.79E C3 11/ 4,5 19.582	4.20E C3 4.79E C3 11/ 4,5 19.420	4.57E C3 4.79E C3 11/ 4,5 19.573	4.20E C3 4.79E C3 11/ 4,5 19.416
44	2.76E C3 1.57E C3 12/ 4,5 19.573	3.20E C3 1.57E C3 12/ 4,5 19.315	2.22E C3 1.57E C3 12/ 4,5 19.570	2.93E C3 1.57E C3 12/ 4,5 19.311	1.29E C3 1.57E C3 12/ 4,5 19.443	2.21E C2 1.57E C3 12/ 4,5 19.308	2.94E C3 1.57E C3 12/ 4,5 19.553	2.11E C2 1.57E C3 12/ 4,5 19.801	2.95E C3 1.57E C3 12/ 4,5 19.548
54	7.32E C3 2.85E C2 11/ 6,3 12.705	2.14E C3 2.85E C2 11/ 6,3 11.450	7.00E C3 2.85E C2 11/ 6,3 12.700	2.13E C3 2.85E C2 11/ 6,3 11.445	1.96E C3 2.85E C2 11/ 6,3 11.405	7.81E C3 2.85E C2 11/ 6,3 12.774	1.93E C3 2.85E C2 11/ 6,3 11.134	7.73E C3 2.85E C2 11/ 6,3 12.763	2.00E C3 2.85E C2 11/ 6,3 11.122
54	4.70E C4 5.74E C3 11/ 5,3 15.751	3.51E C2 5.74E C3 11/ 5,3 14.590	4.73E C4 5.74E C3 11/ 5,3 15.744	2.33E C2 5.74E C3 11/ 5,3 14.573	7.48E C2 5.74E C3 11/ 5,3 14.419	2.23E C5 5.74E C3 11/ 5,3 16.430	1.01E C2 5.74E C3 11/ 5,3 14.567	2.18E C5 5.74E C3 11/ 5,3 16.424	2.41E C1 5.74E C3 11/ 5,3 14.555
54	6.72E C4 7.09E C3 11/ 4,3 18.872	2.59E C4 7.09E C3 11/ 4,3 17.749	6.58E C4 7.09E C3 11/ 4,3 18.864	2.61E C4 7.09E C3 11/ 4,3 17.743	2.25E C4 7.09E C3 11/ 4,3 17.550	3.78E C4 7.09E C3 11/ 4,3 18.522	1.39E C4 7.09E C3 11/ 4,3 17.031	3.77E C4 7.09E C3 11/ 4,3 18.516	1.45E C4 7.09E C3 11/ 4,3 17.084

5*	5.84E C4 3.69E C3 12/ 4,3 19.341	1.36E C4 3.69E C3 12/ 4,3 18.211	5.85E C4 3.69E C3 12/ 4,3 19.336	1.39E C4 3.69E C3 12/ 4,3 18.208	9.82E C3 3.69E C3 12/ 4,3 17.398	4.46E C4 3.69E C3 12/ 4,3 20.074	1.47E C4 3.69E C3 12/ 4,3 18.205	4.34E C4 3.69E C3 12/ 4,3 20.069	1.56E C4 3.69E C3 12/ 4,3 15.254
5*	6.02E C3 3.50E C4 11/ 6,5 13.341	1.15E C4 3.50E C4 11/ 6,5 12.541	5.32E C3 3.50E C4 11/ 6,5 13.333	1.04E C4 3.50E C4 11/ 6,5 12.933	1.42E C4 3.50E C4 11/ 6,5 13.105	1.13E C4 3.50E C4 11/ 6,5 13.465	1.04E C4 3.50E C4 11/ 6,5 13.024	1.04E C4 3.50E C4 11/ 6,5 13.463	1.74E C4 3.50E C4 11/ 6,5 13.018
5*	2.65E C5 1.64E C5 11/ 5,5 16.385	3.07E C5 1.64E C5 11/ 5,5 16.094	2.53E C5 1.64E C5 11/ 5,5 16.374	2.97E C5 1.64E C5 11/ 5,5 16.082	3.28E C5 1.64E C5 11/ 5,5 16.140	1.34E C5 1.64E C5 11/ 5,5 15.411	3.55E C5 1.64E C5 11/ 5,5 16.046	1.32E C5 1.64E C5 11/ 5,5 15.401	3.49E C5 1.64E C5 11/ 5,5 16.041
5*	1.05E C5 1.22E C5 11/ 4,5 19.588	1.44E C5 1.22E C5 11/ 4,5 19.233	9.82E C4 1.22E C5 11/ 4,5 19.571	1.35E C5 1.22E C5 11/ 4,5 19.215	1.32E C5 1.22E C5 11/ 4,5 19.227	3.69E C4 1.22E C5 11/ 4,5 19.191	5.47E C4 1.22E C5 11/ 4,5 19.033	7.52E C4 1.22E C5 11/ 4,5 19.150	5.26E C4 1.22E C5 11/ 4,5 19.028
5*	1.29E C5 1.06E C5 12/ 4,5 20.016	1.72E C5 1.06E C5 12/ 4,5 19.707	1.21E C5 1.06E C5 12/ 4,5 20.008	1.70E C5 1.06E C5 12/ 4,5 19.698	1.52E C5 1.06E C5 12/ 4,5 19.696	2.35E C5 1.06E C5 12/ 4,5 19.416	2.26E C5 1.06E C5 12/ 4,5 19.379	2.22E C5 1.06E C5 12/ 4,5 19.411	2.20E C5 1.06E C5 12/ 4,5 19.576
6*	5.61E C6 3.83E C6 11/ 6,3 12.014	5.07E C6 3.83E C6 11/ 6,3 10.623	6.05E C6 3.83E C6 11/ 6,3 11.054	5.55E C6 3.83E C6 11/ 6,3 10.557	5.35E C6 3.83E C6 11/ 6,3 10.950	5.72E C6 3.83E C6 11/ 6,3 12.591	4.86E C6 3.83E C6 11/ 6,3 10.358	6.11E C6 3.83E C6 11/ 6,3 12.539	5.31E C6 3.83E C6 11/ 6,3 10.794
6*	2.26E C6 1.49E C6 11/ 4,3 18.558	1.68E C6 1.49E C6 11/ 4,3 17.210	2.31E C6 1.49E C6 11/ 4,3 18.346	1.74E C6 1.49E C6 11/ 4,3 17.197	1.80E C6 1.49E C6 11/ 4,3 17.194	3.13E C6 1.49E C6 11/ 4,3 18.746	1.96E C6 1.49E C6 11/ 4,3 17.479	3.12E C6 1.49E C6 11/ 4,3 18.781	1.95E C6 1.49E C6 11/ 4,3 17.473
6*	2.15E C6 3.83E C6 11/ 6,5 13.719	2.67E C6 3.83E C6 11/ 6,5 13.455	2.14E C6 3.83E C6 11/ 6,5 13.718	2.67E C6 3.83E C6 11/ 6,5 13.452	2.66E C6 3.83E C6 11/ 6,5 13.438	1.75E C6 3.83E C6 11/ 6,5 13.915	2.61E C6 3.83E C6 11/ 6,5 13.561	1.76E C6 3.83E C6 11/ 6,5 13.914	2.65E C6 3.83E C6 11/ 6,5 13.559
6*	6.01E C5 1.49E C6 11/ 4,5 19.165	1.21E C6 1.49E C6 11/ 4,5 18.833	5.82E C5 1.49E C6 11/ 4,5 19.162	1.15E C6 1.49E C6 11/ 4,5 18.829	1.13E C6 1.49E C6 11/ 4,5 18.989	2.37E C4 1.49E C6 11/ 4,5 19.390	1.21E C6 1.49E C6 11/ 4,5 19.058	2.38E C4 1.49E C6 11/ 4,5 19.386	1.22E C6 1.49E C6 11/ 4,5 19.054

```

7* 1.09E C8 3.90E C7 1.09E C8 3.92E C7 3.31E C7 2.05E C7 4.92E C7 2.37E C7 5.02E C7
    8.59E C6 8.59E C6 8.59E C6 8.59E C6 8.59E C6 8.59E C6 8.59E C6 8.59E C6 8.59E C6
    11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3 11/ 4,3
    19.021 17.908 19.015 17.903 17.663 19.720 17.935 19.713 17.920

7* 1.45E C8 2.15E C8 1.38E C8 2.07E C8 2.16E C8 2.34E C8 2.05E C8 2.32E C8 2.03E C8
    2.46E C8 2.46E C8 2.46E C8 2.46E C8 2.46E C8 2.46E C8 2.46E C8 2.46E C8 2.46E C8
    11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5 11/ 4,5
    19.719 19.352 19.705 19.338 19.326 18.970 19.117 18.962 19.116

*Stop* 0

```

TABLE D.3.--

Column				
a	Ca ⁴⁸ -TDA	K-K		
b	Ca ⁴⁸ -TDA	K-K	M.S.	
c	Ca ⁴⁸ -TDA	Sussex		
d	Ca ⁴⁸ -TDA	Sussex	M.S.	
e	Ca ⁴⁸ -RPA	K-K	M.S.	65% Strength

	a	b	c	d	e
1-	3.88E-01 .00E 00 11/ 7,2 12.180	3.33E-01 .00E 00 11/ 7,2 11.216	6.29E-01 .00E 00 11/ 7,2 12.335	4.59E-01 .00E 00 11/ 7,2 11.299	5.35E-01 3.86E 00 7/ 4,1 10.066
1-	1.89E-04 5.37E-01 8/ 5,3 7.192	1.93E-03 5.37E-01 8/ 5,3 6.298	1.93E-03 5.37E-01 8/ 5,3 7.183	4.36E-03 5.37E-01 8/ 5,3 5.974	4.65E-01 .00E 00 11/ 7,2 10.667
1-	3.42E-03 3.86E-01 8/ 4,3 7.548	2.49E-03 3.86E-01 8/ 4,3 6.539	4.97E-04 3.86E-01 8/ 4,3 7.971	1.18E-04 3.86E-01 8/ 4,3 6.652	4.53E-03 5.37E-01 8/ 5,3 6.827
1-	2.33E-03 4.29E-02 8/ 6,3 10.341	8.99E-05 4.29E-02 8/ 6,3 9.234	8.40E-03 4.29E-02 8/ 6,3 10.771	3.28E-02 4.29E-02 8/ 6,3 9.525	7.78E-03 4.29E-02 8/ 6,3 7.325
1-	3.27E-02 2.68E-01 10/ 5,3 11.171	1.69E-04 1.35E 00 9/ 6,3 10.578	2.22E-02 2.68E-01 10/ 5,3 13.376	3.07E-03 2.68E-01 10/ 5,3 12.325	1.33E-02 2.68E-01 10/ 5,3 9.845
1-	5.07E-02 1.35E 00 9/ 6,3 11.642	1.59E-02 2.68E-01 10/ 5,3 11.629	1.94E 00 3.86E-01 8/ 4,3 14.192	1.40E-02 9.66E-02 9/ 4,3 17.377	1.66E-02 1.35E 00 9/ 6,3 10.358
1-	3.24E-02 9.66E-02 9/ 4,3 16.579	6.24E-02 9.66E-02 9/ 4,3 15.490	1.33E-02 9.66E-02 9/ 4,3 18.639	1.33E-02 3.43E-02 8/ 6,4 8.248	1.29E-01 9.66E-02 9/ 4,3 14.502
1-	5.76E-03 3.43E-02 8/ 6,4 9.237	3.59E-03 3.43E-02 8/ 6,4 8.108	3.04E-02 3.43E-02 8/ 6,4 9.334	2.32E-03 4.29E-01 8/ 5,4 8.847	1.05E-02 3.43E-02 8/ 6,4 8.297
1-	1.08E-02 4.29E-01 8/ 5,4 10.171	5.28E-03 4.29E-01 8/ 5,4 8.605	7.34E-02 4.29E-01 8/ 5,4 10.111	3.50E-01 1.72E-01 10/ 6,4 10.166	8.13E-03 4.29E-01 8/ 5,4 8.720

1-	2.23E-01 1.72E-01 10/ 6,4 11.384	7.11E-03 2.15E-01 10/ 5,4 9.987	3.66E-01 1.72E-01 10/ 6,4 11.186	2.45E-02 2.15E-01 10/ 5,4 10.527	5.92E-06 3.43E-02 8/ 6,4 9.167
1-	8.35E-03 1.72E-01 10/ 6,4 12.825	1.86E-01 1.72E-01 10/ 6,4 10.274	1.84E-02 2.15E-01 10/ 5,4 11.768	3.91E-01 1.08E 00 9/ 6,4 11.635	1.24E-03 1.72E-01 10/ 6,4 11.459
1-	2.07E-02 2.15E-01 10/ 5,4 13.171	1.91E-03 1.72E-01 10/ 6,4 11.882	3.38E-01 1.08E 00 9/ 6,4 12.690	1.91E-01 3.09E-01 8/ 4,4 12.555	7.81E-03 2.15E-01 10/ 5,4 11.674
1-	2.16E-01 3.09E-01 8/ 4,4 13.913	2.67E-01 3.09E-01 8/ 4,4 12.736	1.54E-01 3.09E-01 8/ 4,4 13.594	1.90E 00 1.72E-01 10/ 6,4 13.090	9.42E-01 1.08E 00 9/ 6,4 12.264
1-	2.88E 00 3.09E-01 8/ 4,4 15.328	2.97E 00 3.09E-01 8/ 4,4 14.111	9.44E-01 3.09E-01 8/ 4,4 15.114	1.14E 00 3.09E-01 8/ 4,4 13.966	1.87E 00 3.09E-01 8/ 4,4 13.106
1-	9.05E-01 7.73E-02 9/ 4,4 17.741	9.17E-01 7.73E-02 9/ 4,4 16.254	2.32E-01 7.73E-02 9/ 4,4 17.502	2.55E-01 7.73E-02 9/ 4,4 16.116	4.74E-01 7.73E-02 9/ 4,4 15.298
2-	5.01E-01 2.48E 00 7/ 6,1 6.549	4.55E-01 2.48E 00 7/ 6,1 5.667	7.35E-01 2.48E 00 7/ 6,1 6.570	8.10E-01 2.48E 00 7/ 6,1 5.460	7.11E-01 2.48E 00 7/ 6,1 5.460
2-	2.49E 00 3.93E 00 7/ 4,1 10.230	2.66E 00 5.26E-01 11/ 7,2 7.772	2.79E 00 3.93E 00 7/ 4,1 10.251	4.93E 00 3.93E 00 7/ 4,1 9.797	1.58E 00 3.93E 00 7/ 4,1 9.101
2-	1.12E 00 5.26E-01 11/ 7,2 8.547	1.80E-02 8.27E-05 8/ 6,3 8.655	9.06E-01 5.26E-01 11/ 7,2 8.231	2.01E-01 5.26E-01 11/ 7,2 7.601	3.33E-02 5.26E-01 11/ 7,2 8.166

2-	5.50E-02 8.27E-05 8/ 6,3 8.673	1.44E 00 6.88E-02 8/ 5,3 9.378	7.00E-04 8.27E-05 8/ 6,3 8.604	8.56E-01 8.27E-05 8/ 6,3 7.213	1.67E-03 8.27E-05 8/ 6,3 7.557
2-	1.75E-01 1.79E-03 10/ 6,3 10.900	7.97E-01 1.79E-03 10/ 6,3 11.115	8.09E-01 1.79E-03 10/ 6,3 10.661	3.24E-01 6.88E-02 8/ 5,3 9.123	6.70E-02 1.79E-03 10/ 6,3 9.809
2-	1.30E-01 7.15E-02 8/ 4,3 11.893	9.35E-02 .00E 00 9/ 5,3 11.290	2.86E 00 6.88E-02 8/ 5,3 10.992	6.50E-03 1.79E-03 10/ 6,3 9.481	1.21E-01 7.15E-02 8/ 4,3 10.739
2-	3.88E-01 6.14E-02 9/ 6,3 12.105	1.87E-01 6.14E-02 9/ 6,3 12.229	2.47E-01 6.14E-02 9/ 6,3 11.171	4.19E-01 6.14E-02 9/ 6,3 10.160	7.15E-02 .00E 00 9/ 5,3 11.231
2-	1.96E-01 .00E 00 9/ 5,3 12.397	7.26E-01 7.15E-02 8/ 4,3 12.707	1.41E-01 .00E 00 9/ 5,3 12.967	1.10E-01 .00E 00 9/ 5,3 11.770	1.04E 00 1.02E-02 10/ 4,3 12.977
2-	6.13E-02 .00E 00 9/ 5,3 12.685	1.34E 00 1.02E-02 10/ 4,3 13.215	1.31E 00 4.96E-04 9/ 4,3 15.608	5.75E-01 1.02E-02 10/ 4,3 13.060	1.77E-01 4.96E-04 9/ 4,3 14.543
2-	1.47E 00 1.02E-02 10/ 4,3 14.375	1.41E-01 4.96E-04 9/ 4,3 14.801	5.98E-01 1.02E-02 10/ 4,3 16.753	1.27E-02 4.96E-04 9/ 4,3 14.480	3.48E 00 1.58E 00 8/ 5,4 7.835
2-	2.89E-01 4.96E-04 9/ 4,3 15.985	3.96E-04 6.26E-02 8/ 6,4 7.515	1.82E 00 1.58E 00 8/ 5,4 9.211	7.14E-01 1.02E-02 10/ 4,3 15.394	1.22E-02 6.26E-02 8/ 6,4 8.709
2-	1.25E 00 1.58E 00 8/ 5,4 9.416	7.59E-01 1.58E 00 8/ 5,4 3.073	1.32E-02 6.26E-02 8/ 6,4 9.714	2.48E 00 1.58E 00 8/ 5,4 7.741	3.27E 00 1.58E 00 8/ 5,4 9.560

2-	9.97E-04 6.26E-02 8/ 6,4 9.804	1.61E 00 6.40E-02 9/ 6,4 9.776	3.34E-01 .00E 00 9/ 5,4 11.674	3.36E-02 6.26E-02 8/ 6,4 8.597	4.84E-01 6.40E-02 9/ 6,4 10.287
2-	2.35E 00 1.58E 00 8/ 5,4 11.002	4.77E-01 8.34E-03 10/ 6,4 9.856	3.15E-02 .00E 00 9/ 5,4 11.904	3.59E-01 .00E 00 9/ 5,4 10.546	3.15E-01 .00E 00 9/ 5,4 10.866
2-	1.31E 00 .00E 00 9/ 5,4 11.526	1.57E 00 .00E 00 9/ 5,4 10.330	7.39E-02 8.34E-03 10/ 6,4 12.232	4.46E-02 .00E 00 9/ 5,4 10.721	3.19E-04 8.34E-03 10/ 6,4 11.413
2-	1.57E-01 6.40E-02 9/ 6,4 13.375	5.93E-02 6.91E-01 8/ 4,4 10.763	9.87E-02 6.40E-02 9/ 6,4 12.341	1.01E-01 8.34E-03 10/ 6,4 11.138	1.95E-01 6.40E-02 9/ 6,4 11.853
2-	7.90E-01 6.91E-01 8/ 4,4 13.824	1.39E-01 8.34E-03 10/ 6,4 11.627	1.06E 00 6.91E-01 8/ 4,4 13.875	1.09E-06 6.40E-02 9/ 6,4 11.229	6.20E-01 6.91E-01 8/ 4,4 12.607
2-	4.18E-01 3.76E-01 9/ 4,4 15.558	8.19E-01 3.76E-01 9/ 4,4 14.182	6.52E-01 5.23E-01 10/ 4,4 14.384	1.14E 00 6.91E-01 8/ 4,4 12.669	4.97E-01 3.76E-01 9/ 4,4 14.076
2-	1.48E 00 5.23E-01 10/ 4,4 16.023	1.32E 00 5.23E-01 10/ 4,4 15.454	1.48E-01 3.76E-01 9/ 4,4 15.855	1.52E 00 3.76E-01 9/ 4,4 14.265	9.16E-01 5.23E-01 10/ 4,4 15.212
3-	1.27E 03 4.74E 02 7/ 5,1 3.941	1.28E 03 4.74E 02 7/ 5,1 3.141	1.23E 03 4.74E 02 7/ 5,1 4.633	1.25E 03 4.74E 02 7/ 5,1 3.686	2.16E 03 4.74E 02 7/ 5,1 3.711
3-	2.27E-01 1.42E 02 7/ 6,1 5.618	3.18E 00 1.42E 02 7/ 6,1 4.787	7.84E-04 1.42E 02 7/ 6,1 5.829	1.37E 01 1.42E 02 7/ 6,1 4.825	1.59E 01 1.42E 02 7/ 6,1 4.871

3-	2.99E 01 4.74E 02 7/ 5,1 7.493	2.28E 02 .00E 00 11/ 7,2 9.236	2.23E 00 4.27E 02 7/ 4,1 9.435	4.41E 01 .00E 00 11/ 7,2 7.431	3.03E 02 .00E 00 11/ 7,2 9.025
3-	9.64E-02 1.33E 02 8/ 6,3 8.358	2.53E 01 1.33E 02 8/ 6,3 6.613	9.51E 00 .00E 00 11/ 7,2 8.349	3.43E 02 .00E 00 11/ 7,2 9.151	1.51E 02 1.33E 02 8/ 6,3 6.790
3-	5.99E 01 1.28E 02 9/ 6,3 11.013	9.05E 00 1.33E 02 8/ 6,3 7.394	8.54E 01 1.33E 02 8/ 6,3 7.631	6.29E 01 1.33E 02 8/ 6,3 6.453	4.71E 01 1.33E 02 8/ 6,3 7.548
3-	3.94E 01 8.85E 01 8/ 4,3 11.584	7.64E 01 8.85E 01 8/ 4,3 10.520	6.31E 00 1.78E 02 9/ 5,3 11.664	1.63E 00 1.78E 02 9/ 5,3 10.466	2.55E 01 1.78E 02 9/ 5,3 10.312
3-	1.18E 01 1.78E 02 9/ 5,3 12.272	1.45E 01 1.28E 02 9/ 6,3 11.228	1.22E 01 1.28E 02 9/ 6,3 12.393	1.84E 00 1.28E 02 9/ 6,3 11.511	5.73E 01 8.85E 01 8/ 4,3 10.514
3-	5.60E 01 1.11E 02 10/ 4,3 13.974	5.09E 01 1.11E 02 10/ 4,3 12.823	3.15E 01 8.85E 01 8/ 4,3 13.801	3.10E 01 8.85E 01 8/ 4,3 12.560	1.77E 01 1.28E 02 9/ 6,3 11.192
3-	3.39E 01 8.54E 01 9/ 4,3 15.247	5.78E 01 8.54E 01 9/ 4,3 14.071	6.82E 01 1.11E 02 10/ 4,3 14.371	6.61E 01 1.11E 02 10/ 4,3 13.026	4.29E 01 1.11E 02 10/ 4,3 12.730
3-	6.13E 00 1.06E 02 8/ 6,4 9.621	6.54E-01 8.54E 01 9/ 4,3 14.431	8.66E 01 8.54E 01 9/ 4,3 16.197	8.84E 01 8.54E 01 9/ 4,3 14.901	9.80E 01 8.54E 01 9/ 4,3 13.945
3-	3.22E 02 1.06E 02 8/ 6,4 10.157	1.66E 01 1.06E 02 8/ 6,4 8.611	1.28E 02 1.11E 02 10/ 4,3 16.604	8.57E 00 1.06E 02 8/ 6,4 8.471	5.50E 00 1.06E 02 8/ 6,4 8.672

3-	4.31E-01 1.42E 02 9/ 5,4 11.452	1.03E 02 1.02E 02 9/ 6,4 9.908	3.98E 02 1.06E 02 8/ 6,4 10.024	2.84E 01 1.02E 02 9/ 6,4 10.208	1.32E 02 1.02E 02 9/ 6,4 9.961
3-	8.94E 01 1.42E 02 9/ 5,4 12.078	4.91E 00 1.42E 02 9/ 5,4 10.335	3.74E 01 1.02E 02 9/ 6,4 11.247	1.76E 02 7.08E 01 8/ 4,4 10.964	5.03E 01 1.42E 02 9/ 5,4 11.314
3-	9.35E 01 7.08E 01 8/ 4,4 13.125	7.44E 01 1.42E 02 9/ 5,4 11.348	1.78E 02 7.08E 01 8/ 4,4 12.142	2.16E 01 1.42E 02 9/ 5,4 11.272	9.69E 01 7.08E 01 8/ 4,4 12.131
3-	1.72E-01 6.83E 01 9/ 4,4 15.715	8.14E 01 7.08E 01 8/ 4,4 11.985	3.96E 00 1.42E 02 9/ 5,4 12.592	8.10E 01 6.83E 01 9/ 4,4 14.170	6.76E 00 6.83E 01 9/ 4,4 14.344
3-	3.32E 02 8.85E 01 10/ 4,4 16.371	3.16E 02 8.85E 01 10/ 4,4 15.107	6.64E 01 6.83E 01 9/ 4,4 15.585	1.28E 02 8.85E 01 10/ 4,4 15.282	2.54E 02 8.85E 01 10/ 4,4 14.949
4-	1.39E 00 4.54E 02 7/ 6,1 5.487	1.42E 01 4.54E 02 7/ 6,1 4.617	1.41E 01 4.54E 02 7/ 6,1 5.574	5.83E 01 4.54E 02 7/ 6,1 4.478	3.38E 01 4.54E 02 7/ 6,1 4.730
4-	1.84E 03 2.58E 03 7/ 5,1 6.287	1.81E 03 2.58E 03 7/ 5,1 5.557	2.08E 03 2.58E 03 7/ 5,1 6.319	2.05E 03 2.53E 03 7/ 5,1 5.492	1.87E 03 2.58E 03 7/ 5,1 5.458
4-	3.76E 03 2.65E 03 7/ 4,1 9.892	3.61E 03 2.65E 03 7/ 4,1 9.125	3.83E 03 2.65E 03 7/ 4,1 9.571	3.69E 03 2.65E 03 7/ 4,1 8.785	3.23E 03 2.65E 03 7/ 4,1 8.927
4-	3.61E 01 7.56E 02 11/ 7,2 9.085	5.34E 00 7.56E 02 11/ 7,2 8.410	7.63E-01 7.56E 02 11/ 7,2 8.678	3.04E 01 7.56E 02 11/ 7,2 7.957	5.31E 01 7.56E 02 11/ 7,2 8.425

4-	1.37E 03 1.02E 02 8/ 4,3 12.104	6.77E 01 2.96E 00 9/ 6,3 11.857	4.61E 02 2.96E 00 9/ 6,3 12.633	3.17E 02 2.96E 00 9/ 6,3 11.587	1.33E 03 1.02E 02 8/ 4,3 10.861
4-	5.36E 01 2.74E-01 9/ 4,3 15.429	1.83E 03 1.02E 02 8/ 4,3 12.820	1.76E 03 1.02E 02 8/ 4,3 13.978	2.05E 03 1.02E 02 8/ 4,3 12.720	4.66E 01 2.96E 00 9/ 6,3 11.610
4-	3.05E 01 1.38E 01 9/ 6,4 11.781	8.52E 00 2.74E-01 9/ 4,3 14.289	9.76E 01 2.74E-01 9/ 4,3 15.094	1.29E 02 2.74E-01 9/ 4,3 14.116	4.69E 01 2.74E-01 9/ 4,3 14.220
4-	8.69E 01 1.38E 01 9/ 6,4 12.880	6.18E 01 1.38E 01 9/ 6,4 10.526	1.28E 02 1.38E 01 9/ 6,4 11.263	1.60E 02 1.38E 01 9/ 6,4 10.238	3.40E 01 1.38E 01 9/ 6,4 10.443
4-	2.08E 03 2.34E 03 8/ 4,4 13.926	1.68E 03 2.34E 03 8/ 4,4 11.005	1.16E 03 2.34E 03 8/ 4,4 11.984	1.07E 03 2.34E 03 8/ 4,4 10.796	2.00E 03 2.34E 03 8/ 4,4 12.687
4-	4.57E 02 2.07E 02 9/ 4,4 14.940	6.36E 02 2.07E 02 9/ 4,4 13.499	1.92E 02 2.07E 02 9/ 4,4 15.485	1.74E 02 2.07E 02 9/ 4,4 13.716	3.54E 02 2.07E 02 9/ 4,4 13.677
5-	2.91E 05 2.24E 05 7/ 6,1 5.037	2.92E 05 2.24E 05 7/ 6,1 4.157	2.91E 05 2.24E 05 7/ 6,1 5.429	2.92E 05 2.24E 05 7/ 6,1 4.318	3.31E 05 2.24E 05 7/ 6,1 4.409
5-	6.70E 04 9.61E 04 7/ 4,1 9.398	6.08E 04 9.61E 04 7/ 4,1 8.677	8.33E 04 9.61E 04 7/ 4,1 9.472	7.14E 04 9.61E 04 7/ 4,1 8.695	6.25E 04 9.61E 04 7/ 4,1 8.633
5-	1.36E 04 .00E 00 11/ 7,2 8.488	1.95E 04 .00E 00 11/ 7,2 7.764	9.91E 03 .00E 00 11/ 7,2 8.985	2.26E 04 .00E 00 11/ 7,2 8.246	3.25E 04 .00E 00 11/ 7,2 7.969

5-	8.34E 04 1.20E 05 9/ 4,3 14.379	8.94E 04 1.20E 05 9/ 4,3 13.288	8.34E 04 1.20E 05 9/ 4,3 14.857	8.81E 04 1.20E 05 9/ 4,3 13.571	1.37E 05 1.20E 05 9/ 4,3 13.377
5-	8.18E 04 9.61E 04 9/ 4,4 15.966	7.52E 04 9.61E 04 9/ 4,4 14.481	6.87E 04 9.61E 04 9/ 4,4 15.854	6.23E 04 9.61E 04 9/ 4,4 14.404	6.60E 04 9.61E 04 9/ 4,4 14.395
6-	4.64E 06 3.77E 06 7/ 4,1 10.031	4.76E 06 3.77E 06 7/ 4,1 9.266	4.31E 06 3.77E 06 7/ 4,1 9.930	4.38E 06 3.77E 06 7/ 4,1 9.119	4.31E 06 3.77E 06 7/ 4,1 9.044
6-	8.11E 05 1.68E 06 11/ 7,2 9.202	6.93E 05 1.68E 06 11/ 7,2 8.545	1.15E 06 1.68E 06 11/ 7,2 8.902	1.08E 06 1.68E 06 11/ 7,2 8.225	8.26E 05 1.68E 06 11/ 7,2 8.496
7-	.00E 00 .00E 00 11/ 7,2 8.810	.00E 00 .00E 00 11/ 7,2 8.157	.00E 00 .00E 00 11/ 7,2 9.154	.00E 00 .00E 00 11/ 7,2 8.478	.00E 00 .00E 00 11/ 7,2 8.243
8-	2.16E 09 2.16E 09 11/ 7,2 9.450	2.16E 09 2.16E 09 11/ 7,2 8.797	2.16E 09 2.16E 09 11/ 7,2 9.389	2.16E 09 2.16E 09 11/ 7,2 8.713	2.07E 09 2.16E 09 11/ 7,2 8.651
1+	4.74E 00 4.74E 00 9/ 7,2 11.037	4.74E 00 4.74E 00 9/ 7,2 10.198	4.74E 00 4.74E 00 9/ 7,2 10.742	4.74E 00 4.74E 00 9/ 7,2 9.748	4.34E 00 4.74E 00 9/ 7,2 9.512
2+	3.40E-01 .00E 00 8/ 7,2 4.519	3.66E-01 .00E 00 8/ 7,2 3.883	1.08E-01 .00E 00 8/ 7,2 4.887	1.19E-01 .00E 00 8/ 7,2 4.154	2.51E-01 .00E 00 8/ 7,2 4.041
2+	7.46E-01 .00E 00 9/ 7,2 9.469	7.68E-01 .00E 00 9/ 7,2 8.626	5.38E-01 .00E 00 9/ 7,2 9.828	6.21E-01 .00E 00 9/ 7,2 8.822	2.82E-01 .00E 00 9/ 7,2 8.563

2+	1.54E 01 2.93E 01 11/ 4,3 13.942	1.49E 01 2.93E 01 11/ 4,3 12.973	1.21E 01 2.93E 01 11/ 4,3 15.169	1.28E 01 2.93E 01 11/ 4,3 13.917	1.43E 01 2.93E 01 11/ 4,3 13.576
2+	3.63E 01 2.34E 01 11/ 4,4 19.845	3.67E 01 2.34E 01 11/ 4,4 18.669	4.01E 01 2.34E 01 11/ 4,4 19.620	3.92E 01 2.34E 01 11/ 4,4 18.584	4.08E 01 2.34E 01 11/ 4,4 18.168
3+	9.78E 01 4.07E 01 8/ 7,2 5.076	9.56E 01 4.07E 01 8/ 7,2 4.443	1.14E 02 4.07E 01 8/ 7,2 5.021	1.11E 02 4.07E 01 8/ 7,2 4.289	1.94E 01 4.07E 01 8/ 7,2 4.434
3+	1.03E 02 1.08E 02 10/ 7,2 7.350	1.02E 02 1.08E 02 10/ 7,2 6.675	1.18E 02 1.08E 02 10/ 7,2 7.406	1.18E 02 1.08E 02 10/ 7,2 6.609	9.87E 01 1.08E 02 10/ 7,2 6.570
3+	2.90E 01 2.32E 01 9/ 7,2 9.268	2.95E 01 2.32E 01 9/ 7,2 8.430	1.72E 01 2.32E 01 9/ 7,2 9.315	1.67E 01 2.32E 01 9/ 7,2 8.315	2.31E 01 2.32E 01 9/ 7,2 8.391
3+	2.54E 01 3.08E 00 11/ 6,3 13.601	2.65E 01 3.08E 00 11/ 6,3 12.444	4.03E 01 3.08E 00 11/ 6,3 13.791	3.66E 01 3.08E 00 11/ 6,3 12.411	2.69E 01 3.08E 00 11/ 6,3 12.231
3+	4.32E 01 1.26E 01 11/ 4,3 16.327	4.93E 01 1.26E 01 11/ 4,3 15.271	6.98E 01 1.26E 01 11/ 4,3 15.849	9.95E 02 1.26E 01 11/ 4,3 14.726	3.30E 01 1.26E 01 11/ 4,3 15.013
3+	4.33E 01 1.23E 02 11/ 6,4 15.851	4.24E 01 1.23E 02 11/ 6,4 14.678	9.19E 00 3.08E 00 11/ 6,3 16.012	8.19E 01 1.23E 02 11/ 6,4 14.566	6.37E 01 1.23E 02 11/ 6,4 14.487
3+	1.44E 02 9.29E 01 11/ 4,4 19.196	1.38E 02 9.29E 01 11/ 4,4 18.091	1.30E 02 9.29E 01 11/ 4,4 18.873	1.32E 02 9.29E 01 11/ 4,4 17.766	1.26E 02 9.29E 01 11/ 4,4 17.006

4+	8.32E 01 .00E 00 8/ 7,2 4.693	9.18E 01 .00E 00 8/ 7,2 4.059	1.45E 01 .00E 00 8/ 7,2 4.913	1.62E 01 .00E 00 8/ 7,2 4.181	1.09E 02 .00E 00 8/ 7,2 4.171
4+	1.49E 02 .00E 00 10/ 7,2 6.809	1.70E 02 .00E 00 10/ 7,2 6.133	7.38E 01 .00E 00 10/ 7,2 7.023	8.79E 01 .00E 00 10/ 7,2 6.221	1.64E 02 .00E 00 10/ 7,2 6.226
4+	5.30E 02 .00E 00 9/ 7,2 8.830	5.84E 02 .00E 00 9/ 7,2 7.979	3.55E 02 .00E 00 9/ 7,2 9.045	4.18E 02 .00E 00 9/ 7,2 8.033	4.43E 02 .00E 00 9/ 7,2 8.128
4+	3.25E 03 7.46E 03 11/ 5,3 12.332	3.24E 03 7.46E 03 11/ 5,3 11.271	1.19E 03 7.46E 03 11/ 5,3 12.637	1.47E 03 7.46E 03 11/ 5,3 11.434	3.15E 03 7.46E 03 11/ 5,3 11.385
4+	5.72E 02 2.05E 03 11/ 6,3 12.777	4.19E 02 2.05E 03 11/ 6,3 11.622	1.14E 03 2.05E 03 11/ 6,3 13.113	1.30E 03 2.05E 03 11/ 6,3 11.730	2.00E 02 2.05E 03 11/ 6,3 11.665
4+	7.52E 03 5.28E 03 11/ 4,3 14.880	4.80E 03 5.28E 03 11/ 4,3 15.096	6.03E 02 2.05E 03 11/ 6,3 15.147	3.10E 03 5.28E 03 11/ 4,3 15.039	4.04E 03 5.28E 03 11/ 4,3 14.891
4+	4.67E 03 5.28E 03 11/ 4,3 16.157	5.55E 03 1.64E 03 11/ 6,4 13.786	3.32E 03 5.28E 03 11/ 4,3 16.235	7.71E 02 1.64E 03 11/ 6,4 13.810	3.55E 03 1.64E 03 11/ 6,4 13.298
4+	3.38E 02 1.64E 03 11/ 6,4 15.009	2.23E 03 5.97E 03 11/ 5,4 13.887	9.79E 03 5.97E 03 11/ 5,4 15.276	9.25E 03 5.97E 03 11/ 5,4 14.177	7.13E 03 5.97E 03 11/ 5,4 14.021
4+	9.52E 03 4.22E 03 11/ 4,4 18.681	9.51E 03 4.22E 03 11/ 4,4 17.561	1.01E 04 4.22E 03 11/ 4,4 18.844	1.02E 04 4.22E 03 11/ 4,4 17.731	9.26E 03 4.22E 03 11/ 4,4 17.575

5+	2.46E 04 1.44E 05 8/ 7,2 5.292	2.40E 04 1.44E 05 8/ 7,2 4.659	2.87E 04 1.44E 05 8/ 7,2 5.346	2.83E 04 1.44E 05 8/ 7,2 4.614	1.15E 05 1.44E 05 8/ 7,2 4.559
5+	8.66E 03 1.18E 04 9/ 7,2 8.918	8.43E 03 1.18E 04 9/ 7,2 8.079	6.29E 03 1.18E 04 9/ 7,2 8.969	6.14E 03 1.18E 04 9/ 7,2 7.973	8.09E 03 1.18E 04 9/ 7,2 8.171
5+	2.68E 04 3.14E 02 11/ 6,3 12.671	1.63E 04 3.14E 02 11/ 6,3 11.525	3.91E 04 3.14E 02 11/ 6,3 12.731	1.16E 04 3.14E 02 11/ 6,3 11.383	1.50E 04 3.14E 02 11/ 6,3 11.608
5+	2.00E 05 6.32E 03 11/ 5,3 13.187	2.10E 05 6.32E 03 11/ 5,3 12.097	1.14E 05 6.32E 03 11/ 5,3 15.676	2.38E 05 6.32E 03 11/ 5,3 12.070	2.03E 05 6.32E 03 11/ 5,3 11.989
5+	8.82E 04 7.81E 03 11/ 4,3 16.163	5.86E 04 6.32E 03 11/ 5,3 14.534	1.27E 04 7.81E 03 11/ 4,3 15.871	1.21E 04 7.81E 03 11/ 4,3 14.684	6.89E 04 7.81E 03 11/ 4,3 14.947
5+	9.73E 02 3.08E 04 11/ 6,4 14.917	1.01E 05 7.81E 03 11/ 4,3 15.099	2.27E 05 1.45E 05 11/ 5,4 13.269	4.79E 03 3.08E 04 11/ 6,4 13.667	2.46E 03 3.08E 04 11/ 6,4 13.456
5+	6.44E 04 1.45E 05 11/ 5,4 15.620	1.84E 03 3.08E 04 11/ 6,4 13.757	3.08E 03 3.08E 04 11/ 6,4 14.988	1.23E 05 1.45E 05 11/ 5,4 14.512	9.35E 04 1.45E 05 11/ 5,4 14.472
5+	1.31E 05 1.08E 05 11/ 4,4 19.006	1.26E 05 1.08E 05 11/ 4,4 17.922	1.14E 05 1.08E 05 11/ 4,4 18.698	1.20E 05 1.08E 05 11/ 4,4 17.567	1.14E 05 1.08E 05 11/ 4,4 17.813
6+	2.59E 05 .00E 00 9/ 7,2 8.380	2.89E 05 .00E 00 9/ 7,2 7.723	2.60E 05 .00E 00 9/ 7,2 8.761	3.00E 05 .00E 00 9/ 7,2 7.734	2.35E 05 .00E 00 9/ 7,2 7.955

6+	1.05E 06 4.42E 06 11/ 6,3 12.548	9.98E 05 4.42E 06 11/ 6,3 11.399	5.15E 05 4.42E 06 11/ 6,3 13.093	7.00E 05 4.42E 06 11/ 6,3 11.677	9.86E 05 4.42E 06 11/ 6,3 11.459
6+	1.34E 06 1.72E 06 11/ 4,3 15.819	1.23E 06 1.72E 06 11/ 4,3 14.730	1.16E 06 1.72E 06 11/ 4,3 16.093	6.44E 05 1.72E 06 11/ 4,3 14.910	5.22E 05 1.72E 06 11/ 4,3 14.695
6+	5.45E 06 3.54E 06 11/ 6,4 14.943	5.61E 06 3.54E 06 11/ 6,4 13.792	3.39E 06 1.72E 06 11/ 4,3 18.257	6.00E 06 3.54E 06 11/ 6,4 13.995	6.72E 06 3.54E 06 11/ 6,4 13.491
6+	2.95E 06 1.38E 06 11/ 4,4 18.543	2.93E 06 1.38E 06 11/ 4,4 17.453	5.74E 06 3.54E 06 11/ 6,4 15.276	3.41E 06 1.38E 06 11/ 4,4 17.706	2.98E 06 1.38E 06 11/ 4,4 17.324
7+	6.28E 07 9.93E 06 11/ 4,3 16.243	7.11E 07 2.27E 08 11/ 4,4 15.170	1.45E 08 9.93E 06 11/ 4,3 19.119	1.56E 08 9.93E 06 11/ 4,3 17.947	6.01E 07 9.93E 06 11/ 4,3 15.026
7+	1.74E 08 2.27E 08 11/ 4,4 19.132	1.66E 08 2.27E 08 11/ 4,4 18.050	9.29E 07 2.27E 08 11/ 4,4 16.185	8.17E 07 2.27E 08 11/ 4,4 15.054	1.71E 08 2.27E 08 11/ 4,4 17.917

STEP 0

TABLE D.4.--

Column				
a	Sr ⁸⁸ -TDA	K-K		
b	Sr ⁸⁸ -TDA	K-K	M.S.	
c	Sr ⁸⁸ -RPA	K-K	M.S.	65% Strength
d	Sr ⁸⁸ -TDA	Sussex		
e	Sr ⁸⁸ -TDA	Sussex	M.S.	

	a	b	c	d	e
1-	1.74E-03 .00E 00 14/10,2 7.257	1.67E-03 .00E 00 14/10,2 6.733	2.29E-03 .00E 00 14/10,2 6.864	3.81E-05 .00E 00 14/10,2 7.021	2.82E-05 .00E 00 14/10,2 6.477
1-	2.29E-02 .00E 00 15/10,2 8.085	2.60E-03 .00E 00 15/10,2 7.508	1.14E-02 .00E 00 15/10,2 7.803	3.32E-03 .00E 00 15/10,2 8.222	1.49E-01 .00E 00 15/10,2 8.388
1-	2.54E-02 1.54E 00 12/ 8,3 5.399	1.82E-04 .00E 00 15/10,2 7.996	2.73E-02 1.54E 00 12/ 8,3 5.478	5.06E-02 .00E 00 15/10,2 8.855	4.98E-02 1.54E 00 12/ 8,3 4.920
1-	9.25E-03 6.29E-01 12/ 7,3 5.782	2.73E-02 1.54E 00 12/ 8,3 4.948	3.70E-02 6.29E-01 12/ 7,3 6.233	5.41E-02 1.54E 00 12/ 8,3 5.538	2.48E-04 6.29E-01 12/ 7,3 5.382
1-	6.37E-03 3.14E-02 12/ 9,3 7.962	7.92E-03 6.29E-01 12/ 7,3 5.265	1.69E-02 3.14E-02 12/ 9,3 7.387	4.46E-04 6.29E-01 12/ 7,3 6.048	5.24E-05 3.14E-02 12/ 9,3 7.524
1-	5.21E-06 4.89E-01 14/ 8,3 8.546	3.85E-03 3.14E-02 12/ 9,3 7.371	5.31E-03 4.89E-01 14/ 8,3 8.079	2.63E-01 4.89E-01 14/ 8,3 9.382	1.70E-01 4.89E-01 14/ 8,3 8.661
1-	2.53E-03 2.83E 00 13/ 9,3 8.963	1.74E-04 4.89E-01 14/ 8,3 8.035	9.22E-03 2.83E 00 13/ 9,3 8.243	5.05E-01 2.83E 00 13/ 9,3 10.105	4.81E-01 2.83E 00 13/ 9,3 9.498
1-	1.93E-04 1.71E-01 15/ 8,3 10.053	3.97E-04 2.83E 00 13/ 9,3 8.503	1.33E-03 1.71E-01 15/ 8,3 9.288	5.97E-03 6.29E-01 12/ 7,3 12.052	1.41E-02 1.71E-01 15/ 8,3 10.716
1-	2.64E-04 4.40E-01 15/ 9,3 10.395	1.15E-03 1.71E-01 15/ 8,3 9.442	2.39E-06 4.40E-01 15/ 9,3 9.645	9.19E-02 1.05E-01 13/ 7,3 14.560	1.37E-02 6.29E-01 12/ 7,3 11.399

1-	2.25E-03 1.05E-01 13/ 7,3 12.177	4.89E-03 4.40E-01 15/ 9,3 9.881	9.37E-02 1.05E-01 13/ 7,3 10.922	1.88E-01 1.32E 00 12/ 8,4 8.070	6.87E-02 1.05E-01 13/ 7,3 13.803
1-	4.11E-02 1.32E 00 12/ 8,4 8.580	6.45E-04 1.05E-01 13/ 7,3 11.581	2.35E-04 1.32E 00 12/ 8,4 7.465	1.32E-01 2.69E-02 12/ 9,4 9.020	8.46E-02 1.32E 00 12/ 8,4 7.474
1-	1.22E-02 2.69E-02 12/ 9,4 8.936	1.27E-02 2.69E-02 12/ 9,4 8.282	4.10E-02 2.69E-02 12/ 9,4 8.209	4.41E-01 2.43E 00 13/ 9,4 9.592	6.62E-02 2.69E-02 12/ 9,4 8.296
1-	7.20E-01 2.43E 00 13/ 9,4 9.766	5.10E-01 2.43E 00 13/ 9,4 9.036	1.06E 00 1.32E 00 12/ 8,4 8.670	1.69E-01 4.19E-01 14/ 8,4 10.529	4.71E-01 2.43E 00 13/ 9,4 8.955
1-	1.16E-03 4.19E-01 14/ 8,4 10.480	1.63E-03 4.19E-01 14/ 8,4 9.534	1.19E-02 4.19E-01 14/ 8,4 9.543	1.57E-03 4.19E-01 14/ 8,4 10.814	3.03E-02 4.19E-01 14/ 8,4 9.802
1-	1.38E-01 1.47E-01 15/ 8,4 11.228	9.27E-02 1.47E-01 15/ 8,4 10.407	2.63E 00 2.43E 00 13/ 9,4 10.128	1.93E 00 5.39E-01 12/ 7,4 11.005	6.87E-02 1.47E-01 15/ 8,4 10.082
1-	6.42E-01 5.39E-01 12/ 7,4 11.576	1.41E 00 5.39E-01 12/ 7,4 10.896	4.84E-01 1.47E-01 15/ 8,4 10.430	8.45E-01 3.77E-01 15/ 9,4 11.218	1.86E 00 5.39E-01 12/ 7,4 10.398
1-	8.70E-01 3.77E-01 15/ 9,4 11.644	3.87E-01 3.77E-01 15/ 9,4 10.948	1.80E-01 5.39E-01 12/ 7,4 10.753	2.22E-03 1.47E-01 15/ 8,4 11.438	1.11E 00 3.77E-01 15/ 9,4 10.608
1-	5.01E 00 3.77E-01 15/ 9,4 13.127	4.78E 00 3.77E-01 15/ 9,4 12.439	3.43E 00 3.77E-01 15/ 9,4 11.511	5.24E 00 3.77E-01 15/ 9,4 12.606	5.21E 00 3.77E-01 15/ 9,4 12.025

1-	2.74E 00 8.98E-02 13/ 7,4 14.262	3.01E 00 8.98E-02 13/ 7,4 13.405	1.45E 00 8.98E-02 13/ 7,4 12.373	3.43E-01 8.98E-02 13/ 7,4 13.865	4.03E-01 8.98E-02 13/ 7,4 13.091
2-	1.21E-01 5.05E 00 11/ 9,1 5.414	8.66E-02 5.05E 00 11/ 9,1 4.920	3.75E-01 5.05E 00 11/ 9,1 4.828	2.98E-02 5.05E 00 11/ 9,1 5.462	7.04E-02 5.05E 00 11/ 9,1 4.825
2-	4.00E 00 8.78E 00 11/ 7,1 6.671	3.86E 00 8.78E 00 11/ 7,1 6.235	4.29E 00 8.78E 00 11/ 7,1 6.359	4.06E 00 8.78E 00 11/ 7,1 6.400	3.80E 00 8.78E 00 11/ 7,1 5.891
2-	2.62E 00 1.55E 00 12/10,2 5.763	7.29E 00 8.78E 00 11/ 7,1 8.085	3.14E 00 1.55E 00 12/10,2 5.178	3.11E 00 1.55E 00 12/10,2 5.764	3.25E 00 1.55E 00 12/10,2 5.059
2-	6.78E-03 9.70E-02 15/10,2 8.264	2.60E 00 1.55E 00 12/10,2 5.243	1.37E-01 9.70E-02 15/10,2 7.794	6.38E-05 9.70E-02 15/10,2 7.912	9.90E-01 9.70E-02 15/10,2 7.872
2-	1.49E-01 2.85E-01 12/ 8,3 7.200	7.15E-02 9.70E-02 15/10,2 7.824	6.94E-01 2.85E-01 12/ 8,3 6.567	7.12E-01 9.70E-02 15/10,2 8.123	3.73E 00 5.00E-01 16/11,2 8.225
2-	5.21E-03 1.61E-04 12/ 9,3 7.487	4.33E-01 2.85E-01 12/ 8,3 6.678	2.47E-03 1.61E-04 12/ 9,3 6.821	5.45E 00 5.00E-01 16/11,2 8.787	3.15E-01 2.85E-01 12/ 8,3 6.195
2-	1.55E-03 0.00E 00 13/ 8,3 8.312	4.59E-03 1.61E-04 12/ 9,3 6.865	1.76E-02 0.00E 00 13/ 8,3 7.619	1.37E-01 2.85E-01 12/ 8,3 6.911	1.32E-01 1.61E-04 12/ 9,3 6.699
2-	3.98E-02 3.14E-01 13/ 9,3 9.150	3.99E-02 0.00E 00 13/ 8,3 7.723	4.33E-01 3.14E-01 13/ 9,3 8.353	6.17E-02 1.61E-04 12/ 9,3 7.404	9.23E-02 0.00E 00 13/ 8,3 7.548

2-	1.42E-00 1.84E-01 12/ 7,3 9.387	5.16E-02 6.27E-02 14/ 8,3 8.614	2.23E-00 6.27E-02 14/ 8,3 8.670	7.65E-01 3.14E-01 13/ 9,3 8.422	1.24E-00 3.14E-01 13/ 9,3 7.762
2-	2.06E-01 .00E-00 14/ 9,3 9.513	1.29E-00 1.84E-01 12/ 7,3 8.860	6.95E-03 .00E-00 14/ 9,3 8.862	1.10E-00 1.84E-01 12/ 7,3 9.214	1.82E-00 1.84E-01 12/ 7,3 8.528
2-	1.61E-01 1.84E-01 12/ 7,3 9.562	4.18E-01 .00E-00 14/ 9,3 8.946	7.75E-03 1.84E-01 12/ 7,3 8.996	1.51E-00 6.27E-02 14/ 8,3 9.552	3.34E-03 .00E-00 14/ 9,3 8.940
2-	3.52E-01 3.30E-04 15/ 8,3 9.818	5.58E-01 1.84E-01 12/ 7,3 9.012	3.18E-01 3.30E-04 15/ 8,3 9.129	9.78E-02 .00E-00 14/ 9,3 9.611	2.38E-01 3.30E-04 15/ 8,3 9.183
2-	6.47E-02 2.00E-02 15/ 9,3 10.433	6.98E-01 3.30E-04 15/ 8,3 9.195	1.81E-00 2.00E-02 15/ 9,3 9.687	3.05E-01 3.30E-04 15/ 8,3 9.850	1.68E-00 2.00E-02 15/ 9,3 9.764
2-	2.00E-01 1.01E-03 13/ 7,3 11.280	2.94E-01 1.01E-03 13/ 7,3 10.640	4.97E-01 1.01E-03 13/ 7,3 10.390	3.32E-04 2.00E-02 15/ 9,3 10.355	1.08E-02 1.01E-03 13/ 7,3 10.358
2-	3.24E-01 1.99E-02 15/ 7,3 12.931	2.88E-01 1.99E-02 15/ 7,3 12.305	1.88E-01 1.99E-02 15/ 7,3 12.045	4.18E-01 1.01E-03 13/ 7,3 11.127	4.82E-01 1.99E-02 15/ 7,3 12.318
2-	7.37E-01 2.95E-00 12/ 8,4 8.053	5.67E-03 2.95E-00 12/ 8,4 7.413	1.88E-03 2.95E-00 12/ 8,4 7.403	6.14E-01 1.99E-02 15/ 7,3 13.111	1.08E-01 2.95E-00 12/ 8,4 7.349
2-	2.63E-01 1.31E-01 12/ 9,4 8.585	2.08E-01 1.31E-01 12/ 9,4 7.935	6.37E-00 2.95E-00 12/ 8,4 7.829	1.59E-01 1.31E-01 12/ 9,4 8.323	1.05E-01 1.31E-01 12/ 9,4 8.029

2-	7.55E 00 2.95E 00 12/ 8,4 8.748	3.60E-01 .00E 00 13/ 8,4 8.728	3.98E-01 1.31E-01 12/ 9,4 7.979	8.06E-01 1.31E-01 12/ 9,4 8.694	1.45E 00 .00E 00 13/ 8,4 8.669
2-	2.31E-01 .00E 00 13/ 8,4 9.406	4.53E-02 1.54E 00 14/ 8,4 9.543	9.48E-02 .00E 00 13/ 8,4 8.726	5.17E-01 .00E 00 13/ 8,4 9.390	1.07E 00 .00E 00 13/ 8,4 8.807
2-	3.54E-02 8.42E-02 13/ 9,4 10.335	1.26E 00 1.54E 00 14/ 8,4 9.761	7.85E-02 8.42E-02 13/ 9,4 9.360	8.65E-02 8.42E-02 13/ 9,4 9.947	5.10E-02 8.42E-02 13/ 9,4 9.300
2-	5.79E-01 .00E 00 14/ 9,4 10.582	5.02E-01 .00E 00 14/ 9,4 9.910	6.42E-01 1.54E 00 14/ 8,4 9.645	1.93E 00 1.54E 00 14/ 8,4 10.491	8.72E-01 1.54E 00 14/ 8,4 9.612
2-	1.19E 00 8.42E-02 13/ 9,4 10.621	6.33E-01 .00E 00 14/ 9,4 10.010	2.63E-03 .00E 00 14/ 9,4 10.005	3.67E-01 .00E 00 14/ 9,4 10.610	1.92E-01 .00E 00 14/ 9,4 9.998
2-	3.98E-04 2.67E-01 15/ 8,4 10.868	1.16E-01 2.67E-01 15/ 8,4 10.092	2.53E-01 2.67E-01 15/ 8,4 10.144	1.01E-01 2.67E-01 15/ 8,4 10.978	8.03E-02 2.67E-01 15/ 8,4 10.209
2-	3.11E 00 1.17E 00 12/ 7,4 11.022	2.48E 00 1.17E 00 12/ 7,4 10.328	1.72E 00 1.17E 00 12/ 7,4 10.322	1.44E 00 1.17E 00 12/ 7,4 11.063	1.96E 00 1.17E 00 12/ 7,4 10.474
2-	1.70E 00 2.23E-02 15/ 9,4 11.679	1.52E 00 2.23E-02 15/ 9,4 11.025	6.32E-01 2.23E-02 15/ 9,4 10.833	2.13E 00 2.23E-02 15/ 9,4 11.447	2.04E 00 2.23E-02 15/ 9,4 10.844
2-	1.58E 00 8.18E-01 13/ 7,4 12.578	1.69E 00 8.18E-01 13/ 7,4 11.750	1.33E 00 8.18E-01 13/ 7,4 11.541	2.06E 00 8.18E-01 13/ 7,4 12.607	2.06E 00 8.18E-01 13/ 7,4 11.758

2-	3.46E 00 1.09E 00 15/ 7,4 14.228	3.34E 00 1.09E 00 15/ 7,4 13.566	2.21E 00 1.09E 00 15/ 7,4 13.304	2.17E 00 1.09E 00 15/ 7,4 14.102	2.30E 00 1.09E 00 15/ 7,4 13.388
3-	4.85E 03 2.10E 03 11/ 8,1 2.290	4.87E 03 2.10E 03 11/ 8,1 1.863	1.25E 04 2.10E 03 11/ 8,1 2.098	4.75E 03 2.10E 03 11/ 8,1 2.787	4.79E 03 2.10E 03 11/ 8,1 2.272
3-	4.89E 00 2.75E 02 11/ 9,1 4.511	1.25E 00 2.75E 02 11/ 9,1 4.047	7.79E 01 2.75E 02 11/ 9,1 4.140	2.70E 01 2.75E 02 11/ 9,1 4.711	3.98E 00 2.75E 02 11/ 9,1 4.133
3-	4.46E 01 .00E 00 12/10,2 5.333	5.17E 01 .00E 00 12/10,2 4.828	1.34E 01 .00E 00 12/10,2 4.820	2.71E 02 1.65E 03 11/ 7,1 6.117	3.56E 02 1.65E 03 11/ 7,1 5.537
3-	9.55E 01 .00E 00 12/10,2 5.862	1.11E 02 .00E 00 12/10,2 5.406	4.83E 02 .00E 00 12/10,2 5.431	1.77E 01 .00E 00 12/10,2 5.496	3.67E 01 .00E 00 12/10,2 4.814
3-	2.16E 02 .00E 00 13/10,2 6.542	1.22E 02 .00E 00 13/10,2 6.108	1.81E 02 .00E 00 13/10,2 6.136	3.28E 02 .00E 00 13/10,2 6.635	1.47E 02 .00E 00 13/10,2 6.160
3-	8.61E 02 .00E 00 16/11,2 8.502	6.30E 02 .00E 00 16/11,2 7.950	1.23E 02 3.95E 02 12/ 8,3 6.373	2.70E 01 .00E 00 16/11,2 7.787	7.68E 01 .00E 00 13/10,2 6.266
3-	4.16E 00 3.95E 02 12/ 8,3 6.802	2.76E 01 3.95E 02 12/ 8,3 6.326	5.36E 01 1.44E 02 12/ 9,3 6.608	7.38E 02 .00E 00 16/11,2 8.439	8.27E 02 .00E 00 16/11,2 7.876
3-	8.33E 01 1.44E 02 12/ 9,3 7.069	1.11E 02 1.44E 02 12/ 9,3 6.481	2.21E 01 2.10E 02 13/ 8,3 7.439	1.05E 01 3.95E 02 12/ 8,3 6.870	8.89E 01 1.44E 02 12/ 9,3 6.548

3-	3.83E-03 2.10E 02 13/ 8,3 8.087	9.06E-01 2.10E 02 13/ 8,3 7.470	6.90E 00 6.06E 02 13/ 9,3 7.792	5.14E 01 1.44E 02 12/ 9,3 7.260	6.92E 01 2.10E 02 13/ 8,3 7.599
3-	4.84E 01 6.06E 02 13/ 9,3 8.333	8.64E 01 6.06E 02 13/ 9,3 7.876	1.42E 02 2.10E 02 14/ 9,3 8.288	4.80E-01 2.10E 02 13/ 8,3 8.270	1.58E 02 6.06E 02 13/ 9,3 8.071
3-	2.98E 01 5.92E 02 15/ 8,3 9.452	1.00E 02 5.92E 02 15/ 8,3 8.873	2.25E 02 5.92E 02 15/ 8,3 8.867	2.54E 02 6.06E 02 13/ 9,3 8.667	7.27E 01 2.10E 02 14/ 9,3 8.394
3-	1.23E 02 5.92E 02 15/ 8,3 9.560	2.57E 02 2.10E 02 14/ 9,3 8.949	1.80E 02 3.60E 02 12/ 7,3 8.910	6.00E 01 2.10E 02 14/ 9,3 9.052	1.86E 02 3.60E 02 12/ 7,3 8.993
3-	5.79E 01 2.16E 02 15/ 9,3 9.943	2.31E 01 2.16E 02 15/ 9,3 9.396	2.32E 01 2.16E 02 15/ 9,3 9.377	1.05E 02 5.92E 02 15/ 8,3 9.713	1.72E 02 5.92E 02 15/ 8,3 9.068
3-	1.12E 02 1.65E 02 13/ 7,3 10.928	8.37E 01 1.65E 02 13/ 7,3 10.468	1.18E 02 1.65E 02 13/ 7,3 10.145	8.86E 01 5.92E 02 15/ 8,3 9.988	2.63E 01 2.16E 02 15/ 9,3 9.534
3-	3.17E 02 2.80E 02 14/ 7,3 11.615	2.08E 02 2.80E 02 14/ 7,3 11.010	6.55E 01 2.80E 02 14/ 7,3 10.937	2.44E 01 2.16E 02 15/ 9,3 10.172	7.21E 01 1.65E 02 13/ 7,3 10.757
3-	1.14E 02 1.20E 02 15/ 7,3 12.358	2.21E 01 1.20E 02 15/ 7,3 11.761	2.13E-01 1.20E 02 15/ 7,3 11.703	7.24E 01 1.65E 02 13/ 7,3 11.513	2.37E 02 2.80E 02 14/ 7,3 11.195
3-	1.31E 00 3.38E 02 12/ 8,4 7.833	8.91E 01 3.38E 02 12/ 8,4 7.152	9.10E 01 3.38E 02 12/ 8,4 7.211	1.95E 02 2.80E 02 14/ 7,3 11.930	1.21E 01 3.38E 02 12/ 8,4 7.230

3-	7.53E-01 1.24E 02 12/ 9,4 8.245	1.89E-01 1.24E 02 12/ 9,4 7.615	1.63E 02 3.38E 02 12/ 8,4 7.611	1.60E 02 3.38E 02 12/ 8,4 8.292	4.28E 01 3.38E 02 12/ 8,4 7.559
3-	1.22E 01 1.24E 02 12/ 9,4 8.799	8.15E-01 1.24E 02 12/ 9,4 8.190	5.73E 02 1.24E 02 12/ 9,4 7.944	4.31E 00 1.80E 02 13/ 8,4 9.306	5.40E 00 1.80E 02 13/ 8,4 8.637
3-	1.01E 01 1.80E 02 13/ 8,4 9.231	1.52E 00 1.80E 02 13/ 8,4 8.564	2.24E 01 1.80E 02 13/ 8,4 8.602	3.34E 02 5.19E 02 13/ 9,4 9.648	1.40E 02 5.19E 02 13/ 9,4 9.346
3-	4.04E 02 5.19E 02 13/ 9,4 9.907	3.11E 02 5.19E 02 13/ 9,4 9.149	3.67E 02 5.19E 02 13/ 9,4 9.085	1.55E 02 1.80E 02 14/ 9,4 10.595	1.73E 02 1.80E 02 14/ 9,4 10.001
3-	6.12E 01 1.80E 02 14/ 9,4 10.608	4.94E 01 1.80E 02 14/ 9,4 10.005	9.57E 01 1.80E 02 14/ 9,4 10.022	2.09E-01 3.09E 02 12/ 7,4 10.907	5.80E 01 5.08E 02 15/ 8,4 10.200
3-	1.36E 02 3.09E 02 12/ 7,4 10.841	3.27E 01 5.08E 02 15/ 8,4 10.166	2.13E 02 3.09E 02 12/ 7,4 10.216	3.14E 02 5.08E 02 15/ 8,4 11.100	4.02E 02 3.09E 02 12/ 7,4 10.400
3-	2.84E 01 1.85E 02 15/ 9,4 11.182	3.81E 02 3.09E 02 12/ 7,4 10.236	6.66E 02 5.08E 02 15/ 8,4 10.371	9.49E 02 1.85E 02 15/ 9,4 11.239	7.88E 02 1.85E 02 15/ 9,4 10.653
3-	9.74E 02 5.08E 02 15/ 8,4 11.255	9.20E 02 1.85E 02 15/ 9,4 10.590	6.34E 02 1.85E 02 15/ 9,4 10.585	3.26E 02 1.42E 02 13/ 7,4 12.487	3.43E 02 1.42E 02 13/ 7,4 11.645
3-	3.78E 02 1.42E 02 13/ 7,4 12.484	5.76E 02 1.42E 02 13/ 7,4 11.615	5.49E 02 1.42E 02 13/ 7,4 11.447	8.95E 01 1.03E 02 15/ 7,4 12.893	1.02E 01 1.03E 02 15/ 7,4 12.187

3-	4.64E 02 2.40E 02 14/ 7,4 12.908	3.85E 02 2.40E 02 14/ 7,4 12.300	3.71E 02 2.40E 02 14/ 7,4 12.290	3.45E 02 2.40E 02 14/ 7,4 13.082	3.48E 02 2.40E 02 14/ 7,4 12.407
3-	7.18E 02 1.03E 02 15/ 7,4 13.763	6.97E 02 1.03E 02 15/ 7,4 13.102	4.35E 02 1.03E 02 15/ 7,4 12.998	4.54E 02 1.03E 02 15/ 7,4 13.827	5.09E 02 1.03E 02 15/ 7,4 13.108
4-	2.95E 03 6.08E 03 11/ 8,1 4.304	2.53E 03 6.08E 03 11/ 8,1 3.905	3.04E 03 6.08E 03 11/ 8,1 3.914	4.09E 03 6.08E 03 11/ 8,1 4.279	3.70E 03 6.08E 03 11/ 8,1 3.833
4-	1.87E 03 2.11E 03 11/ 9,1 4.843	2.23E 03 2.11E 03 11/ 9,1 4.337	1.87E 03 2.11E 03 11/ 9,1 4.319	1.44E 03 2.11E 03 11/ 9,1 4.863	1.87E 03 2.11E 03 11/ 9,1 4.197
4-	4.82E 03 9.19E 03 11/ 7,1 6.988	4.74E 03 9.19E 03 11/ 7,1 6.556	5.97E 03 9.19E 03 11/ 7,1 6.564	3.27E 03 9.19E 03 11/ 7,1 6.746	2.66E 03 9.19E 03 11/ 7,1 6.297
4-	1.11E 02 4.63E 01 13/10,2 6.561	1.30E 02 4.63E 01 13/10,2 6.179	8.50E 01 4.63E 01 13/10,2 6.161	1.21E 03 4.63E 01 13/10,2 6.459	1.57E 03 4.63E 01 13/10,2 6.032
4-	1.44E 03 1.19E 03 16/11,2 7.922	2.23E 01 1.19E 03 16/11,2 7.547	1.92E 01 1.19E 03 16/11,2 7.505	3.24E 03 1.19E 03 16/11,2 7.819	1.26E 02 1.19E 03 16/11,2 7.437
4-	6.99E 00 4.62E-01 12/ 9,3 7.331	1.50E 02 4.62E-01 12/ 9,3 6.723	2.76E 01 4.56E 02 12/ 8,3 6.650	3.84E 01 4.62E-01 12/ 9,3 7.170	1.00E 02 4.62E-01 12/ 9,3 6.463
4-	1.55E-02 4.62E-01 12/ 9,3 7.383	4.68E 02 4.56E 02 12/ 8,3 6.791	1.24E 01 4.62E-01 12/ 9,3 6.734	1.49E 03 4.56E 02 12/ 8,3 7.459	2.39E 03 4.56E 02 12/ 8,3 6.726

4-	3.49E 02 4.20E 00 13/ 8,3 8.083	4.84E 01 4.20E 00 13/ 8,3 7.415	1.26E 01 4.20E 00 13/ 8,3 7.410	6.71E 02 4.20E 00 13/ 8,3 8.041	1.58E 02 4.20E 00 13/ 8,3 7.267
4-	5.68E 03 6.33E 01 13/ 9,3 8.707	2.59E 03 6.33E 01 13/ 9,3 8.228	1.37E 03 6.33E 01 13/ 9,3 8.041	3.51E 03 6.33E 01 13/ 9,3 8.231	1.13E 04 6.33E 01 13/ 9,3 7.597
4-	1.65E 01 3.59E 02 12/ 7,3 9.744	7.23E 01 3.59E 02 12/ 7,3 9.188	2.87E 01 3.59E 02 12/ 7,3 9.123	1.18E 02 3.59E 02 12/ 7,3 9.591	3.94E 03 6.33E 01 13/ 9,3 7.750
4-	9.10E 01 5.00E 00 15/ 9,3 10.278	1.16E 02 5.00E 00 15/ 9,3 9.746	5.81E 01 5.00E 00 15/ 9,3 9.615	3.60E 02 5.00E 00 15/ 9,3 10.298	1.03E 01 3.59E 02 12/ 7,3 8.840
4-	9.80E 02 1.27E 00 13/ 7,3 10.834	4.09E 02 1.27E 00 13/ 7,3 10.180	3.87E 01 1.27E 00 13/ 7,3 10.115	9.14E 02 1.27E 00 13/ 7,3 10.757	3.29E 02 5.00E 00 15/ 9,3 9.662
4-	1.02E 03 1.51E 02 14/ 7,3 11.813	8.70E 02 1.51E 02 14/ 7,3 11.222	8.53E 02 1.51E 02 14/ 7,3 11.143	9.43E 02 1.51E 02 14/ 7,3 11.976	3.93E 01 1.27E 00 13/ 7,3 10.010
4-	3.57E 02 6.23E 00 15/ 7,3 12.387	3.82E 02 6.23E 00 15/ 7,3 11.760	2.35E 02 6.23E 00 15/ 7,3 11.711	1.10E 03 6.23E 00 15/ 7,3 12.439	1.52E 01 1.51E 02 14/ 7,3 11.240
4-	2.11E 02 3.75E 02 12/ 9,4 8.416	1.68E 03 3.75E 02 12/ 9,4 7.756	1.52E 04 1.12E 04 12/ 8,4 7.727	9.37E 03 1.12E 04 12/ 8,4 8.394	8.81E 02 6.23E 00 15/ 7,3 11.646
4-	1.21E 04 1.12E 04 12/ 8,4 8.598	1.52E 04 1.12E 04 12/ 8,4 7.860	1.55E 03 3.75E 02 12/ 9,4 7.861	1.79E 03 3.75E 02 12/ 9,4 8.548	2.20E 03 3.75E 02 12/ 9,4 7.913

4-	5.71E 02 1.45E 02 13/ 8,4 9.082	2.76E 02 1.45E 02 13/ 8,4 8.422	2.07E 02 1.45E 02 13/ 8,4 8.500	4.10E 02 1.45E 02 13/ 8,4 9.138	4.09E 02 1.45E 02 13/ 8,4 8.473
4-	3.92E 02 1.25E 02 13/ 9,4 9.846	3.67E 02 1.25E 02 13/ 9,4 9.059	1.86E 02 1.25E 02 13/ 9,4 9.030	1.95E 02 1.25E 02 13/ 9,4 9.481	3.29E 02 1.25E 02 13/ 9,4 8.920
4-	3.50E 03 4.90E 03 12/ 7,4 10.851	4.12E 03 4.90E 03 12/ 7,4 10.211	4.61E 03 4.90E 03 12/ 7,4 10.230	4.33E 03 4.90E 03 12/ 7,4 10.841	5.30E 03 4.90E 03 12/ 7,4 10.206
4-	4.15E 02 2.50E 01 15/ 9,4 11.413	4.97E 02 2.50E 01 15/ 9,4 10.771	2.39E 02 2.50E 01 15/ 9,4 10.736	1.98E 02 2.50E 01 15/ 9,4 11.220	2.42E 02 2.50E 01 15/ 9,4 10.618
4-	1.20E 03 1.03E 03 13/ 7,4 11.991	1.28E 03 1.03E 03 13/ 7,4 11.169	1.02E 03 1.03E 03 13/ 7,4 11.194	1.66E 03 1.03E 03 13/ 7,4 12.115	2.15E 03 1.03E 03 13/ 7,4 11.279
4-	4.22E 03 3.71E 03 14/ 7,4 12.887	3.91E 03 3.71E 03 14/ 7,4 12.287	4.39E 03 3.71E 03 14/ 7,4 12.291	3.42E 03 3.71E 03 14/ 7,4 12.916	3.71E 03 3.71E 03 14/ 7,4 12.282
4-	4.21E 03 1.15E 03 15/ 7,4 13.499	4.39E 03 1.15E 03 15/ 7,4 12.851	2.71E 03 1.15E 03 15/ 7,4 12.262	2.77E 03 1.15E 03 15/ 7,4 13.539	3.08E 03 1.15E 03 15/ 7,4 12.832
5-	2.32E 06 7.64E 05 11/ 8,1 3.786	2.48E 06 7.64E 05 11/ 8,1 3.363	2.45E 06 7.64E 05 11/ 8,1 3.593	1.94E 06 7.64E 05 11/ 8,1 3.966	2.19E 06 7.64E 05 11/ 8,1 3.474
5-	3.77E 05 5.32E 05 11/ 9,1 4.490	2.38E 05 5.32E 05 11/ 9,1 4.003	5.38E 05 5.32E 05 11/ 9,1 4.099	4.48E 05 5.32E 05 11/ 9,1 4.671	2.12E 05 5.32E 05 11/ 9,1 4.049

5-	7.75E 05 7.98E 05 11/ 7,1 6.050	7.90E 05 7.98E 05 11/ 7,1 5.556	1.64E 06 7.98E 05 11/ 7,1 5.838	2.35E 04 7.98E 05 11/ 7,1 6.877	1.57E 05 7.98E 05 11/ 7,1 6.335
5-	6.20E 03 .00E 00 16/11,2 7.711	1.78E 04 .00E 00 16/11,2 7.511	2.14E 04 .00E 00 16/11,2 7.482	2.41E 02 .00E 00 16/11,2 7.745	3.79E 02 .00E 00 16/11,2 7.481
5-	1.48E 04 5.92E 05 12/ 9,3 6.934	9.20E 02 5.92E 05 12/ 9,3 6.386	1.95E 03 5.92E 05 12/ 9,3 6.492	1.21E 06 5.92E 05 12/ 9,3 6.440	1.11E 06 5.92E 05 12/ 9,3 5.777
5-	5.90E 04 7.64E 05 13/ 8,3 8.012	1.53E 03 7.64E 05 13/ 8,3 7.216	3.16E 04 7.64E 05 13/ 8,3 7.169	1.94E 04 7.64E 05 13/ 8,3 8.101	1.39E 04 7.64E 05 13/ 8,3 7.229
5-	7.11E 03 2.47E 05 13/ 9,3 8.282	9.63E 03 2.47E 05 13/ 9,3 7.783	1.92E 04 2.47E 05 13/ 9,3 7.769	3.75E 05 2.47E 05 13/ 9,3 8.552	3.79E 05 2.47E 05 13/ 9,3 8.071
5-	1.34E 05 2.37E 05 12/ 7,3 9.480	1.70E 05 2.37E 05 12/ 7,3 8.992	9.10E 04 2.37E 05 12/ 7,3 8.970	1.96E 05 2.37E 05 12/ 7,3 9.953	2.05E 05 2.37E 05 12/ 7,3 9.265
5-	1.68E 05 2.85E 05 13/ 7,3 10.628	2.01E 05 2.85E 05 13/ 7,3 10.082	4.20E 04 2.85E 05 13/ 7,3 9.980	8.01E 04 2.85E 05 13/ 7,3 11.082	1.55E 05 2.85E 05 13/ 7,3 10.326
5-	2.32E 05 2.85E 05 13/ 7,3 10.714	5.83E 02 5.52E 05 15/ 7,3 11.513	2.24E 04 5.52E 05 15/ 7,3 11.517	2.20E 02 5.52E 05 15/ 7,3 12.651	1.65E 03 5.52E 05 15/ 7,3 11.849
5-	3.10E 05 5.52E 05 15/ 7,3 12.055	6.80E 05 5.07E 05 12/ 9,4 8.089	7.27E 05 5.07E 05 12/ 9,4 8.051	6.29E 05 5.07E 05 12/ 9,4 8.675	5.81E 05 5.07E 05 12/ 9,4 7.982

5-	7.18E 05 5.07E 05 12/ 9,4 3.732	4.75E 04 6.55E 05 13/ 8,4 8.601	3.42E 05 6.55E 05 13/ 8,4 8.650	1.43E 05 6.55E 05 13/ 8,4 9.343	2.05E 05 6.55E 05 13/ 8,4 8.688
5-	1.78E 05 6.55E 05 13/ 8,4 9.282	7.46E 05 2.12E 05 13/ 9,4 8.792	7.22E 05 2.12E 05 13/ 9,4 8.835	4.19E 05 2.12E 05 13/ 9,4 9.511	3.10E 05 2.12E 05 13/ 9,4 8.887
5-	6.00E 05 2.12E 05 13/ 9,4 9.635	1.96E 05 2.03E 05 12/ 7,4 9.988	3.44E 05 2.03E 05 12/ 7,4 10.114	2.43E 05 2.03E 05 12/ 7,4 10.787	2.04E 05 2.03E 05 12/ 7,4 10.148
5-	1.37E 05 2.44E 05 13/ 7,4 12.204	4.81E 05 2.44E 05 13/ 7,4 11.273	5.44E 05 2.44E 05 13/ 7,4 11.264	4.29E 05 2.44E 05 13/ 7,4 12.139	4.41E 05 2.44E 05 13/ 7,4 11.281
5-	1.02E 06 4.73E 05 15/ 7,4 13.721	1.01E 06 4.73E 05 15/ 7,4 13.059	9.17E 05 4.73E 05 15/ 7,4 13.000	9.01E 05 4.73E 05 15/ 7,4 13.826	8.93E 05 4.73E 05 15/ 7,4 13.119
6-	9.96E 06 2.31E 07 11/ 8,1 4.416	5.58E 06 2.31E 07 11/ 8,1 3.982	1.10E 07 2.31E 07 11/ 8,1 3.979	1.23E 07 2.31E 07 11/ 8,1 4.484	1.70E 06 1.42E 06 11/ 9,1 3.934
6-	7.80E 06 1.42E 06 11/ 9,1 4.694	1.20E 07 1.42E 06 11/ 9,1 4.222	7.44E 06 1.42E 06 11/ 9,1 4.210	7.35E 06 1.42E 06 11/ 9,1 4.690	1.79E 07 2.31E 07 11/ 8,1 4.128
6-	1.36E 07 1.46E 07 11/ 7,1 7.158	1.39E 07 1.46E 07 11/ 7,1 6.724	1.30E 07 1.46E 07 11/ 7,1 6.653	1.22E 07 1.46E 07 11/ 7,1 6.870	1.24E 07 1.46E 07 11/ 7,1 6.410
6-	1.01E 07 6.04E 06 16/11,2 7.956	9.38E 06 6.04E 06 16/11,2 7.571	7.85E 06 6.04E 06 16/11,2 7.536	1.14E 07 6.04E 06 16/11,2 7.752	1.09E 07 6.04E 06 16/11,2 7.357

6-	2.01E 05 9.23E 03 13/ 9,3 8.751	3.64E 05 9.23E 03 13/ 9,3 8.262	2.47E 05 9.23E 03 13/ 9,3 8.090	3.36E 02 9.23E 03 13/ 9,3 3.638	2.92E 01 9.23E 03 13/ 9,3 8.060
6-	2.38E 06 9.21E 05 12/ 7,3 9.504	3.47E 06 9.21E 05 12/ 7,3 9.349	2.68E 06 9.21E 05 12/ 7,3 9.217	4.34E 06 9.21E 05 12/ 7,3 10.016	3.13E 06 9.21E 05 12/ 7,3 9.314
6-	1.93E 05 1.28E 03 13/ 7,3 10.680	3.04E 05 1.28E 03 13/ 7,3 10.016	2.41E 05 1.28E 03 13/ 7,3 10.017	6.37E 06 1.28E 03 13/ 7,3 10.619	4.40E 06 1.28E 03 13/ 7,3 9.895
6-	2.31E 05 4.61E 04 13/ 9,4 9.953	7.08E 04 4.61E 04 13/ 9,4 9.169	6.00E 04 4.61E 04 13/ 9,4 9.106	4.21E 05 4.61E 04 13/ 9,4 9.543	4.23E 05 4.61E 04 13/ 9,4 8.950
6-	2.71E 07 2.26E 07 12/ 7,4 11.019	2.63E 07 2.26E 07 12/ 7,4 10.376	2.61E 07 2.26E 07 12/ 7,4 10.330	1.82E 07 2.26E 07 12/ 7,4 11.015	2.16E 07 2.26E 07 12/ 7,4 10.350
6-	2.18E 06 1.04E 06 13/ 7,4 11.779	2.36E 06 1.04E 06 13/ 7,4 10.959	1.62E 06 1.04E 06 13/ 7,4 11.063	1.36E 06 1.04E 06 13/ 7,4 11.955	1.31E 06 1.04E 06 13/ 7,4 11.081
7-	2.12E 09 1.67E 09 11/ 9,1 4.361	2.12E 09 1.67E 09 11/ 9,1 3.843	2.26E 09 1.67E 09 11/ 9,1 4.011	2.13E 09 1.67E 09 11/ 9,1 4.570	2.13E 09 1.67E 09 11/ 9,1 3.897
7-	3.24E 08 4.94E 08 11/ 7,1 6.687	3.35E 08 4.94E 08 11/ 7,1 6.250	4.57E 08 4.94E 08 11/ 7,1 6.359	4.40E 08 4.94E 08 11/ 7,1 6.967	4.51E 08 4.94E 08 11/ 7,1 6.503
7-	5.48E 07 .00E 00 16/11,2 7.762	4.52E 07 .00E 00 16/11,2 7.377	1.02E 07 .00E 00 16/11,2 7.390	9.67E 06 .00E 00 16/11,2 7.910	5.82E 06 .00E 00 16/11,2 7.512

7-	2.31E 08 8.65E 08 13/ 7,3 10.196	1.98E 08 8.65E 08 13/ 7,3 9.587	3.22E 08 8.65E 08 13/ 7,3 9.666	1.28E 08 8.65E 08 13/ 7,3 10.519	1.05E 08 8.65E 08 13/ 7,3 9.777
7-	1.04E 09 7.41E 08 13/ 7,4 12.321	1.07E 09 7.41E 08 13/ 7,4 11.450	1.20E 09 7.41E 08 13/ 7,4 11.378	1.06E 09 7.41E 08 13/ 7,4 12.283	1.08E 09 7.41E 08 13/ 7,4 11.396
8-	3.45E 10 4.56E 10 11/ 7,1 7.335	3.54E 10 4.56E 10 11/ 7,1 6.902	3.76E 10 4.56E 10 11/ 7,1 6.775	4.09E 10 4.56E 10 11/ 7,1 7.315	4.15E 10 4.56E 10 11/ 7,1 6.859
8-	3.51E 10 2.40E 10 16/11,2 7.996	3.42E 10 2.40E 10 16/11,2 7.618	2.86E 10 2.40E 10 16/11,2 7.563	2.87E 10 2.40E 10 16/11,2 7.772	2.81E 10 2.40E 10 16/11,2 7.383
9-	.00E 00 .00E 00 16/11,2 7.706	.00E 00 .00E 00 16/11,2 7.329	.00E 00 .00E 00 16/11,2 7.382	.00E 00 .00E 00 16/11,2 7.935	.00E 00 .00E 00 16/11,2 7.546
10-	6.93E 13 6.93E 13 16/11,2 8.140	6.93E 13 6.93E 13 16/11,2 7.763	6.69E 13 6.93E 13 16/11,2 7.660	6.93E 13 6.93E 13 16/11,2 8.110	6.93E 13 6.93E 13 16/11,2 7.721
1+	2.36E-02 2.47E-02 10/ 8,1 4.025	2.37E-02 2.47E-02 10/ 8,1 3.391	2.11E-02 2.47E-02 10/ 8,1 3.229	2.35E-02 2.47E-02 10/ 8,1 4.167	2.36E-02 2.47E-02 10/ 8,1 3.375
1+	5.81E-03 4.77E-03 13/11,2 7.645	5.76E-03 4.77E-03 13/11,2 7.149	4.72E-03 4.77E-03 13/11,2 6.539	5.98E-03 4.77E-03 13/11,2 7.387	5.91E-03 4.77E-03 13/11,2 6.778
2+	6.17E 01 2.84E 01 10/ 9,1 2.756	6.32E 01 2.74E 01 10/ 8,1 2.259	8.27E 01 2.74E 01 10/ 8,1 2.522	5.70E 01 2.84E 01 10/ 9,1 2.203	5.97E 01 2.74E 01 10/ 8,1 2.309

2+	1.02E 00	3.69E-02	3.45E 00	2.04E 00	2.36E-02
	2.74E 01	2.84E 01	2.84E 01	2.74E 01	2.84E 01
	10/ 8,1	10/ 9,1	10/ 9,1	10/ 8,1	10/ 9,1
	3.554	3.037	3.105	3.779	3.157

2+	6.10E 00	5.32E 00	2.04E 00	6.68E 00	5.93E 00
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	12/11,2	12/11,2	12/11,2	12/11,2	12/11,2
	4.913	4.547	4.451	5.192	4.773

2+	6.22E-04	3.70E-04	1.52E-01	6.26E-03	9.67E-03
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	13/11,2	13/11,2	13/11,2	13/11,2	13/11,2
	6.492	5.996	5.819	6.839	6.232

2+	4.91E 01	4.87E 01	6.23E 01	5.10E 01	5.12E 01
	7.60E 01	7.60E 01	7.60E 01	7.60E 01	7.60E 01
	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3
	10.432	9.948	10.516	11.348	10.661

2+	7.91E 01	7.98E 01	8.51E 01	8.04E 01	8.01E 01
	6.52E 01	6.52E 01	6.52E 01	6.52E 01	6.52E 01
	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4
	15.550	14.819	14.231	15.255	14.654

3+	4.02E-02	4.02E-02	3.20E-02	5.17E-01	5.38E-01
	1.41E-01	1.41E-01	1.41E-01	1.41E-01	1.41E-01
	10/ 9,1	10/ 9,1	10/ 9,1	10/ 9,1	10/ 9,1
	3.953	3.559	3.498	3.391	3.462

3+	4.52E 01	4.63E 01	4.76E 01	4.83E 01	5.01E 01
	6.96E 01	6.96E 01	6.96E 01	6.96E 01	6.96E 01
	10/ 7,1	10/ 7,1	10/ 7,1	10/ 7,1	10/ 7,1
	6.298	5.849	5.772	6.519	5.947

3+	3.81E 00	3.63E 00	4.23E 00	6.32E 00	6.26E 00
	6.02E 01	6.02E 01	6.02E 01	6.02E 01	6.02E 01
	12/11,2	12/11,2	12/11,2	12/11,2	12/11,2
	4.894	4.543	4.528	4.858	4.451

3+	2.33E 00	4.83E-01	7.08E-04	9.10E 00	6.79E 00
	6.02E 01	6.02E 01	6.02E 01	6.02E 01	6.02E 01
	13/11,2	13/11,2	13/11,2	13/11,2	13/11,2
	6.152	5.665	5.617	6.043	5.456

3+	2.90E 01 1.97E 02 15/11,2 7.956	2.73E 01 1.97E 02 15/11,2 7.569	2.56E 01 1.97E 02 15/11,2 7.410	2.84E 01 1.97E 02 15/11,2 7.912	2.81E 01 1.97E 02 15/11,2 7.442
3+	1.64E 01 8.57E 00 16/ 9,3 11.076	1.85E 01 8.57E 00 16/ 9,3 10.447	1.84E 01 8.57E 00 16/ 9,3 10.227	2.87E 01 8.57E 00 16/ 9,3 11.297	2.52E 01 8.57E 00 16/ 9,3 10.464
3+	1.84E-01 4.42E 01 16/ 7,3 12.863	5.63E-01 4.42E 01 16/ 7,3 12.346	7.78E-02 4.42E 01 16/ 7,3 12.158	3.98E 01 4.42E 01 16/ 7,3 12.561	1.85E 01 4.42E 01 16/ 7,3 11.848
3+	1.64E 02 3.68E 02 16/ 9,4 12.444	1.62E 02 3.68E 02 16/ 9,4 11.733	2.34E 02 3.68E 02 16/ 9,4 11.525	1.67E 02 3.68E 02 16/ 9,4 12.439	2.07E 02 3.68E 02 16/ 9,4 11.669
3+	5.40E 02 2.58E 02 16/ 7,4 14.455	5.43E 02 2.58E 02 16/ 7,4 13.744	4.37E 02 2.58E 02 16/ 7,4 13.517	4.73E 02 2.58E 02 16/ 7,4 14.260	4.59E 02 2.58E 02 16/ 7,4 13.644
4+	2.01E 04 2.03E 04 10/ 7,1 5.573	9.24E 03 .00E 00 12/11,2 4.067	6.22E 03 .00E 00 12/11,2 4.249	2.26E 04 2.03E 04 10/ 7,1 5.909	1.97E 04 2.03E 04 10/ 7,1 5.356
4+	8.13E 03 .00E 00 12/11,2 4.435	1.82E 04 .00E 00 13/11,2 5.122	2.02E 04 .00E 00 13/11,2 5.267	2.91E 03 .00E 00 12/11,2 4.674	3.66E 03 .00E 00 12/11,2 4.254
4+	5.59E 03 .00E 00 13/11,2 6.193	7.09E 03 .00E 00 13/11,2 5.731	8.72E 03 .00E 00 13/11,2 5.679	3.69E 03 .00E 00 13/11,2 6.192	6.92E 03 .00E 00 13/11,2 5.611
4+	7.52E 02 .00E 00 14/11,2 6.743	4.37E 02 .00E 00 14/11,2 6.387	2.84E 01 .00E 00 14/11,2 6.402	2.00E 03 .00E 00 14/11,2 6.844	1.35E 03 .00E 00 14/11,2 6.427

4+	5.00E 01 .00E 00 15/11,2 7.494	1.11E 02 .00E 00 15/11,2 7.104	2.47E 02 .00E 00 15/11,2 7.113	4.08E 02 .00E 00 15/11,2 7.605	5.91E 02 .00E 00 15/11,2 7.130
4+	3.48E 04 4.52E 04 16/ 8,3 9.236	3.37E 04 4.52E 04 16/ 8,3 8.686	3.77E 04 4.52E 04 16/ 8,3 8.850	3.07E 04 4.52E 04 16/ 8,3 9.554	3.14E 04 4.52E 04 16/ 8,3 8.372
4+	3.83E 03 5.25E 03 16/ 9,3 10.429	3.45E 03 5.25E 03 16/ 9,3 9.785	3.10E 03 5.25E 03 16/ 9,3 9.763	7.36E 03 5.25E 03 16/ 9,3 10.723	4.87E 03 5.25E 03 16/ 9,3 9.803
4+	9.15E 02 2.62E 04 16/ 7,3 12.342	2.97E 02 2.62E 04 16/ 7,3 11.813	4.81E 02 2.62E 04 16/ 7,3 11.784	1.70E 02 2.62E 04 16/ 7,3 12.602	2.62E 02 2.62E 04 16/ 7,3 11.904
4+	1.67E 04 3.87E 04 16/ 8,4 11.296	1.37E 04 3.87E 04 16/ 8,4 10.654	2.53E 04 3.87E 04 16/ 8,4 10.684	1.32E 04 3.87E 04 16/ 8,4 11.421	6.68E 03 3.87E 04 16/ 8,4 10.730
4+	2.44E 04 4.50E 03 16/ 9,4 11.817	2.76E 04 4.50E 03 16/ 9,4 11.157	3.13E 04 4.50E 03 16/ 9,4 11.105	3.29E 04 4.50E 03 16/ 9,4 11.883	4.11E 04 3.87E 04 16/ 8,4 11.193
4+	4.75E 04 2.25E 04 16/ 7,4 14.191	4.88E 04 2.25E 04 16/ 7,4 13.473	4.40E 04 2.25E 04 16/ 7,4 13.366	4.66E 04 2.25E 04 16/ 7,4 14.109	4.62E 04 2.25E 04 16/ 7,4 13.502
5+	2.52E 04 2.62E 05 12/11,2 4.881	2.48E 04 2.62E 05 12/11,2 4.530	1.39E 05 2.62E 05 12/11,2 4.518	3.53E 04 2.62E 05 12/11,2 4.824	3.50E 04 2.62E 05 12/11,2 4.417
5+	2.72E 04 6.54E 04 13/11,2 5.927	2.99E 04 6.54E 04 13/11,2 5.432	3.37E 04 6.54E 04 13/11,2 5.461	6.26E 04 6.54E 04 13/11,2 5.995	5.82E 04 6.54E 04 13/11,2 5.387

5+	6.02E 05 8.45E 05 14/11,2 6.917	5.83E 05 8.45E 05 14/11,2 6.569	6.59E 05 8.45E 05 14/11,2 6.544	6.15E 05 8.45E 05 14/11,2 6.964	5.95E 05 8.45E 05 14/11,2 6.557
5+	2.69E 05 1.61E 05 15/11,2 7.507	2.78E 05 1.61E 05 15/11,2 7.125	2.15E 05 1.61E 05 15/11,2 7.126	2.50E 05 1.61E 05 15/11,2 7.505	2.74E 05 1.61E 05 15/11,2 7.140
5+	5.18E 05 5.12E 05 16/10,2 8.573	4.95E 05 5.12E 05 16/10,2 8.185	4.62E 05 5.12E 05 16/10,2 8.147	5.20E 05 5.12E 05 16/10,2 8.623	4.97E 05 5.12E 05 16/10,2 8.161
5+	1.03E 05 2.87E 04 16/ 8,3 10.079	9.81E 04 2.87E 04 16/ 8,3 9.494	9.01E 04 2.87E 04 16/ 8,3 9.457	1.28E 05 2.87E 04 16/ 8,3 10.018	9.49E 04 2.87E 04 16/ 8,3 9.326
5+	8.22E 04 1.87E 03 16/ 9,3 10.554	1.07E 05 1.87E 03 16/ 9,3 9.923	6.10E 04 1.87E 03 16/ 9,3 9.834	1.16E 05 1.87E 03 16/ 9,3 10.630	1.22E 05 1.87E 03 16/ 9,3 9.807
5+	3.45E 04 4.37E 04 16/ 7,3 12.801	6.60E 04 4.37E 04 16/ 7,3 12.279	2.65E 04 4.37E 04 16/ 7,3 12.159	3.67E 05 4.24E 05 16/ 8,4 11.124	1.31E 04 4.37E 04 16/ 7,3 11.843
5+	2.99E 05 4.24E 05 16/ 8,4 11.122	2.57E 05 4.24E 05 16/ 8,4 10.504	3.53E 05 4.24E 05 16/ 8,4 10.562	2.48E 05 1.97E 05 16/ 9,4 11.734	3.49E 05 4.24E 05 16/ 8,4 10.529
5+	3.09E 05 1.97E 05 16/ 9,4 11.689	3.34E 05 1.97E 05 16/ 9,4 10.992	3.33E 05 1.97E 05 16/ 9,4 10.996	1.50E 04 4.37E 04 16/ 7,3 12.528	3.03E 05 1.97E 05 16/ 9,4 10.950
5+	7.37E 05 4.52E 05 16/ 7,4 14.034	7.20E 05 4.52E 05 16/ 7,4 13.340	5.90E 05 4.52E 05 16/ 7,4 13.303	6.29E 05 4.52E 05 16/ 7,4 13.852	6.32E 05 4.52E 05 16/ 7,4 13.242

6+	1.60E 05 .00E 00 12/11,2 4.668	1.83E 05 .00E 00 12/11,2 4.316	1.43E 05 .00E 00 12/11,2 4.376	2.50E 04 .00E 00 12/11,2 4.801	3.20E 04 .00E 00 12/11,2 4.392
6+	8.06E 05 .00E 00 13/11,2 5.776	8.22E 05 .00E 00 13/11,2 5.281	6.56E 05 .00E 00 13/11,2 5.369	6.51E 05 .00E 00 13/11,2 5.898	6.89E 05 .00E 00 13/11,2 5.291
6+	1.27E 06 .00E 00 15/11,2 7.300	1.44E 06 .00E 00 15/11,2 6.912	8.89E 05 .00E 00 15/11,2 7.013	6.53E 05 .00E 00 15/11,2 7.471	7.71E 05 .00E 00 15/11,2 6.999
6+	1.17E 06 .00E 00 16/10,2 8.343	1.38E 06 .00E 00 16/10,2 7.954	1.08E 06 .00E 00 16/10,2 7.979	4.61E 05 .00E 00 16/10,2 8.449	5.49E 05 .00E 00 16/10,2 7.992
6+	1.52E 07 2.05E 07 16/ 8,3 9.740	1.47E 07 2.05E 07 16/ 8,3 9.170	1.48E 07 2.05E 07 16/ 8,3 9.218	1.09E 07 2.05E 07 16/ 8,3 9.912	1.33E 07 2.05E 07 16/ 8,3 9.225
6+	5.20E 06 1.32E 07 16/ 9,3 10.271	4.26E 06 1.32E 07 16/ 9,3 9.635	4.46E 06 1.32E 07 16/ 9,3 9.649	7.90E 06 1.32E 07 16/ 9,3 10.534	4.70E 06 1.32E 07 16/ 9,3 9.716
6+	6.56E 05 1.75E 07 16/ 7,3 12.439	4.44E 05 1.75E 07 16/ 7,3 11.919	1.84E 06 1.75E 07 16/ 7,3 11.910	1.22E 06 1.75E 07 16/ 7,3 12.768	1.82E 06 1.75E 07 16/ 7,3 12.086
6+	1.58E 07 1.75E 07 16/ 8,4 11.053	1.47E 07 1.75E 07 16/ 8,4 10.438	1.90E 07 1.75E 07 16/ 8,4 10.510	1.48E 07 1.75E 07 16/ 8,4 11.122	1.19E 07 1.75E 07 16/ 8,4 10.505
6+	2.55E 07 1.13E 07 16/ 9,4 11.670	2.67E 07 1.13E 07 16/ 9,4 10.968	2.66E 07 1.13E 07 16/ 9,4 10.987	2.67E 07 1.13E 07 16/ 9,4 11.699	3.01E 07 1.13E 07 16/ 9,4 10.928

6+	2.92E 07 1.50E 07 16/ 7,4 13.844	3.03E 07 1.50E 07 16/ 7,4 13.141	2.82E 07 1.50E 07 16/ 7,4 13.182	3.18E 07 1.50E 07 16/ 7,4 13.903	3.12E 07 1.50E 07 16/ 7,4 13.288
7+	4.27E 08 1.46E 09 12/11,2 5.023	4.17E 08 1.46E 09 12/11,2 4.671	1.60E 08 1.46E 09 12/11,2 4.605	5.12E 08 1.46E 09 12/11,2 5.066	5.09E 08 1.46E 09 12/11,2 4.659
7+	1.03E 08 7.20E 07 13/11,2 5.820	1.15E 08 7.20E 07 13/11,2 5.325	8.13E 07 7.20E 07 13/11,2 5.389	4.64E 07 7.20E 07 13/11,2 5.849	4.36E 07 7.20E 07 13/11,2 5.240
7+	3.97E 08 8.67E 07 16/ 8,3 10.177	3.11E 08 8.67E 07 16/ 8,3 9.578	4.31E 08 8.67E 07 16/ 8,3 9.530	3.45E 08 7.54E 05 16/ 9,3 10.220	7.46E 07 7.54E 05 16/ 9,3 9.433
7+	2.17E 08 7.54E 05 16/ 9,3 10.414	3.48E 08 7.54E 05 16/ 9,3 9.789	1.25E 08 7.54E 05 16/ 9,3 9.739	7.52E 08 7.54E 05 16/ 9,3 10.487	8.52E 08 8.67E 07 16/ 8,3 9.762
7+	1.21E 08 6.31E 07 16/ 7,3 12.836	2.22E 08 6.31E 07 16/ 7,3 12.304	1.01E 08 6.31E 07 16/ 7,3 12.186	7.21E 07 6.31E 07 16/ 7,3 12.661	5.57E 07 6.31E 07 16/ 7,3 11.982
7+	1.15E 09 2.13E 09 16/ 8,4 11.232	7.94E 08 2.13E 09 16/ 8,4 10.591	1.54E 09 2.13E 09 16/ 8,4 10.645	1.36E 09 2.13E 09 16/ 8,4 11.218	1.02E 09 2.13E 09 16/ 8,4 10.580
7+	1.07E 09 1.66E 08 16/ 9,4 11.541	1.35E 09 1.66E 08 16/ 9,4 10.867	8.82E 08 1.66E 08 16/ 9,4 10.891	6.60E 08 1.66E 08 16/ 9,4 11.612	1.17E 09 1.66E 08 16/ 9,4 10.857
7+	1.64E 09 1.04E 09 16/ 7,4 13.986	1.57E 09 1.04E 09 16/ 7,4 13.303	1.38E 09 1.04E 09 16/ 7,4 13.277	1.33E 09 1.04E 09 16/ 7,4 13.766	1.35E 09 1.04E 09 16/ 7,4 13.150

8+	1.75E 09 .00E 00 13/11,2 5.653	1.85E 09 .00E 00 13/11,2 5.154	1.62E 09 .00E 00 13/11,2 5.280	2.31E 09 .00E 00 13/11,2 5.748	2.52E 09 .00E 00 13/11,2 5.130
8+	3.23E 10 5.23E 10 16/ 9,3 9.951	3.09E 10 5.23E 10 16/ 9,3 9.317	3.06E 10 5.23E 10 16/ 9,3 9.421	2.51E 10 5.23E 10 16/ 9,3 10.417	2.60E 10 5.23E 10 16/ 9,3 9.566
8+	1.26E 07 1.43E 10 16/ 7,3 12.551	8.95E 07 1.43E 10 16/ 7,3 12.017	4.52E 08 1.43E 10 16/ 7,3 11.993	4.23E 07 1.43E 10 16/ 7,3 12.870	4.29E 07 1.43E 10 16/ 7,3 12.196
8+	6.38E 10 4.48E 10 16/ 9,4 11.790	6.44E 10 4.48E 10 16/ 9,4 11.076	7.05E 10 4.48E 10 16/ 9,4 11.063	6.43E 10 4.48E 10 16/ 9,4 11.941	6.41E 10 4.48E 10 16/ 9,4 11.163
8+	2.58E 10 1.22E 10 16/ 7,4 13.710	2.64E 10 1.22E 10 16/ 7,4 13.022	2.43E 10 1.22E 10 16/ 7,4 13.106	3.17E 10 1.22E 10 16/ 7,4 13.824	3.08E 10 1.22E 10 16/ 7,4 13.199
9+	2.02E 11 1.78E 11 16/ 7,3 12.941	4.07E 11 1.78E 11 16/ 7,3 12.410	2.58E 11 1.78E 11 16/ 7,3 12.264	1.12E 12 1.78E 11 16/ 7,3 13.079	9.18E 11 1.78E 11 16/ 7,3 12.424
9+	4.35E 12 4.37E 12 16/ 7,4 14.107	4.14E 12 4.37E 12 16/ 7,4 13.422	4.19E 12 4.37E 12 16/ 7,4 13.368	3.44E 12 4.37E 12 16/ 7,4 13.942	3.64E 12 4.37E 12 16/ 7,4 13.305

STOP 0

APPENDIX E
VECTOR AMPLITUDES

This appendix consists of four sections as Appendix

D.

Summary of important vectors:

J = spin, parity of state

E = excitation energy of state

N = dimension of vector

Type - 1	pp^{-1}	excitation
2	nn^{-1}	excitation
3	T=0	excitation
4	T=1	excitation $N \neq Z$
5	T=1	excitation $N=Z$

Configuration: p/h see Appendix C.

X amp.

Y amp.

BEJ(UP), BEJ(DOWN) units of $e^2 f^{2J}$

BMJ(UP), BMJ(DOWN) units of $e^2 f^{2J}$

SINGLE PARTICLE

Transition as of vector was composed solely to
major component and type.

P-TO-H

Transition of single particle between orbits P,H.

(PH) -TO-(G.S.)

Transition of a single particle-hole configuration,
 ph^{-1} , to ground state.

Ratio of BMJ or BEJ to above can be considered
a measure of the enhancement or deenhancement due
to configuration mixing.

Density Function

to be ignored.

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=10.624 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
••294	•859	•337	-•228	•040

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
••009	•089	•007	-•004	••002

BEJ(UP)=1.047E-03

BEJ(DOWN)=3.490E-04

MAJOR COMPONENT P= 5 H= 3 TYPE=3

SINGLE PARTICLE BEJ

P-T0-H=1.241E-01 (PH)-T0-0(G.S.)=8.271E-02

DENSITY FUNCTION

CSTORE(2)=-1.028E-01

CSTORE(4)= 5.913E-02

016=TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=13.846 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.021	-.059	-.076	.023	-.003

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.118	.986	-.043	.010	-.030

BEJ(UP)=9.648E-02

BEJ(DOWN)=3.216E-02

MAJOR COMPONENT P= 5 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P=T0-H=1.241E-01 (PH)=T0-Q(G.S.)=8.271E-02

DENSITY FUNCTION

CSTORE(2)=9.618E-01

CSTORE(4)= 5.576E-01

016-TDA K.K.

ISPIN(G.S.)= C ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=16.768 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.100	-.390	.857	-.308	.007

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.001	.051	.064	-.045	-.007

BEJ(UP)=4.999E-04

BEJ(DOWN)=1.666E-04

MAJOR COMPONENT P= 5 H= 2 TYPE=3

SINGLE PARTICLE BEJ

P=T0-H=2.481E-01 (PH)=T0-Q(G.S.)=1.654E-01

DENSITY FUNCTION

CSTORE(2)=-1.471E-01

CSTORE(4)= 7.129E-02

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=17.987 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..431	..103	.232	.524	.169

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..219	..023	..093	.602	.167

BEJ(UP)=3.353E-02

BEJ(DOWN)=1.118E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=3.102E-01 (PH)-T0-Q(G.S.)=4.135E-01

DENSITY FUNCTION

CSTORE(2)= 1.606E-01

CSTORE(4)= 3.765E-02

016-TDA K.K.

ISPIN(G.S.) = 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=18.179 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.390	.070	-.141	-.499	-.150

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..229	..039	..158	.663	.180

BEJ(UP)=3.093E-02

BEJ(DOWN)=1.031E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=3.102E-01 (PH)-T0-0(G.S.)=4.135E-01

DENSITY FUNCTION

CSTORE(2)= 2.728E-01

CSTORE(4)=-1.126E-02

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=20.211 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.017	.018	-.064	-.009	-.010

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..284	.008	.940	.047	.167

BEJ(UP)=4.449E-02

BEJ(DOWN)=1.483E-02

MAJOR COMPONENT P= 5 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=2.481E-01 (PH)-T0-0(G.S.)=1.654E-01

DENSITY FUNCTION

CSTORE(2)=-1.390E 00

CSTORE(4)= 6.735E-01

016-TDA K.K.

ISPIN(G.S.) = 0 ITDRP = 0 IA = 16 IZ = 8 HW = 13.30
 IPU = 0
 J = 1 E = 23.537 N = 10

TYPE = 3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.006	.000	-.006	-.004	.025

TYPE = 5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.896	.119	.223	.322	.170

BEJ(UP) = 3.346E 00

BEJ(DOWN) = 1.115E 00

MAJOR COMPONENT P = 4 H = 2 TYPE = 5

SINGLE PARTICLE BEJ

P-T0-H = 3.722E-01 (PH) = T0-Q(G.S.) = 7.444E-01

DENSITY FUNCTION

CSTORE(2) = -4.516E-01

CSTORE(4) = 1.199E 00

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HA=13.30
 IPU=0
 J= 1 E=24.422 N=10

TYPE=3				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.279	.052	-.036	-.052	.956

TYPE=5				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.025	-.004	-.009	-.017	.022

BEJ(UP)=5.713E-03 BEJ(DOWN)=1.904E-03

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BEJ
 P-TB-H=6.203E-02 (PH)-TB-Q(G.S.)=8.271E-02

DENSITY FUNCTION
 CSTORE(2)= 1.739E-02
 CSTORE(4)=-4.902E-02

016=TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=26.368 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..008	..003	.005	.004	..026

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..032	.021	..161	..300	.939

BEJ(UP)=9.076E-01

BEJ(DOWN)=3.025E-01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P=TB-H=6.203E-02 (PH)=TB-O(G.S.)=8.271E-02

DENSITY FUNCTION

CSTORE(2)= 2.149E-01

CSTORE(4)= -6.161E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=12.250 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.957	.233	.049	.069	.004

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.144	.033	.012	.001	.010

BMJ(UP)=2.074E-01

BMJ(DOWN)=4.149E-02

MAJOR COMPONENT P= 4 H= 3 TYPE=3

SINGLE PARTICLE BMJ

P-TB-H=1.637E-02 (PH)-TB-C(G.S.)=1.965E-02

DENSITY FUNCTION

CSTORE(2)=4.206E-02

CSTORE(4)=1.795E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=13.236 N=10

TYPE=3				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.143	-.039	-.005	-.014	.000

TYPE=5				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.956	.233	.074	-.005	.070

BMJ(UP)=1.777E 00 BMJ(DOWN)=3.554E=01

MAJOR COMPONENT P= 4 H= 3 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=1.049E 00 (PH)-T0-0(G.S.)=1.259E 00

DENSITY FUNCTION
 CST0RE(2)=-2.434E-01
 CST0RE(4)=-4.773E-01

016=TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=16.734 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
••162	•417	••056	•876	••136

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
•000	•031	••006	•097	••010

BMJ(UP)=4.316E-01

BMJ(DOWN)=8.632E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=4.306E-03

(PH)-T0-Q(G.S.)=3.444E-03

DENSITY FUNCTION

CSTORE(2)= 2.267E-02

CSTORE(4)= 2.741E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=17.988 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.025	..091	.024	..063	.021

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..059	.300	..033	.938	..109

BMJ(UP)=1.384E-01

BMJ(DOWN)=2.767E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=2.511E-02 (PH)-T0-Q(G.S.)=2.009E-02

DENSITY FUNCTION

CSTORE(2)= 1.074E-01

CSTORE(4)= 1.174E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=18.563 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..116	.707	..530	..409	..065

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..012	.111	..146	.017	..008

BMJ(UP)=5.299E-01

BMJ(DOWN)=1.060E-01

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=1.148E-01 (PH)-T0-C(G.S.)=1.377E-01

DENSITY FUNCTION

CSTORE(2)= 5.083E-01

CSTORE(4)= 1.105E-01

016-TDA K.K.

ISPIN(G.S.)= C ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=19.351 N=10

TYPE=3				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..081	.315	.277	..159	..067

TYPE=5				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.065	..488	.710	.203	.007

BMJ(UP)=7.554E-02 BMJ(DOWN)=1.511E-02

MAJOR COMPONENT P= 5 H= 2 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=1.519E 00 (PH)=T0-0(G.S.)=6.076E-01

DENSITY FUNCTION
 CST0RE(2)=.2.352E 00
 CST0RE(4)= 1.059E 00

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=19.698 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..115	.361	.786	..162	..117

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..062	.340	..255	..115	..031

BMJ(UP)=9.680E-01

BMJ(DOWN)=1.936E-01

MAJOR COMPONENT P= 5 H= 2 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=5.306E-02 (PH)-T0-Q(G.S.)=2.122E-02

DENSITY FUNCTION

CSTORE(2)= 7.985E-01

CSTORE(4)= 1.047E-01

816-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=20.939 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.017	-.046	-.116	.024	.018

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..197	.672	.624	..232	..223

BMJ(UP)=1.129E 01 BMJ(DOWN)=2.258E 00

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.386E 00 (PH)-T0-Q(G.S.)=1.663E 00

DENSITY FUNCTION

CSTORE(2)=-2.048E 00

CSTORE(4)= 2.268E 00

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=23.276 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
••054	•171	•070	•065	•976

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
••009	•013	•006	•003	•073

BMJ(UP)=9.962E-02

BMJ(DOWN)=1.992E-02

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=1.991E-04 (PH)=T0-0(G.S.)=1.593E-04

DENSITY FUNCTION

CSTORE(2)=-2.340E-02

CSTORE(4)= 1.454E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=24.057 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.006	-.014	-.011	-.005	-.073

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.125	.187	.120	.049	.963

BMJ(UP)=3.389E 00

BMJ(DOWN)=6.778E-01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.884E-01 (PH)-T0-C(G.S.)=1.507E-01

DENSITY FUNCTION

CSTORE(2)=-3.945E-01

CSTORE(4)= 9.514E-01

016-TDA K.K.

ISPIN(G.S.) = 0 ITDRP = 0 IA = 16 IZ = 8 HW = 13.30
 IPU = 0
 J = 3 E = 8.464 N = 6

TYPE = 3

4/ 3	4/ 2	6/ 2
.917	.298	-.264

TYPE = 5

4/ 3	4/ 2	6/ 2
.028	-.001	-.001

BEJ(UP) = 4.993E 02 BEJ(DOWN) = 7.133E 01

MAJOR COMPONENT P = 4 H = 3 TYPE = 3

SINGLE PARTICLE BEJ
 P-T0-H = 3.694E 01 (PH)-T0-Q(G.S.) = 3.166E 01

DENSITY FUNCTION
 CSTORE(4) = -7.460E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=13.225 N= 6

TYPE=3
 4/ 3 4/ 2 6/ 2
 .018 .026 .014

TYPE=5
 4/ 3 4/ 2 6/ 2
 .985 .166 .000

BEJ(UP)=1.348E 02 BEJ(DOWN)=1.926E 01

MAJOR COMPONENT P= 4 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=3.694E 01 (PH)-T0-Q(G.S.)=3.166E 01

DENSITY FUNCTION

CSTORE(4)=-3.876E-01

B16•TDA K•K•

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3• E=16.368 N= 6

TYPE=3			
4/ 3	4/ 2	6/ 2	
•.359	•905	•.224	

TYPE=5			
4/ 3	4/ 2	6/ 2	
•023	•016	•000	

BEJ(UP)=1.191E 02 BEJ(DOWN)=1.702E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BEJ
 P=T0•H=2.955E 01 (PH)=T0=0(G.S.)=2.533E 01

DENSITY FUNCTION
 CSTORE(4)=•3.644E=01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=18.829 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
.005	.016	.014

TYPE=5

4/ 3	4/ 2	6/ 2
.165	.980	.106

BEJ(UP)=1.798E 02 BEJ(DOWN)=2.569E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BEJ
 P=TB=H=2.955E 01 (PH)=TB=O(G.S.)=2.533E 01

DENSITY FUNCTION
 CSTORE(4)=.4.477E=01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=22.114 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
•173	•301	•938

TYPE=5

4/ 3	4/ 2	6/ 2
••004	••010	•016

BEJ(UP)=8.404E 01

BEJ(DOWN)=1.201E 01

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BEJ

P-T0-H=6.649E 01 (PH)=T0-O(G.S.)=3.800E 01

DENSITY FUNCTION

CSTORE(4)= 3.061E=01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=25.105 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
..003	..003	..016

TYPE=5

4/ 3	4/ 2	6/ 2
..018	..104	.994

BEJ(UP)=3.128E 02 BEJ(DOWN)=4.469E 01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BEJ
 P-T0-H=6.649E 01 (PH)-T0-0(G.S.)=3.800E 01

DENSITY FUNCTION
 CSTORE(4)= 5.905E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 4- E=18.833 N= 2

TYPE=3
 4/ 2
 .997

TYPE=5
 4/ 2
 .075

BMJ(UP)=5.147E 02 BMJ(DOWN)=5.719E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BMJ
 P-T0-H=4.388E 01 (PH)-T0-O(G.S.)=2.925E 01

DENSITY FUNCTION
 CST0RE(4)=-6.680E-01

016-TDA K.K.

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 4 E=19.713 N= 2

TYPE=3

4/ 2

•.075

TYPE=5

4/ 2

•997

BMJ(UP)=7.282E 03

BMJ(DOWN)=8.091E 02

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.256E 03 (PH)-T0-Q(G.S.)=8.374E 02

DENSITY FUNCTION

CSTORE(4)=-2.512E 00

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.) = 0 ITDRP = 0 IA = 16 IZ = 8 HW = 13.30
 IPU = 0
 J = 1 E = 7.416 N = 10

TYPE=3				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..308	.858	.332	..231	.045

TYPE=5				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..005	.049	.006	..003	..001

BEJ(UP) = 3.356E-04 BEJ(DOWN) = 1.119E-04

MAJOR COMPONENT P = 5 H = 3 TYPE = 3

SINGLE PARTICLE BEJ

P-T0-H = 1.241E-01 (PH) = T0-0(G.S.) = 8.271E-02

DENSITY FUNCTION

CSTORE(2) = -5.976E-02

CSTORE(4) = 3.410E-02

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 H_w=13.30
 IPU=0
 J= 1 E=13.169 N=10

TYPE=3				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.000	.098	-.330	.087	-.011

TYPE=5				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.115	.926	-.051	.015	-.028

BEJ(UP)=8.074E-02 BEJ(DOWN)=2.691E-02

MAJOR COMPONENT P= 5 H= 3 TYPE=5

SINGLE PARTICLE BEJ
 P-T0-H=1.241E-01 (PH)-T0-0(G.S.)=8.271E-02

DENSITY FUNCTION
 CST0RE(2)=-8.877E-01
 CST0RE(4)= 5.132E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 MW=13.30
 IPU=0
 J= 1- E=13.597 A=10

TYPE=3				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.054	-.384	.816	-.242	.022

TYPE=5				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.045	.350	.020	-.009	-.011

BEJ(UP)=1.361E-02 BEJ(DOWN)=4.535E-03

MAJOR COMPONENT P= 5 H= 2 TYPE=3

SINGLE PARTICLE BEJ
 P-T0-H=2.481E-01 (PH)-T0-0(G.S.)=1.654E-01

DENSITY FUNCTION
 CST0RE(2)=-3.933E-01
 CST0RE(4)= 2.222E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30

IPU=0

J= 1 E=15.131 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..576	..096	.203	.748	.235

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..021	.012	.005	.047	.012

BEJ(UP)=5.998E-04

BEJ(DOWN)=1.999E-04

MAJOR COMPONENT P= 6 H= 3 TYPE=3

SINGLE PARTICLE BEJ

P-T0-W=3.102E-01 (PH)-T0-Q(G.S.)=4.135E-01

DENSITY FUNCTION

CSTORE(2)=-1.983E-02

CSTORE(4)= 2.156E-02

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30

IPU=0

J= 1 E=17.156 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.027	.002	.006	-.045	-.011

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
-.319	-.049	-.160	.898	.248

BEJ(UP)=6.910E-02

BEJ(DOWN)=2.303E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=3.102E-01 (PH)-T0-0(G.S.)=4.135E-01

DENSITY FUNCTION

CSTORE(2)= 2.862E-01

CSTORE(4)= 3.183E-02

016=TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 MW=13.30
 IPU=0
 J= 1 E=19.554 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
•006	•008	••036	••001	••008

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
••297	•006	•940	•017	•165

BEJ(UP)=2.499E-02

BEJ(DOWN)=8.331E-03

MAJOR COMPONENT P= 5 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=2.481E-01 (PH)-T0-G(G.S.)=1.654E-01

DENSITY FUNCTION

CSTORE(2)=-1.388E 00

CSTORE(4)= 6.433E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1- E=21.092 N=10

TYPE=3				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.288	.052	.038	.061	.953

TYPE=5				
4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.012	.000	.005	.001	.015

BEJ(UP)=2.279E-04 BEJ(DOWN)=7.597E-05

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BEJ
 P-T0-H=6.203E-02 (PH)=T0-Q(G.S.)=8.271E-02

DENSITY FUNCTION
 CST0RE(2)=-7.351E-03
 CST0RE(4)= 1.134E-02

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HX=13.30
 IPU=0
 J= 1- E=22.623 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..006	..002	..004	..001	..014

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
.891	.123	.244	.319	.174

BEJ(UP)=3.361E 00 BEJ(DOWN)=1.120E 00

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P-TB-H=3.722E-01 (PH)-TB-Q(G.S.)=7.444E-01

DENSITY FUNCTION

CSTORE(2)=-4.866E-01

CSTORE(4)= 1.215E 00

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 1 E=25.458 N=10

TYPE=3

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..004	..002	.003	.003	..011

TYPE=5

4/ 2	5/ 3	5/ 2	6/ 3	6/ 2
..033	.021	..169	..299	.938

BEJ(UP)=9.181E-01

BEJ(DOWN)=3.060E-01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P=TB-H=6.203E-02 (PH)=TB-Q(G.S.)=8.271E-02

DENSITY FUNCTION

CSTORE(2)= 2.266E-01

CSTORE(4)=-6.239E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E= 8.869 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.971	.222	.050	.060	.006

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.041	.008	.003	.001	.002

BMJ(UP)=1.089E-01

BMJ(DOWN)=2.179E-02

MAJOR COMPONENT P= 4 H= 3 TYPE=3

SINGLE PARTICLE BMJ

P-TB-H=1.637E-02 (PH)-TB-O(G.S.)=1.965E-02

DENSITY FUNCTION

CSTORE(2)=-1.248E-02

CSTORE(4)=-1.373E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=12.312 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.039	-.017	.002	-.010	.002

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.965	.236	.071	-.005	.070

BMJ(UP)=1.911E 00 BMJ(DOWN)=3.821E-01

MAJOR COMPONENT P= 4 H= 3 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.049E 00 (PH)-T0-Q(G.S.)=1.259E 00

DENSITY FUNCTION

CSTORE(2)=-2.338E-01

CSTORE(4)=-5.023E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=13.868 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..157	.476	..076	.848	..153

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.009	.014	..003	.037	..003

BMJ(UP)=4.559E-01

BMJ(DOWN)=9.119E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=4.306E-03 (PH)-T0-Q(G.S.)=3.444E-03

DENSITY FUNCTION

CSTORE(2)= 1.384E-02

CSTORE(4)= 2.856E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=15.505 N=10

TYPE=3	4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
	..089	.644	..615	..441	..048

TYPE=5	4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
	.003	.016	..043	..034	.003

BMJ(UP)=3.449E-01 BMJ(DOWN)=6.898E-02

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BMJ
 P-T0-H=1.148E-01 (PH)-T0-Q(G.S.)=1.377E-01

DENSITY FUNCTION
 CST0RE(2)= 1.736E-01
 CST0RE(4)= 1.837E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.) = 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=16.449 N=10

TYPE=3				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.142	.525	.775	-.275	-.145

TYPE=5				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.001	-.017	.067	-.047	.000

BMJ(UP)=5.021E-01 BMJ(DOWN)=1.004E-01

MAJOR COMPONENT P= 5 H= 2 TYPE=3

SINGLE PARTICLE BMJ
 P-T0-H=5.306E-02 (PH)-T0-0(G.S.)=2.122E-02

DENSITY FUNCTION
 CST0RE(2)=-2.610E-01
 CST0RE(4)= 4.098E-01

816-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=17.033 N=10

TYPE=3				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..004	.026	.027	..059	.000

TYPE=5				
4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..059	.301	..028	.943	..109

BMJ(UP)=2.689E-01 BMJ(DOWN)=5.378E-02

MAJOR COMPONENT P= 6 H= 3 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=2.511E-02 (PH)=T0-0(G.S.)=2.009E-02

DENSITY FUNCTION
 CST0RE(2)= 9.077E-02
 CST0RE(4)= 1.872E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=18.642 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
.000	-.009	.066	.007	-.011

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
-.109	.662	-.696	-.244	-.038

BMJ(UP)=4.315E-01

BMJ(DOWN)=8.630E-02

MAJOR COMPONENT P= 5 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.519E 00 (PH)-T0-0(G.S.)=6.076E-01

DENSITY FUNCTION

CSTORE(2)= 2.288E 00

CSTORE(4)=-6.320E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=19.935 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..055	.181	.072	.070	.976

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
..010	.030	.024	..011	.009

BMJ(UP)=1.301E-01

BMJ(DOWN)=2.602E-02

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BMJ

P-T0-H=1.991E-04 (PH)-T0-0(G.S.)=1.593E-04

DENSITY FUNCTION

CSTORE(2)= -8.277E-02

CSTORE(4)= 1.886E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2 E=20.131 N=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
•008	••021	••048	•006	••031

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
••186	•615	•697	••211	••229

BMJ(UP)=1.121E 01

BMJ(DOWN)=2.243E 00

MAJOR COMPONENT P= 5 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.519E 00 (PH)=T0-0(G.S.)=6.076E-01

DENSITY FUNCTION

CSTORE(2)=•2.292E 00

CSTORE(4)= 2.361E 00

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 2- E=23.145 A=10

TYPE=3

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
•002	••004	••005	••001	••017

TYPE=5

4/ 3	4/ 2	5/ 2	6/ 3	6/ 2
••126	•188	•129	•048	•964

BMJ(UP)=3.523E 00

BMJ(DOWN)=7.045E-01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BMJ

P-T0-H=1.884E-01 (PH)-T0-0(G.S.)=1.507E-01

DENSITY FUNCTION

CSTORE(2)=•4.244E-01

CSTORE(4)= 9.789E-01

016=TDA K.K. M9N0P0LE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E= 5.082 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
.921	.286	-.262

TYPE=5

4/ 3	4/ 2	6/ 2
.019	.000	-.001

BEJ(UP)=4.881E 02 BEJ(DOWN)=6.972E 01

MAJOR COMPONENT P= 4 H= 3 TYPE=3

SINGLE PARTICLE BEJ
 P-T0-H=3.694E 01 (PH)-T0-Q(G.S.)=3.166E 01

DENSITY FUNCTION
 CST0RE(4)=-7.375E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRF=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=12.312 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
•006	••063	•024

TYPE=5

4/ 3	4/ 2	6/ 2
•984	••167	•000

BEJ(UP)=1.273E 02 BEJ(DOWN)=1.819E 01

MAJOR COMPONENT P= 4 H= 3 TYPE=5

SINGLE PARTICLE BEJ

P•T0-H=3.694E 01 (PH)=T0-C(G.S.)=3.166E 01

DENSITY FUNCTION

CSTORE(4)=•3.767E-01

016-TDA K.K. M9N0P0LE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 Hw=13.30
 IPU=0
 J= 3 E=13.264 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
..350	.903	..242

TYPE=5

4/ 3	4/ 2	6/ 2
.066	.000	..001

BEJ(UP)=1.383E 02 BEJ(DOWN)=1.975E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BEJ

P-T0-H=2.955E 01 (PH)-T0-Q(G.S.)=2.533E 01

DENSITY FUNCTION

CSTORE(4)= -3.926E-01

016-TDA K.K. MONOPOLAR SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3 E=17.892 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
•006	•000	•035

TYPE=5

4/ 3	4/ 2	6/ 2
•166	•980	•106

BEJ(UP)=1.772E 02 BEJ(DOWN)=2.531E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BEJ
 P-T0-H=2.955E 01 (PH)-T0-Q(G.S.)=2.533E 01

DENSITY FUNCTION
 CSTORE(4)=4.444E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 3- E=18.786 N= 6

TYPE=3

4/ 3	4/ 2	6/ 2
•168	•316	•933

TYPE=5

4/ 3	4/ 2	6/ 2
••009	••033	•006

BEJ(UP)=8.424E 01 BEJ(DOWN)=1.203E 01

MAJOR COMPONENT P= 6 H= 2 TYPE=3

SINGLE PARTICLE BEJ

P-T0-H=6.649E 01 (PH)=T0-0(G.S.)=3.800E 01

DENSITY FUNCTION

CSTORE(4)= 3.064E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 4. E=15.793 N= 2

TYPE=3
 4/ 2
 1.000

TYPE=5
 4/ 2
 .022

BMJ(UP)=3.289E 02 BMJ(DOWN)=3.654E 01

MAJOR COMPONENT P= 4 H= 2 TYPE=3

SINGLE PARTICLE BMJ
 P-T0-H=4.388E 01 (PH)-T0-0(G.S.)=2.925E 01

DENSITY FUNCTION
 CST0RE(4)=-5.339E-01

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30
 IPU=0
 J= 4 E=18.773 N= 2

TYPE=3
 4/ 2
 .022

TYPE=5
 4/ 2
 1.000

BMJ(UP)=7.474E 03 BMJ(DOWN)=8.305E 02

MAJOR COMPONENT P= 4 H= 2 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=1.256E 03 (PH)-T0-C(G.S.)=8.374E 02

DENSITY FUNCTION
 CST0RE(4)=-2.545E 00

016-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=16 IZ= 8 HW=13.30

IPU=0

J= 3 E=24.191 N= 6

TYPE=3

4/ 3 4/ 2 6/ 2

--001 --001 --009

TYPE=5

4/ 3 4/ 2 6/ 2

--018 --104 .994

BEJ(UP)=3.149E 02 BEJ(DOWN)=4.498E 01

MAJOR COMPONENT P= 6 H= 2 TYPE=5

SINGLE PARTICLE BEJ

P-T0-H=6.649E 01 (PH)=T0-0(G.S.)=3.800E 01

DENSITY FUNCTION

CSTORE(4)= 5.924E-01

CASO-TDA K.K. MENEPPELE SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=40 IZ=20 HW=10.50
IPU=0
J= 2= E= 6.804 N=20

TYPE-3
10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
7/ 4

.001 .016 .029 .012 .015 -.079 .080 .018 .958

.176

TYPE-5
10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
7/ 4

.000 .004 -.006 .004 .009 -.020 .024 .005 .185

.033

BMJ(UP)=7.506E-01 BMJ(DOWN)=1.501E-01

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BMJ
P=10-H=3.733E-02 (PH)=10-C(G.S.)=5.972E-02

DENSITY FUNCTION
CSTORE(2)=-4.578E-02
CSTORE(4)= 2.822E-02
CSTORE(6)=-9.765E-02

CA40-TDA K.K. MONSELE SHIFT

ISPIN(G.S.)= 0 ITRD=0 IA=40 IZ=20 MH=10.50
 IPU=0
 J= 3- E= 4.340 N=18

TYPE=3

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
0.105	0.229	0.188	0.126	0.303	0.106	0.701	0.437	0.309

TYPE=5

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
0.002	0.005	0.004	0.003	0.014	0.002	0.061	0.013	0.006

BEJ(UP)=5.922E 03 BEJ(DOWN)=8.459E 02

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BEJ
 P-TS-M=5.791E 01 (PH)=TS-C(G.S.)=6.619E 01

DENSITY FUNCTION
 CSTORE(4)= 7.165E-01
 CSTORE(6)=5.597E-01

CA40-TDA K.K. MENSPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 4 E= 5.905 N=12

TYPE=3

9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
.025	-.003	.010	.964	.063	.054

TYPE=5

9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
.005	.004	.003	.250	.023	.013

BMJ(UP)=3.184E 02 BMJ(DOWN)=3.538E 01

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BMJ
 P-T8-H=3.860E 00 (PM)=T8-0(G.S.)=3.431E 00

DENSITY FUNCTION

CST9RE(4)= 4.143E-02
 CST9RE(6)= 7.269E-02

CA40-TDA K.K. MONOPOLY SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 MW=10.50
 IPU=C
 J= 5- E= 4.478 N= 6

TYPE=3
 9/ 4 7/ 6 7/ 4
 .141 .976 .139

TYPE=5
 9/ 4 7/ 6 7/ 4
 .002 .087 .001

BEJ(UP)=1.855E 06 BEJ(DOWN)=1.686E 05

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BEJ
 P-T0-H=1.366E 05 (PH)-T0-0(G.S.)=9.937E 04

DENSITY FUNCTION
 CSTRE(6)= 2.603E-01

CA40-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 MW=10.50
 IPU=0
 J= 2- E= 8.419 N=20

TYPE-3
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 .004 .003 .011 .001 .001 .051 .008 .001 .001
 .037

TYPE-5
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 .003 .020 .047 .022 .051 .127 .139 .023 .945
 .163

BMJ(UP)=4.882E 00 BMJ(DOWN)=9.764E-01

MAJOR COMPONENT P= 7 H= 6 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=2.392E 00 (PH)-TS-Q(G.S.)=3.827E 00

DENSITY FUNCTION
 CSTORE(2)= 1.188E 00
 CSTORE(4)= 1.468E 00
 CSTORE(6)= 4.194E-02

CA#0-TDA K.K. MONOPOLY SHIFT

ISFIN(G.S.)= 0 ITRP=C IA=0 IZ=20 HW=10.50
IDU=0
J= 3. E= 7.466 N=18

TYPE=3		10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
		..029	..051	.027	.020	.397	.030	..053	..222	..073

TYPE=5		10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
		..006	..023	..013	..013	..009	.000	.862	..184	..038

BEJ(UP)=5.794E 01 BEJ(DOWN)=8.277E 00

MAJOR COMPONENT P= 7 H= 6 TYPE=5

SINGLE PARTICLE BEJ
P-T8-W=5.791E 01 (PH)=T8-0(G.S.)=6.619E 01DENSITY FUNCTION
CSTRE(4)= 1.902E-01
CSTRE(6)=8.188E-02

CA40-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 4 E= 7.151 N=12

TYPE=3	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	••007	•001	••003	••251	••011	••015

TYPE=5	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	•018	•015	•013	•961	•097	•047

BMJ(UP)=1.666E 03 BMJ(DOWN)=1.851E 02

MAJOR COMPONENT P= 7 H= 6 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=8.328E 02 (PH)-T0-0(G.S.)=7.403E 02

DENSITY FUNCTION
 CSTORE(4)= 3.308E-01
 CSTORE(6)= 1.138E-01

CA40-TDA K.K. MONSPELE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 5- E= 7.869 N= 6

TYPE-3
 9/ 4 7/ 6 7/ 4
 .018 -.081 -.031

TYPE-5
 9/ 4 7/ 6 7/ 4
 .007 .992 -.085

BEJ(UP)=7.157E 05 BEJ(DOWN)=6.507E 04

MAJOR COMPONENT P= 7 H= 6 TYPE=5

SINGLE PARTICLE BEJ
 P-T0-H=1.366E 05 (PW)-T0-C(G.S.)=9.937E 04

DENSITY FUNCTION
 CSTERE(6)= 1.617E-01

CA4C-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 1- E= 7.190 N=16

TYPE=3							
10/ 6	10/ 5	9/ 6	9/ 4	8/ 6	8/ 5	8/ 4	7/ 4
.526	.011	-.156	.015	.697	-.064	.382	-.234

TYPE=5							
10/ 6	10/ 5	9/ 6	9/ 4	8/ 6	8/ 5	8/ 4	7/ 4
.013	-.001	-.004	-.001	.084	-.006	.015	-.012

BEJ(UP)=1.806E-04 BEJ(DOWN)=6.022E-05

MAJOR COMPONENT P= 8 H= 6 TYPE=3

SINGLE PARTICLE BEJ
 P-T0-H=3.143E-02 (PH)=T0-Q(G.S.)=4.191E-02

DENSITY FUNCTION
 CSTORE(2)=-1.230E-02
 CSTORE(4)=-5.616E-02
 CSTORE(6)= 1.935E-02

CA80-TDA K.K. MONOPOLY SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 MW=10.50
 IPU=0
 J= 2 E= 7.847 N=20

TYPE=3
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 .079 .012 .015 .011 .006 .965 .025 .046 .076
 .029

TYPE=5
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 .015 .007 .003 .004 .002 .228 .005 .007 .007
 .002

BMJ(UP)=3.911E-03 BMJ(DOWN)=7.822E-04

MAJOR COMPONENT P= 8 M= 6 TYPE=3

SINGLE PARTICLE BMJ
 P-TS-M=1.009E-04 (PH)=T0-0(G.S.)=8.069E-05

DENSITY FUNCTION
 CST0RE(2)=3.523E-02
 CST0RE(4)= 7.813E-03
 CST0RE(6)= 8.639E-03

CAO-TDA K.K. MONCELE SHIFT

ISPIN(G.S.)= 0 ITRP=0 IA=0 IZ=20 HW=10.50
 IPU=0
 J= 3- E= 6.560 N=18

TYPE=3	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
	.097	.068	.071	.026	.653	.104	.595	.346	.087

TYPE=5	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
	.000	.006	.002	.003	.079	.002	.229	.051	.009

BEJ(UP)=1.099E 03 BEJ(DOWN)=1.570E 02

MAJOR COMPONENT P= 8 H= 6 TYPE=3

SINGLE PARTICLE BEJ
 P-T8-H=2.162E 02 (PH)-T8-C(G.S.)=1.236E 02

DENSITY FUNCTION
 CSTORE(4)= 9.911E-01
 CSTORE(6)= -3.927E-01

CA40-TDA K.K. MONOPOLY SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=40 IZ=20 HW=10.50
 IPU=0
 J= 1- E= 9.737 N=16

TYPE=3	10/ 6	10/ 5	9/ 6	9/ 4	8/ 6	8/ 5	8/ 4	7/ 4
	.138	.006	-.008	.003	-.224	-.003	.017	-.002

TYPE=5	10/ 6	10/ 5	9/ 6	9/ 4	8/ 6	8/ 5	8/ 4	7/ 4
	-.272	-.022	.021	-.014	.922	-.040	.045	-.038

BEJ(UP)=7.628E-03 BEJ(DOWN)=2.543E-03

MAJOR COMPONENT P= 8 H= 6 TYPE=5

SINGLE PARTICLE BEJ
 P-T8-H=3.143E-02 (PH)-T8-O(G.S.)=4.191E-02

DENSITY FUNCTION
 CSTORE(2)=-5.682E-02
 CSTORE(4)=-1.361E-01
 CSTORE(6)= 5.772E-02

CA40-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 0 ITRP=C IA=40 IZ=20 MW=10.50
 IPU=0
 J= 2. E= 9.327 N=20

TYPE=3
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 ..028 ..002 ..005 ..002 ..001 ..223 ..003 ..013 ..022
 ..009

TYPE=5
 10/ 6 10/ 4 9/ 6 9/ 5 9/ 4 8/ 6 8/ 5 8/ 4 7/ 6
 7/ 4
 ..072 ..038 ..005 ..020 ..016 ..960 ..049 ..031 ..121
 ..032

B=J(UP)=..851E-01 BMJ(DOWN)=9.702E-02

MAJOR COMPONENT P= 8 H= 6 TYPE=5

SINGLE PARTICLE BMJ
 P-T8-M=9.546E-02 (PH)=T8-Q(G.S.)=7.636E-02

DENSITY FUNCTION
 CSTORE(2)= 4.195E-01
 CSTORE(4)= 1.471E-01
 CSTORE(6)= 1.662E-01

CA*0-TDA K.K. MONSPLE SHIFT

ISPIN(G.S.)= 0 ITORP=0 IA=40 IZ=20 MW=10.50
 IPUC
 J= 3 E= 9.617 N=18

TYPE=3

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
.016	.021	-.008	-.006	-.130	-.021	-.016	.067	.032

TYPE=5

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
.000	.006	-.006	-.004	.913	-.029	.011	-.376	.005

BEJ(UP)=1.444E 02 BEJ(DOWN)=2.063E 01

MAJOR COMPONENT P= 8 M= 6 TYPE=5

SINGLE PARTICLE SEJ
 P-TS-M=2.162E 02 (PHI)=TS-O(G.S.)=1.236E 02

DENSITY FUNCTION
 CSTORE(4)= 4.897E-01
 CSTORE(6)= -1.714E-01

CANO-TDA K.K. MANSPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 3- E= 7.747 N=18

TYPE=3	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
021	021	0103	0071	0038	00513	0018	00327	0041	0143

TYPE=5	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
0002	0008	0008	0007	00138	0001	0001	0003	0003	0014

BEJ(UP)=3.291E 02 BEJ(DOWN)=4.701E 01

MAJOR COMPONENT P= 7 H= 5 TYPE=3

SINGLE PARTICLE BEJ
 P-TB-H=1.930E 02 (PH)-T0-01(G.S.)=2.206E 02

DENSITY FUNCTION
 CSTORE(4)=-2.595E-01
 CSTORE(6)=-3.674E-02

CA40-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 4 E= 9.079 N=12

TYPE=3	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	.004	-.011	-.039	-.054	.964	-.117

TYPE=5	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	.002	-.005	-.014	-.025	.225	-.041

BMJ(UP)=4.157E 01 BMJ(DOWN)=4.619E 00

MAJOR COMPONENT P= 7 H= 5 TYPE=3

SINGLE PARTICLE BMJ
 P-T0-H=1.338E 02 (PH)-T0-0(G.S.)=1.189E 02

DENSITY FUNCTION
 CSTORE(4)=-7.916E-03
 CSTORE(6)= 3.135E-02

CA40-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=C IA=40 IZ=20 HW=10.50
 IPU=0
 J= 3- E=10.898 N=18

TYPE-3	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
.000	.248	-.044	-.042	-.070	.007	-.111	-.300	.449	

TYPE-5	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
.002	-.060	-.002	-.015	.277	-.038	.148	.706	-.151	

3EJ(UPI)=1.721E 03 BEJ(DOWN)=2.459E 02

1AJ9R COMPONENT P= 7 H= 5 TYPE=5
 SINGLE PARTICLE BEJ
 T8-H=1.930E 02 (PH)-T8-Q(G.S.)=2.206E 02

DENSITY FUNCTION
 STORE(4)= 3.600E-01
 STORE(6)=2.959E-01

CA40-TDA K.K. MONOPSE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
 IPU=0
 J= 4 E=10.429 N=12

TYPE-3	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	-.001	.003	.008	.016	-.229	.016

TYPE-5	9/ 6	9/ 4	8/ 4	7/ 6	7/ 5	7/ 4
	.009	-.022	-.060	-.083	.947	-.198

BMJ(UP)=4.996E 04 BMJ(DOWN)=5.551E 03

MAJOR COMPONENT P= 7 H= 5 TYPE=5

SINGLE PARTICLE BMJ
 P-T0-H=3.829E 03 (PH)=T0-Q(G.S.)=3.404E 03

DENSITY FUNCTION
 CST9RE(4)= 2.420E 00
 CST9RE(6)=-1.564E 00

CA48-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 MW=10.25
 IPU=0
 J= 3 E= 3.141 N=16

TYPE=1
 7/ 6 7/ 5 7/ 4
 .412 .609 .274

TYPE=2
 11/ 7
 .385

TYPE=3
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 .249 .125 -.117 .235 -.251 -.147

TYPE=4
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 -.061 -.017 .011 -.006 -.014 -.007

BEJ(UP)=8.965E 03 BEJ(DOWN)=1.281E 03

MAJOR COMPONENT P= 7 H= 5 TYPE=1

SINGLE PARTICLE BEJ
 P-T0-H=4.150E 02 (PH)-T0-Q(G.S.)=4.743E 02

DENSITY FUNCTION
 CSTORE(4)= 8.301E-01
 CSTORE(6)=-6.597E-01
 CSTORE(8)= .000E 00

CA48-TDA K.K. MONOPHLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 MW=10.25
 IPU=0
 J= 4 E= 5.557 N=10

TYPE=1
 7/ 6 7/ 5 7/ 4
 --.269 .947 --.169

TYPE=2
 11/ 7
 .015

TYPE=3
 8/ 4 9/ 6 9/ 4
 --.019 --.003 --.008

TYPE=4
 8/ 4 9/ 6 9/ 4
 --.033 .002 --.020

BMJ(UP)=1.625E 04 BMJ(DOWN)=1.806E 03

MAJOR COMPONENT P= 7 H= 5 TYPE=1

SINGLE PARTICLE BMJ
 P-T0-H=2.899E 03 (PM)-T0-Q(G.S.)=2.577E 03

DENSITY FUNCTION
 CST0RE(4)= 1.299E 00
 CST0RE(6)= -8.593E-01
 CST0RE(8)= 1.150E-03

CA48-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPJ=0
 J= 2- E= 5.667 N=19

TYPE=1
 7/ 6 7/ 4
 .938 .303

TYPE=2
 11/ 7
 .092

TYPE=3	8/ 6	8/ 5	8/ 4	10/ 6	10/ 4	9/ 6	9/ 5	9/ 4
	..013	..041	..012	..005	..008	..050	..018	..004

TYPE=4	8/ 6	8/ 5	8/ 4	10/ 6	10/ 4	9/ 6	9/ 5	9/ 4
	..026	..107	..016	..001	..014	..024	..025	..042

BMJ(UP)=2.276E 00 BMJ(DOWN)=4.551E-01

MAJOR COMPONENT P= 7 H= 6 TYPE=1

SINGLE PARTICLE BMJ
 P-TB-H=1.550E 00 (PH)-TB-Q(G.S.)=2.481E 00

DENSITY FUNCTION
 CSTORE(2)= 6.328E-01
 CSTORE(4)=-7.508E-01
 CSTORE(6)=-2.284E-03
 CSTORE(8)=-4.142E-03

CA48-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 3- E= 4.787 N=16

TYPE=1
 7/ 6 7/ 5 7/ 4
 .824 -.564 .032

TYPE=2
 11/ 7
 .008

TYPE=3
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 -.037 -.012 .010 .015 .003 -.014

TYPE=4
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 .006 .005 -.005 -.001 -.015 -.009

BEJ(UP)=2.228E 01 BEJ(DOWN)=3.183E 00

MAJOR COMPONENT P= 7 H= 6 TYPE=1

SINGLE PARTICLE BEJ
 P-T0-H=1.245E 02 (PH)-T0-Q(G.S.)=1.423E 02

DENSITY FUNCTION
 CSTORE(4)=-3.997E-01
 CSTORE(6)= 1.125E-01
 CSTORE(8)= .000E 00

CA*8-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 4- E= 4.617 N=10

TYPE=1
 7/ 6 7/ 5 7/ 4
 .957 .282 .054

TYPE=2
 11/ 7
 .026

TYPE=3
 8/ 4 9/ 6 9/ 4
 .002 .022 -.006

TYPE=4
 8/ 4 9/ 6 9/ 4
 .004 .016 .010

BMJ(UP)=1.282E 02 BMJ(DOWN)=1.424E 01

MAJOR COMPONENT P= 7 H= 6 TYPE=1

SINGLE PARTICLE BMJ
 P-T9-H=5.106E 02 (PH)-T9-Q(G.S.)=4.539E 02

DENSITY FUNCTION
 CSTORE(4)= 4.443E-01
 CSTORE(6)=-5.958E-02
 CSTORE(8)= 1.994E-03

CA48-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 5 E= 4.157 N= 5

TYPE=1
 7/ 6 7/ 4
 .960 .102

TYPE=2
 11/ 7
 .208

TYPE=3
 9/ 4
 .157

TYPE=4
 9/ 4
 .001

BEJ(UP)=3.211E 06 BEJ(DOWN)=2.919E 05

MAJOR COMPONENT P= 7 H= 6 TYPE=1

SINGLE PARTICLE BEJ
 P-T9-H=3.083E 05 (PH)-T9-0(G.S.)=2.242E 05

DENSITY FUNCTION
 CSTORE(6)= 3.224E-01
 CSTORE(8)= .000E 00

CA48-TDA K.K. MONSPELE SHIFT

ISPIN(G.S.)= 4 ITORP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 5+ E= 4.659 N= 8

TYPE=2
 8/ 7 9/ 7
 .998 -.039

TYPE=3
 11/ 6 11/ 5 11/ 4
 -.014 .024 .015

TYPE=4
 11/ 6 11/ 5 11/ 4
 .018 -.032 -.020

BMJ(UP)=2.644E 05 BMJ(DOWN)=2.404E 04

MAJOR COMPONENT P= 8 H= 7 TYPE=2

SINGLE PARTICLE BMJ
 P-TB-H=3.965E 05 (PH)-TB-Q(G.S.)=1.442E 05

DENSITY FUNCTION
 CSTORE(5)= 9.744E-01
 CSTORE(7)=-3.633E-01

CA48-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 2+ E= 3.883 N= 4

TYPE=2
 8/ 7 9/ 7
 .994 .012

TYPE=3
 11/ 4
 -.109

TYPE=4
 11/ 4
 -.003

BEJ(UP)=1.828E 00 BEJ(DOWN)=3.656E-01

MAJOR COMPONENT P= 8 H= 7 TYPE=2

SINGLE PARTICLE BEJ
 P-TS-H= .000E 00 (PH)-TS-O(G.S.)= .000E 00

DENSITY FUNCTION
 CSTORE(5)= .000E 00
 CSTORE(7)=-1.615E-02

CA48-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 3+ E= 4.443 N= 7

TYPE=2
 8/ 7 10/ 7 9/ 7
 .983 -.179 -.026

TYPE=3
 11/ 6 11/ 4
 -.018 .003

TYPE=4
 11/ 6 11/ 4
 .019 -.011

BMJ(UP)=6.693E 02 BMJ(DOWN)=9.561E 01

MAJOR COMPONENT P= 8 H= 7 TYPE=2

SINGLE PARTICLE BMJ
 P-T0-H=7.117E 01 (PH)-T0-O(G.S.)=4.067E 01

DENSITY FUNCTION
 CSTORE(5)=-1.555E 00
 CSTORE(7)= 6.067E-01

CA48-TDA K.K. MENSEPLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=10.25
 IPU=0
 J= 4+ E= 4.059 N= 9

TYPE=2
 8/ 7 10/ 7 9/ 7
 .994 -.068 -.026

TYPE=3
 11/ 6 11/ 5 11/ 4
 -.037 -.055 -.036

TYPE=4
 11/ 6 11/ 5 11/ 4
 .002 -.003 -.006

BEJ(UP)=8.266E 02 BEJ(DOWN)=9.184E 01

MAJOR COMPONENT P= 8 H= 7 TYPE=2

SINGLE PARTICLE BEJ
 P-T0-M= .000E 00 (PH)-T0-Q(G.S.)= .000E 00

DENSITY FUNCTION
 CSTORE(5)=1.234E-02
 CSTORE(7)= 1.375E-02

CA48-TDA K.K. MONSPELE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 MW=10.25
 IPU=0
 J= 3= E= 7.394 N=16

TYPE-1
 7/ 6 7/ 5 7/ 4
 .161 .149 -.458

TYPE-2
 11/ 7
 -.429

TYPE-3
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 .617 .080 -.071 -.155 .064 .056

TYPE-4
 8/ 6 8/ 4 10/ 4 9/ 6 9/ 5 9/ 4
 -.366 -.007 .011 -.025 .002 -.002

BEJ(UP)=6.332E 01 BEJ(DOWN)=9.045E 00

MAJOR COMPONENT P= 8 H= 6 TYPE=3

SINGLE PARTICLE BEJ
 P-TS-H=2.324E 02 (PH)-T0-0(G.S.)=1.328E 02

DENSITY FUNCTION
 CSTORE(4)= 4.200E-01
 CSTORE(6)=-5.329E-02
 CSTORE(8)= .000E 00

SR88-TDA K.K. MONSPELE SHIFT

ISPIN(G.S.)= 6 ITRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 3 E= 1.863 N=28

TYPE=1
 11/ 7 11/ 8 11/ 9
 .307 .619 .195

TYPE=2
 12/10 13/10 16/11
 .265 .270 .308

TYPE=3
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 14/ 9 15/ 7
 15/ 8
 .125 .202 .111 .120 .164 .293 .068 .073 .056
 .167 .091

TYPE=4
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 14/ 9 15/ 7
 15/ 8
 .007 .016 .024 .007 .005 .026 .000 .008 .002
 .002 .009

BEJ(UP)=3.408E 04 BEJ(DOWN)=4.868E 03

MAJOR COMPONENT P=11 H= 8 TYPE=1

SINGLE PARTICLE BEJ
 P=10-H=1.471E 03 (PM)-10-0(G.S.)=2.102E 03

DENSITY FUNCTION
 CSTORE(4)=5.763E-01
 CSTORE(6)= 8.162E-01
 CSTORE(8)=2.637E-01
 CSTORE(10)= .000E 00

SR88-TDA K.K. MONOPOLY SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00

IPU=0

J= 2+ E= 2.259 N= 6

TYPE=1

10/ 8 10/ 9

•720 ••554

TYPE=2

12/11 13/11

••376 •078

TYPE=3

16/ 7

•165

TYPE=4

16/ 7

••026

BEJ(UP)=3.158E 02

BEJ(DOWN)=6.316E 01

MAJOR COMPONENT P=10 H= 8 TYPE=1

SINGLE PARTICLE BEJ

P=TB-H=6.843E 01 (PH)=TB-O(G.S.)=2.737E 01

DENSITY FUNCTION

CSTORE(3)= 1.933E 00

CSTORE(5)=•1.936E 00

CSTORE(7)= 4.650E-01

CSTORE(9)= 5.240E-03

SR88-TDA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 2+ E= 3.037 N= 6

TYPE-1
 10/ 8 10/ 9
 .669 .699

TYPE-2
 12/11 13/11
 .251 .028

TYPE-3
 16/ 7
 .013

TYPE-4
 16/ 7
 .018

BEJ(UP)=1.844E-01 BEJ(DOWN)=3.689E-02

MAJOR COMPONENT P=10 H= 9 TYPE=1

SINGLE PARTICLE BEJ
 P-TS-H=7.096E 01 (PH)-T0-Q(G.S.)=2.839E 01

DENSITY FUNCTION
 CSTORE(3)= 1.796E 00
 CSTORE(5)=9.453E-01
 CSTORE(7)= 9.079E-02
 CSTORE(9)= 1.363E-04

SR88-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITCRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 5= E= 3.263 N=16

TYPE=1
 11/ 7 11/ 8 11/ 9
 .147 .823 .397

TYPE=2
 16/11
 .184

TYPE=3
 12/ 7 12/ 9 13/ 7 13/ 8 13/ 9 15/ 7
 .059 .154 -.105 -.215 .134 -.066

TYPE=4
 12/ 7 12/ 9 13/ 7 13/ 8 13/ 9 15/ 7
 -.009 -.042 .004 .024 -.029 .004

BEJ(UP)=2.730E 07 BEJ(DOWN)=2.482E 06

MAJOR COMPONENT P=11 H= 8 TYPE=1

SINGLE PARTICLE BEJ
 P-T0-H=8.401E 05 (PH)-T0-Q(G.S.)=7.637E 05

DENSITY FUNCTION
 CSTORE(6)=-3.194E-01
 CSTORE(8)= 1.536E-01
 CSTORE(10)= .000E 00

SR88-TDA K.K. M5N9P0LE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=86 IZ=38 MW= 9.00
 IPU=0
 C= 1+ E= 3.391 N= 2

TYPE=1
 10/ 8
 .999

TYPE=2
 13/11
 .044

BMJ(UP)=7.102E-02 BMJ(DOWN)=2.367E-02

MAJOR COMPONENT P=10 H= 8 TYPE=1

SINGLE PARTICLE BMJ
 P-J0-H=3.700E-02 (PH)-T0-C(G.S.)=2.467E-02

DENSITY FUNCTION
 CST0RE(3)= 1.669E 00
 CST0RE(5)=-1.335E 00
 CST0RE(7)= 2.671E-01
 CST0RE(9)=-3.285E-04

SR88-TCA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 12=38 HW= 9.00
 IPU=0
 J= 3+ E= 3.559 N= 9

TYPE=1
 10/ 7 10/ 9
 --C01 1.000

TYPE=2
 12/11 13/11 15/11
 .011 .006 --.005

TYPE=3
 16/ 7 16/ 9
 --C10 --.002

TYPE=4
 16/ 7 16/ 9
 --008 .001

BMJ(UP)=2.818E-01 BMJ(DOWN)=4.025E-02

MAJOR COMPONENT P=10 H= 9 TYPE=1

SINGLE PARTICLE BMJ
 P-TS-H=4.931E-01 (PH)-TS-O(G.S.)=1.409E-01

DENSITY FUNCTION
 CSTORE(5)=-5.062E-02
 CSTORE(7)= 1.999E-02
 CSTORE(9)=-7.344E-04

SR88-TDA K.K, MONOPELE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 7- E= 3.843 N= 5

TYPE=1
 11/ 7 11/ 9
 .090 .973

TYPE=2
 16/11
 .140

TYPE=3
 13/ 7
 .160

TYPE=4
 13/ 7
 .016

BEJ(UP)=3.174E 10 BEJ(DOWN)=2.116E 09

MAJOR COMPONENT P=11 H= 9 TYPE=1

SINGLE PARTICLE BEJ
 P-TB-H=2.501E 09 (PH)-TB-Q(G.S.)=1.667E 09

DENSITY FUNCTION
 CSTORE(8)=-8.829E-02
 CSTORE(10)= .000E 00

SR88-TDA K.K, MENSPELE SHIFT

ISPIN(G.S.)= 6 ITRD=0 IA=88 IZ=38 HW= 9.00
IPU=0
J= 4 E= 3.905 N=23

TYPE=1
11/ 7 11/ 8 11/ 9
0032 0939 0339

TYPE=2
13/10 16/11
0002 0034

TYPE=3
12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 15/ 7 15/ 9
0005 0009 0006 0011 0009 0025 0004 0005

TYPE=4
12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 15/ 7 15/ 9
0012 0007 0002 0002 0001 0010 0004 0005

BMJ(UP)=2.277E 04 BMJ(DOWN)=2.530E 03

MAJOR COMPONENT P=11 H= 8 TYPE=1

SINGLE PARTICLE BMJ
P-T9-H=5.473E 03 (PW)=T9-Q(G.S.)=6.081E 03

DENSITY FUNCTION
CSTORE(4)= 7.307E-02
CSTORE(6)= 5.874E-01
CSTORE(8)= 2.134E-01
CSTORE(10)= 5.679E-04

SR88-TDA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 6 E= 3.982 N=10

TYPE=1
 11/ 7 11/ 8 11/ 9
 .034 .719 .693

TYPE=2
 16/11
 .020

TYPE=3
 12/ 7 13/ 7 13/ 9
 .009 .009 .013

TYPE=4
 12/ 7 13/ 7 13/ 9
 .015 .001 .011

BMJ(UP)=7.253E 07 BMJ(DOWN)=5.579E 06

MAJOR COMPONENT P=11 H= 8 TYPE=1

SINGLE PARTICLE BMJ
 P-T8-H=3.005E 07 (PH)-T8-Q(G.S.)=2.312E 07

DENSITY FUNCTION
 CST8RE(6)=-8.905E-01
 CST8RE(8)= 2.973E-01
 CST8RE(10)=-4.859E-04

SR88-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 5= E= 4.003 N=16

TYPE-1
 11/ 7 11/ 8 11/ 9
 .114 -.508 .833

TYPE-2
 16/11
 .100

TYPE-3
 12/ 7 12/ 9 13/ 7 13/ 8 13/ 9 15/ 7
 .022 .055 -.065 -.101 .082 -.023

TYPE-4
 12/ 7 12/ 9 13/ 7 13/ 8 13/ 9 15/ 7
 .000 -.014 -.004 -.003 -.018 -.003

BEJ(UP)=2.613E 06 BEJ(DOWN)=2.376E 05

MAJOR COMPONENT P=11 H= 9 TYPE=1

SINGLE PARTICLE BEJ
 P-T8-H=5.850E 05 (PH)-T8-0(G.S.)=5.319E 05

DENSITY FUNCTION
 CSTSRE(6)= 6.390E-02
 CSTSRE(8)= 2.250E-02
 CSTSRE(10)= .000E 00

SR88-TDA K.K. MONOP9LE SHIFT

ISPIN(G.S.)= 6 ITDRP-C IA=88 IZ=38 W= 9.00
 IPU=0
 J= 3- E= 4.047 N=28

TYPE-1
 11/ 7 11/ 8 11/ 9
 .189 -.597 .694

TYPE-2
 12/10 13/10 16/11
 .284 -.004 .067

TYPE-3
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 14/ 9 15/ 7
 15/ 8
 .005 .138 .003 -.040 -.012 .103 -.001 .000 -.002
 -.094 .003

TYPE-4
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 14/ 9 15/ 7
 15/ 8
 .009 -.001 .016 -.002 -.008 .001 .004 .014 .001
 -.001 .008

BEJ(UP)=8.764E 00 BEJ(DOWN)=1.252E 00

MAJOR COMPONENT P=11 M= 9 TYPE=1

SINGLE PARTICLE BEJ
 P-T8-M=1.927E 02 (PM)=TS-O(G.S.)=2.753E 02

DENSITY FUNCTION
 CSTORE(4)=3.403E-01
 CSTORE(6)= 3.795E-03
 CSTORE(8)= 1.084E-02
 CSTORE(10)= .000E 00

SR88-TDA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 MW= 9.00

IPU=0
J= 4+ E= 4.067 N=11

TYPE-1

IC/ 7

••342

TYPE-2

12/11

13/11

14/11

15/11

••908

••137

•C91

••058

TYPE-3

16/ 7

16/ 8

16/ 9

••C80

••138

••056

TYPE-4

16/ 7

16/ 8

16/ 9

••004

••003

•003

BEJ(UP)=8.315E 04

BEJ(DOWN)=9.239E 03

MAJOR COMPONENT P=12 H=11 TYPE=2

SINGLE PARTICLE BEJ

P-TB-H= .000E 00 (PH)-TB-Q(G.S.)= .000E 00

DENSITY FUNCTION

CSTBRE(5)=•2.069E-01

CSTBRE(7)= 6.545E-02

CSTBRE(9)= 9.404E-03

SR88-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 MW= 9.00

IPU=0
J= 6- E= 4.222 N=10

TYPE-1
11/ 7 11/ 8 11/ 9
•135 ••684 •716

TYPE-2
16/11
••003

TYPE-3
12/ 7 13/ 7 13/ 9
•016 •000 •012

TYPE-4
12/ 7 13/ 7 13/ 9
•024 •015 •007

BMJ(UP)=1.567E 08 BMJ(DOWN)=1.205E 07

MAJOR COMPONENT P=11 H= 9 TYPE=1

SINGLE PARTICLE BMJ
P-T8-H=1.849E 06 (PH)-T8-Q(G.S.)=1.423E 06

DENSITY FUNCTION
CSTORE(6)= 8.200E-01
CSTORE(8)= -3.570E-01
CSTORE(10)= 7.288E-05

SR88-TDA K.K, MENSPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HW= 9.00
 IPU=0
 J= 6+ E= 4.316 N=10

TYPE=2				
	12/11	13/11	15/11	16/10
	.995	-.065	-.033	-.034

TYPE=3			
	16/ 7	16/ 8	16/ 9
	-.023	-.032	-.033

TYPE=4			
	16/ 7	16/ 8	16/ 9
	-.007	-.008	-.002

BEJ(UP)=2.384E 06 BEJ(DOWN)=1.834E 05

MAJOR COMPONENT P=12 H=11 TYPE=2

SINGLE PARTICLE BEJ
 P-TS-H= .000E 00 (PH)=TS-O(G.S.)= .000E 00

DENSITY FUNCTION
 CSTORE(7)= 2.754E-03
 CSTORE(9)=2.131E-03

SR88-TDA K.K. MONSPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=0 IA=88 IZ=38 HK= 9.00
 IPU=0
 J= 4 E= 4.337 N=23

TYPE-1
 11/ 7 11/ 8 11/ 9
 .148 .331 .929

TYPE-2
 13/10 16/11
 .000 .020

TYPE-3
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 15/ 7 15/ 9
 .008 .032 .008 .001 .005 .027 .003 .004 .002

TYPE-4
 12/ 7 12/ 8 12/ 9 13/ 7 13/ 8 13/ 9 14/ 7 15/ 7 15/ 9
 .012 .046 .010 .021 .017 .003 .003 .005 .002

BMJ(UP)=2.006E 04 BMJ(DOWN)=2.229E 03

MAJOR COMPONENT P=11 H= 9 TYPE=1

SINGLE PARTICLE BMJ
 P-T0-H=1.897E 03 (PH)-T0-O(G.S.)=2.107E 03

DENSITY FUNCTION
 CSTORE(4)=3.819E-01
 CSTORE(6)= 5.855E-02
 CSTORE(8)= 9.640E-02
 CSTORE(10)= 3.341E-04

SR38-TDA K.K, MONSPOLE SHIFT

ISPIN(G.S.)= 6 ITDRP=C IA=88 IZ=38 MW= 9.00

IPU=C

J= 2+ E= 4.547 A= 6

TYPE=1

10/ 8 10/ 9

.120 -.437

TYPE=2

12/11 13/11

.881 .125

TYPE=3

16/ 7

-.044

TYPE=4

16/ 7

-.033

BEJ(UP)=2.659E 01

BEJ(DOWN)=5.318E 00

MAJOR COMPONENT P=12 H=11 TYPE=2

SINGLE PARTICLE BEJ

P-TG-H= .000E 00 (PH)=TG-Q(G.S.)= .000E 00

DENSITY FUNCTION

CSTORE(3)= 3.221E-01

CSTORE(5)= -5.648E-01

CSTORE(7)= 1.744E-01

CSTORE(9)= -2.772E-03

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 03178 1101