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±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-Kolltveit 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(El)'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 $T_<$ 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

LIST OF TABLES

LIST OF FIGURES

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 $Ca^{40}(He^3,t)Sc^{40}$ (Sc71a). There also exists new data on Sr^{88} through the two particle transfer reaction $Sr^{86}(t,p)Sr^{88}$ (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 operatior 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≠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 componant 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 $|ph^{-1},J>$. The diagonal term

$$<ph^{-1},J|H|ph^{-1},J> = \varepsilon_p-\varepsilon_h+V_c+V^J_{ph}$$

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^J_{ph} is the diagonal particle-hole matrix element.

The centroid of a given p-h multiplet is not at $\varepsilon_p-\varepsilon_n+V_c$ but is shifted away from this value by the average value of V^J_{ph} for a given p-h multiplet.

$$\text{i.e.} \quad \alpha^0_{ph} = \sum_J (2J+1)V^J_{ph} / \sum_J (2J+1)$$

$$= \frac{1}{(2p+1)(2h+1)} \sum_J (2J+1)<ph,J|V|ph,J>$$

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

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

of the interaction. The centroid for a given p-h multiplet is therefore located at $\varepsilon_p-\varepsilon_h+V_c+\alpha^o_{ph}$

An explanation for the presence of α^o_{ph} 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

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

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

$$\varepsilon_A = \varepsilon_O + \frac{4}{A} \varepsilon_1 \langle A | \vec{t}_p \cdot \vec{T}_{A-1} | A \rangle$$

and

$$\varepsilon_{A+1} \tilde{} \varepsilon_O + \frac{4}{A} \varepsilon_1 \langle A+1 | \vec{t}_p \cdot \vec{T}_A | A \rangle$$

The corrections to the diagonal elements become $\varepsilon_A - \varepsilon_{A+1} - \alpha^O_{ph}$. The values of $\varepsilon_A - \varepsilon_{A+1}$ are for the various occuring cases, (Appendix B.2), are in the tables 2.1 and 2.2

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

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

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

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

For N≠Z and where the T of the state equals T_0+1

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

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

$$E_s = \varepsilon_n + \Delta - \varepsilon_p = \frac{4T_0}{A}\,\varepsilon_1 = \frac{1}{3}\varepsilon_1$$

where Δ is the coulomb difference between Ca^{49} and Sc^{49}. The value of $\varepsilon_1 \sim 20$ 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-multihole 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 then 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 then the T=0 levels from the K-K interaction but also the

T=0, T=1 separation is less with a Sussex interaction then 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^0_{ph} 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(El)=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(El)'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

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

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

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

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

The single particle energies are then

TABLE 3.1.--O^{16} Single Particle Energies.

	$^{O}s_{1/2}$	$^{O}p_{3/2}$	$^{O}p_{1/2}$	$^{O}d_{5/2}$	$^{O}s_{1/2}$	$^{O}d_{3/2}$
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 O^{16} calculation the reader is refered to Appendix D.1, and Appendix E.1.

3.2 Discussion of States in O^{16}

A 1^-, T=0 state is seen at 7.12 MeV with reported B(El)'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 $^{15}N(^{3}He,d)^{16}O$ for this level which indicates a fair amount of 1p-1h structure. From the $^{15}N(d,n)^{16}O$

reaction an $\ell=0$ transfer was seen (Fu67, Mu70), this would indicate that a large component of the 1^-, T=0 state is $1s_{1/2}{}^{-0}p_{1/2}^{-1}$. 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(El)'s for the various cases calculated are all approximately $2\times10^{-4}\ e^2f^2$ (Appendix D.1).

Theoretically the only contribution to a B(El) 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, $1s_{1/2}{}^{-0}p_{1/2}^{-1}$ 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.--O^{16}. $1^{st}, 1^-, T=0$ vector components.

$0d_{5/2}\text{-}0p_{3/2}^{-1}$	$1s_{1/2}\text{-}0p_{3/2}^{-1}$	$0d_{3/2}\text{-}0p_{1/2}^{-1}$
-.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 $1s_{1/2}\text{-}0p_{1/2}^{-1}$ 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 $B(E1) = 3.5\times10^{-4}e^2f^2$, with the shift $B(E1) = 1.1\times10^{-4}e^2f^2$. 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 $N^{15}(d,n)O^{16}$ reaction and is probably a multiparticle-multihole 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 $1s_{1/2}\text{-}0p_{3/2}^{-1}$ which is consistant with the 'ℓ' transfer. The monopole shift increases the B(El) from $1.7\text{x}10^{-4}e^2f^2$ to $4.5\text{x}10^{-3}e^2f^2$, the experimental values (Aj71) cited are $3.5\text{x}10^{-3}e^2f^2$ and $6.5\text{x}10^{-3}e^2f^2$ so the monopole shift again seems to improve the transition rate. The increase in the transition rate arises from the change in the $1s_{1/2}\text{-}0p_{1/2}^{-1}$, 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(El) 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 $N^{15}(He^3,d)O^{16}$ reaction (Bo69) indicate that these levels have a large 1p-1h component. The 'ℓ' transfer and spectroscopic factor for the 2^- state are ℓ=2, S=.87 while for the 0^- state they are ℓ=0, S=1.77. The major component would seem to be for the 2^-, $0d_{5/2}\text{-}0p_{1/2}^{-1}$ since it is lower in energy then the $0d_{3/2}\text{-}p_{1/2}^{-1}$ and for the 0^- it would be the $1s_{1/2}\text{-}0p_{1/2}^{-1}$. 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 $0d_{5/2}\text{-}0p_{1/2}^{-1}$. 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,

$4.2\text{x}10^{-2}e^2f^4$ and also too large with the shift, $2.2\text{x}10^{-2}e^2f^4$. 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 $0d_{5/2}\text{-}0p^{-1}_{1/2}$, T=1 amplitude of the state from .144 to .041. This mixture arises from the lst 2^-, T=1 level near 13 MeV. When the T=1 component is completely eliminated the $B(M2)=1.4\text{x}10^{-2}e^2f^4$.

Most of the contribution to the B(M2) is from the T=1 componant as it is in general for a B(MJ). For T=0 states the magnetic moment contribution to the transition matrix element is $u_p+u_u = .88$ 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

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

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 $(1s_{1/2}\text{-}0p^{-1}_{1/2})^{00}$. 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 $(1s_{1/2}\text{-}0p_{1/2})^{00}$ 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.

$$0^-,1^- \quad : \quad 1s_{1/2}\text{-}0p^{-1}_{1/2}$$

$$2^-,3^- \quad : \quad 0d_{5/2}\text{-}0p^{-1}_{1/2}$$

There is virtually no I-spin mixing in any of the T=1 states except for the 0^- which has a significant $1s_{1/2}\text{-}0p^{-1}_{1/2}$, 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 $1s_{1/2}\text{-}0p^{-1}_{3/2}$ 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(El) for the 1^-, T=1 has been measured (Aj71) as both $.021e^2f^2$ and $.013e^2f^2$. The calculated value of the B(El) from the K-K interaction is $.032e^2f^2$ without the shift and with the shift $B(El)=.027e^2f^2$ so the T=0 admixture is necessary to decrease the B(El) 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 $B(El)=.032e^2f^2$. The single configuration has a $B(El)=.083e^2f^2$ 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 .36 e^2f^4 to .38 e^2f^4: this is reduced from the single particle value of 1.26 e^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 $B(M2)=.30\ e^3f^4$ which is slightly less then 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 interferring $0d_{5/2}$-$0p_{1/2}^{-1}$, 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(El) for the 17.20 MeV 1^-, T=1 level is $.012^2\ e^2f^2$. The calculated value from the KK-TDA with monopole shift is $.023\ e^2f^2$. The major component of the vector is $0d_{3/2}\text{-}0p^{-1}_{1/2}$ (amp. 90) which by itself would give a B(El)=.41 e^2f^2, i.e. 20 times larger. The B(El) 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^2f^4. The B(M2)=.054 e^2f^4 for the KK-TDA with the monopole shift is approximately twice the single configuration value of .02 e^2f^4. The T=0 part of the B(M2) is adding coherently, since for a pure T=1 vector the B(M2) = .048 e^2f^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^2f^4 for the state compared with the single configuration B(M2) = .61 e^2f^4.

The two major components $0d_{5/2}\text{-}0p_{3/2}^{-1}$ (.662) and $1s_{1/2}\text{-}0p_{3/2}^{-1}$ (-.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^2f^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^2f^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^2f^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^2f^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(El) = 5.2×10^{-3} e^2f^2. The shift in this case brings the energy down from 20.21 MeV to 19.55 MeV but also decreases the B(El) from 1.5×10^{-2} e^2f^2 to 8.3×10^{-3} e^2f^2, so the B(El) 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(El) = 1.12 e^2f^2, which is probably the giant dipole state, and a state at 25.46 MeV, B(El) = .31 e^2f^2 whose transition strength is about 1/3 the giant dipole strength. The 22.26 MeV does not have a B(El) 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^2f^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^2f^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^2f^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^2f^6. The state vector for the bare K-K interaction without the shift is mainly $0d_{5/2}\text{-}0p^{-1}_{1/2}$, T=0 (amp. = .92) but contains other significant T=0 components, $0d_{5/2}\text{-}0p^{-1}_{3/2}$ (amp. = .30) and $0d_{3/2}\text{-}0p^{-1}_{3/2}$ (amp. = -.26). The largest T=1 component is the $0d_{5/2}\text{-}0p^{-1}_{1/2}$ (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 $0d_{5/2}\text{-}0p^{-1}_{1/2}$, 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^2f^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^2f^6 and is accompanied by a slightly larger admixture of the T=1 component of the vector, $0d_{5/2}\text{-}0p_{1/2}^{-1}$ (.036). The relative strengths of the weaker T=0 components have switched as compared to the K-K interaction, $0d_{5/2}\text{-}0p_{3/2}^{-1}$ (amp. = .26) and $0d_{3/2}\text{-}0p_{3/2}^{-1}$ (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^2f^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^2f^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^2f^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^2f^6 for the K-K and 180 e^2f^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^{0}_{ph}, 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^2f^6. Aside from charging 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} (Bl69).

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 O^{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 O^{15}, O^{17} also came out quite well.

In summary the present calculation with "realistic" interactions and a monopole shift gives results for the O^{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 E(maj. comp.) BJ	KK-MS E(maj. comp.) BJ	Remarks
3^-,0 6.13	188	8.46(4/3,3) 71	5.08 (4/3,3) 69.7	
1^-,0 7.12	1.24×10^{-4} 1.64×10^{-4}	10.62 (5/3,3) 3.49×10^{-4}	7.41 (5/3,3) 1.12×10^{-4}	
2^-,0 8.87	.0054	12.25 (4/3,3) .042	8.87 (4/3,3) .022	
1^-,0 9.60	2.38×10^{-5} 1.94×10^{-5}			Probably multiparticle-multihole state
3^-,0 11.44				
3^-,0 11.63				
1^-,0 12.44	.0064 .0035	16.77 (5/2,3) .00016	13.60 (5/3,3) .0045	
2^-,0 12.53	.084	16.73 (6/3,3) .086	13.87 (6/3,3) .091	
3^-,0 13.13		16.37 (4/2,3) 17	13.26 (4/2,3) 20	

TABLE 3.5.--Continued.

Exp	BJ(Exp)	KK E(maj. com.) BJ		KK-MS E(maj. comp.) BJ		Remarks
13 MeV compl.						
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)	
17 MeV comp.						Levels from e,e'
1^-,1 17.20	.012	18.18 .010	(6/3,5)	17.16 .023	(6/3,5)	unresolved doublet one componant 1^-
(2^-),1 17.60	.051	17.99 .028	(6/3,5)	17.03 .054	(6/3,5)	
18 MeV Comp.						Levels from e,e'
3^-,1		18.83 26	(4/2,5)	17.89 25	(4/2,5)	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 E(maj. comp.) BJ		KK-MS E(maj. comp.) BJ		Remarks
4^-		19.71 809	(4/2,5)	18.73 830	(4/2,5)	not seen
20 MeV comp.						
1^-,1 19.50	.0052	20.21 .015	(5/2,5)	19.55 .008	(5/2,5)	
2^-,1 20.32	1.04	20.94 2.26	(4/2,5)	20.13 2.24	(4/2,5)	giant magnetic quadrupole
22-26 MeV comp.						
1^-,1 22.8		23.54 1.11	(4/2,5)	22.62 1.12	(4/2,5)	giant dipole
(2^-,1) 23.7		24.06 .68	(6/2,5)	23.14 .71	(6/2,5)	
3^-,1		25.11 45	(6/2,5)	24.19 45	(6/2,5)	not seen
1^-,1 25.5		26.37 .30	(6/2,5)	25.46 .31	(6/2,5)	
0^-,1		27.16	(6/2,5)	26.25	(6/2,5)	not seen

TABLE 3.6.--O^{16} 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

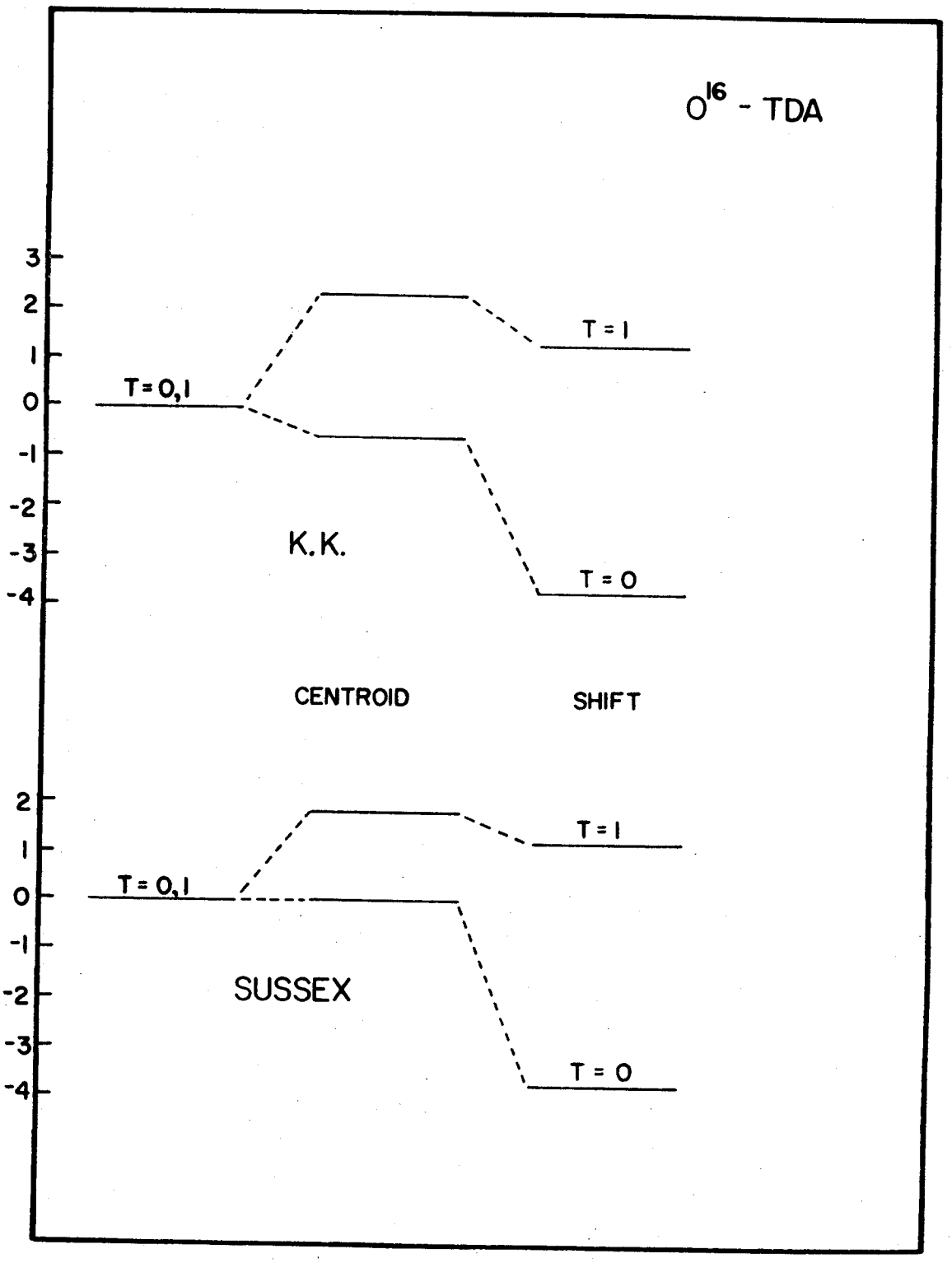


FIGURE 1.--O^{16} Monopole Shifts.

FIGURE 2.--O^{16} K-K Energy Levels.

A = exp.

B = KK-TDA

C = KK-MSTDA

D = KK-RPA

E = KK-RPA Shift

F = KK-RPA Shift 65%

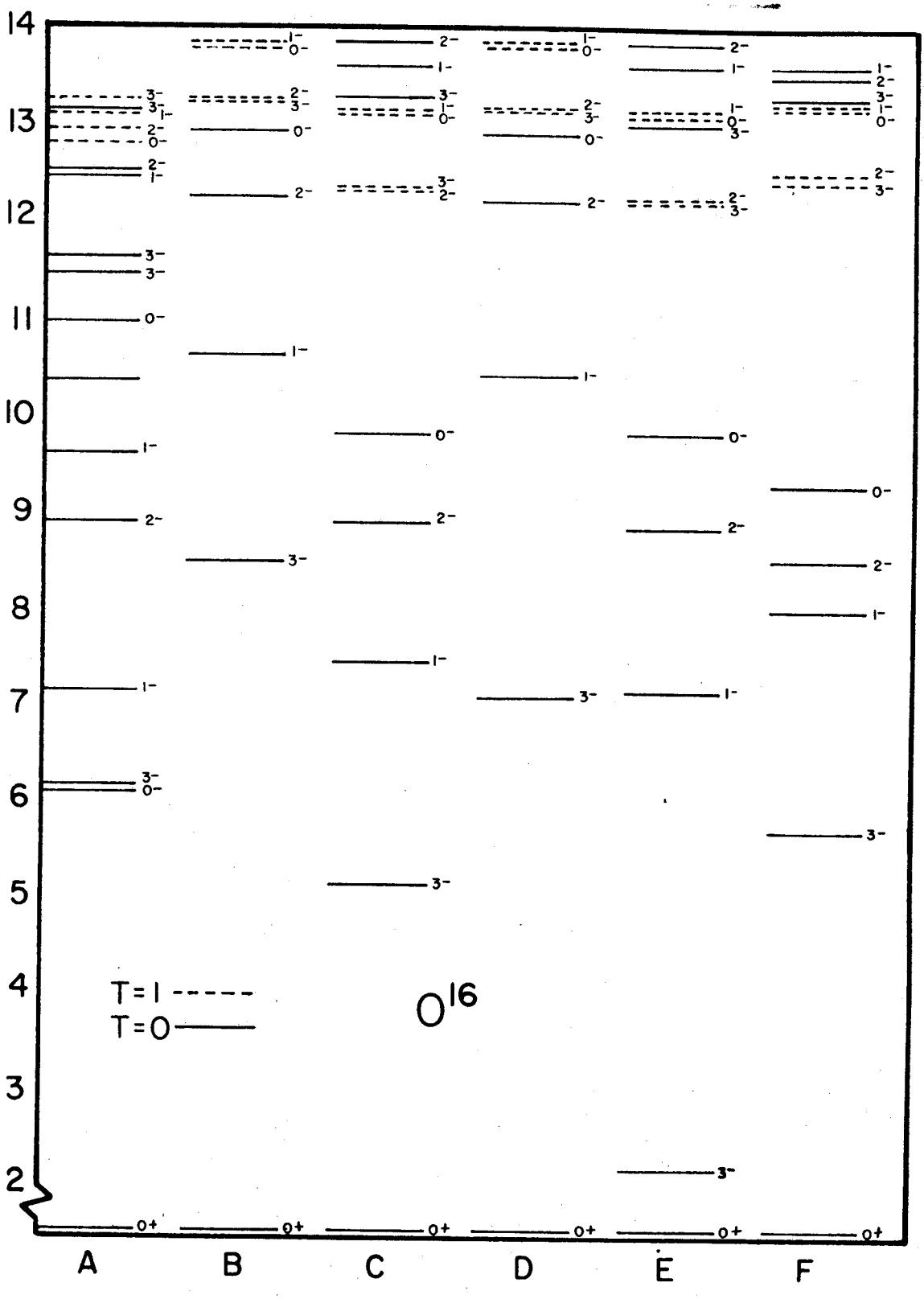

14
13
12
11
10
9
8
7
6
5
4
3
2
A
B
C
D
E
F
T=1
T=0
O16
0+
1-
2-
3-

FIGURE 3.--O^{16} Sussex Energy Levels.

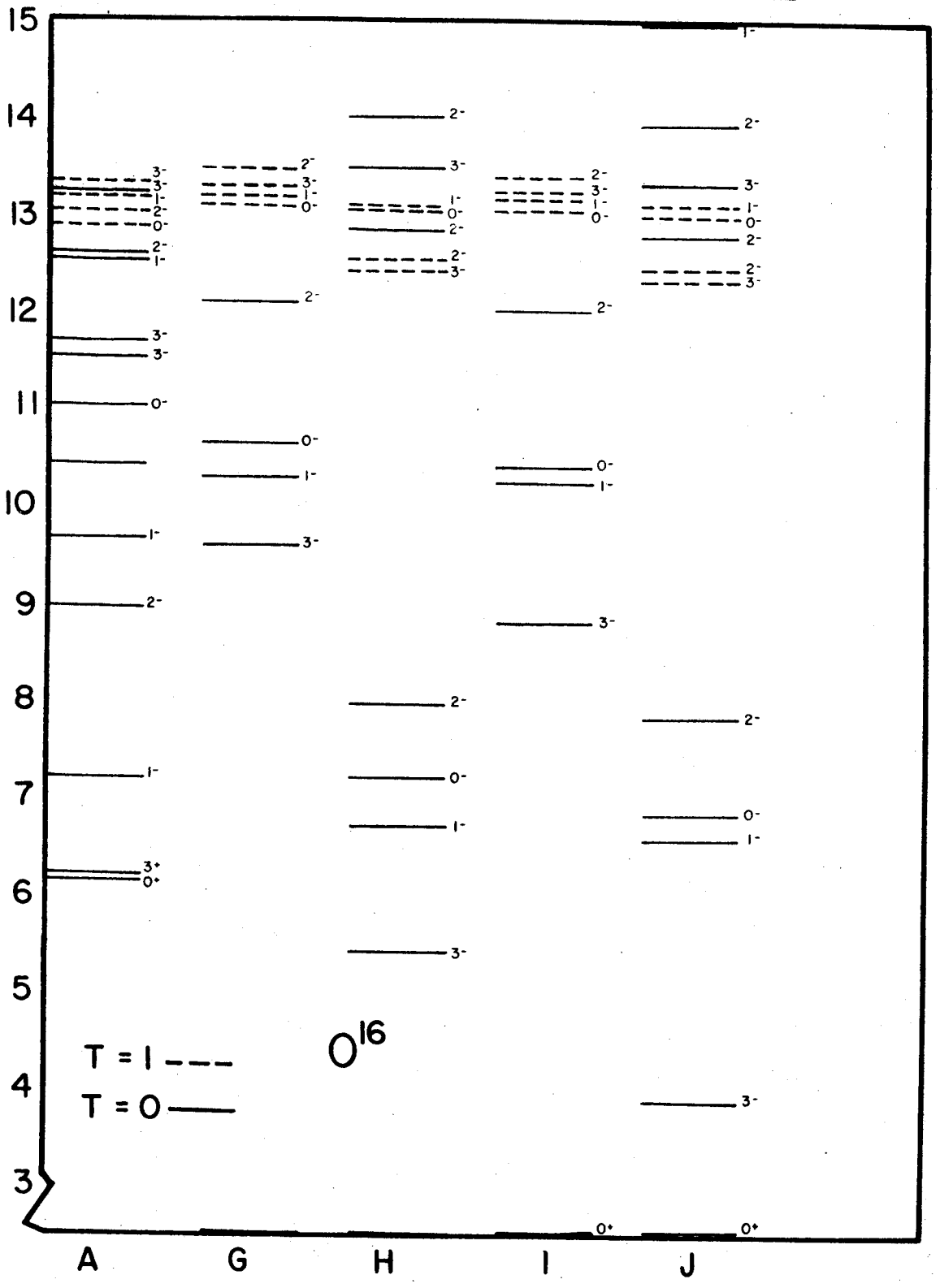
A = exp.

G = Sussex-TDA

H = Sussex-Shift TDA

I = Sussex RPA

J = Sussex MS - RPA


15
14
13
12
11
10
9
8
7
6
5
4
3
A
G
H
I
J
T = 1
T = 0
O16

CHAPTER IV

Ca^{40}

4.1. Ca^{40} General Discussion

A number of studies have been made of Ca^{40}. Gillet and Sanderson (Ge67) calculated the odd parity spectrum of Ca^{40} within the framework of a 1p-1h 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 O^{16}, Ca^{48}, Sr^{88} and Pb^{208}. 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 $K^{39}(He^3,d)Ca^{40}$ reaction. In this reaction Erskine identified the major components of the configurations $(0f_{7/2}\text{-}0d_{3/2}^{-1})_{T=0}$, $(0f_{7/2}\text{-}0d_{3/2}^{-1})_{T=1}$ and $(1p_{3/2}\text{-}0d_{3/2}^{-1})_{T=0}$ through a DWBA analysis of the 'ℓ' transfer. T. Kuo (Ku71) recently did a $Ca^{40}(p,p')Ca^{40}$ 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 $Ca^{40}(He^3,t)Sc^{40}$ to excite the T=1 states of Sc^{40}. This experiment does not seem to have been done.

The T=1 states from the $(0f_{7/2}\text{-}0d_{3/2}^{-1})$ 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 $Sc^{40}\text{-}Ca^{40}$ and $K^{40}\text{-}Ca^{40}$ 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

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

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 1p-1h 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

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

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

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 1p-1h configurations are $(0f_{7/2}\text{-}0d^{-1}_{3/2})$, $(1p_{3/2}\text{-}0d^{-1}_{3/2})$, $(0f_{7/2}\text{-}1s^{-1}_{1/2})$, 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 1p-1h 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 $1/2(\varepsilon_p^p-\varepsilon_h^p+\varepsilon_p^n-\varepsilon_n^n)$ and the proton particle hole gap was reduced by .3 MeV to simulate the Coulomb shift of the single excited proton.

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

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

TABLE 4.1.--Ca^{40} 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 $(0f_{7/2}\text{-}0d^{-1}_{3/2})_{T=0}$ 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 then 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 componant was $0f_{7/2}\text{-}0d^{-1}_{3/2}$. 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 $B(E5)=2.43\times10^5\ e^2f^{10}$, the K-K interaction without the shift has $B(E5)=1.75\times10^5\ e^2f^{10}$ while with the monopole shift $B(E5)=1.69\times10^5\ e^2f^{10}$, 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 $92\ e^2f^8$ and $35\ e^2f^8$ 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 $B(E5)=2.12\times10^5\ e^2f^{10}$ which is a slight improvement over the TDA results while $B(E4)=31e^2f^8$.

The 3^-, T=0 state of the $(0f_{7/2}\text{-}0d^{-1}_{3/2})$ multiplet is quite collective, its largest component, as expected is $(0f_{7/2}\text{-}0d^{-1}_{3/2})$ but it represents less than 40% of the vector, the $(0f_{7/2}\text{-}1s^{-1}_{1/2})$ configuration contains about 18% while the $(1p_{3/2}\text{-}0d^{-1}_{3/2})$ and the $(0f_{7/2}\text{-}0d^{-1}_{5/2})$ 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 $B(E3)=869\ e^2f^6$

for the KK-TDA no shift, this is an order of magnitude higher than the single configuration value of 66 e^2f^6 and is a factor of 3 smaller than the experimental value of 2410 e^2f^6. The KK-RPA without the monopole shift gives a B(E3)=3 190 e^2f^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^2f^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 $0f_{7/2}$-$0d^{-1}_{3/2}$ 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 consistant 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 $(0f_{7/2}\text{-}0d^{-1}_{3/2})$, T=1 levels were also identified by Erskine through ℓ=3 transfers in the $K^{39}(He^3,d)Ca^{40}$ 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 $(0f_{7/2}\text{-}0d^{-1}_{7/2})$ 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 $(0f_{7/2}\text{-}0d_{3/2}^{-1})$ 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. $(1p_{3/2}\text{-}0d_{3/2}^{-1})_{T=0}$ and $(0f_{7/2}\text{-}1s_{1/2})_{T=0}$ Multiplets

Erskine also observed a number of ℓ=1 transfers along with the ℓ=3 transfers. The lowest 1p-1h configuration which would exhibit an ℓ=1 transfer in the $K^{39}(He^3,d)Ca^{40}$ reaction is the $(1p_{3/2}\text{-}0d_{3/2}^{-1})$. The allowed values of J for this multiplet are $J=0^-,1^-,2^-,3^-$. The $(1p_{3/2}\text{-}0d_{3/2}^{-1})$ is almost degenerate with the $(0f_{7/2}\text{-}1s_{1/2}^{-1})$ 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 $(1p_{3/2}\text{-}0d_{3/2}^{-1})$ 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 componant the $(1p_{3/2}\text{-}0d_{3/2}^{-1})$. 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 $(1p_{3/2}\text{-}0d_{3/2}^{-1})$ multiplet mixes quite strongly with the 3^- state from the $(0f_{7/2}\text{-}1s_{1/2}^{-1})$ multiplet as expected. The K-K interaction with the monopole shift predicts two 3^-, T=0 states with major components,

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

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

the 3^-_3 state has a significant T=1 component from $(0f_{7/2}\text{-}0d_{3/2}^{-1})$, Gerace and Green calculate that the 3^-_2 state is about 50% deformed with major shell model configurations of $(1p_{3/2}\text{-}0d_{3/2}^{-1})$ and $(0f_{7/2}\text{-}1s_{1/2}^{-1})$ while the 3^-_3 is pure shell model with major configuration of $(0f_{7/2}\text{-}1s_{1/2}^{-1})$. Experimentally there are two 3^-, T=0 states near 3^-_2, at 6.28 MeV and 6.58 MeV. Erskine found a ℓ=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 $(1p_{3/2}\text{-}0d^{-1}_{3/2})$ multiplet on the basis of an ℓ=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 $(1p_{3/2}\text{-}0d^{-1}_{3/2})$. Part of the $3^-_3(7.75)$ strength may be contained in this level.

There appears to be seen exerimentally much more 3^- strength then 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 (18x18) of the 3^- matrix (i.e. accidental degeneracies occur). The 4^-, T=0 state from the $(0f_{7/2}\text{-}1s^{-1}_{1/2})$ 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 componants, 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 $(0f_{7/2}\text{-}1s_{1/2}^{-1})$. 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 then 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 Ca^{40} for Explanation of (Maj. Comp.) See Appendix C.

Exp.	BJ(Exp.)	KK E(maj. comp.) BJ		KK-MS E(maj. comp.) BJ		Remarks
$(0f_{7/2}\text{-}0d_{3/2}^{-1})_{T=0}$						
3^-, 3.731	2410	5.64 869	(7/6,3)	4.43 846	(7/6,3)	Collective
5^-, 4.487	$2.43\text{x}10^5$	5.83 $1.75\text{x}10^5$	(7/6,3)	4.48 $1.69\text{x}10^5$	(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)
$(0f_{7/2}\text{-}0d_{3/2}^{-1})_{T=1}$						
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 6×10^4	(7/6,5)	7.87 6.5×10^4	(7/6,5)	
$(1p_{3/2}\text{-}0d_{3/2}^{-1})_{T=0}$						
$(0f_{7/2}\text{-}1s_{1/2})_{T=0}$						
1^-, 5.90						98% 3p-3h (Ge68)
1^-, 6.94		8.45 1.73×10^{-4}	(8/6,3)	7.19 6.02×10^{-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 assignment due to mixing		6.56 157	(8.63)	
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.--Ca^{40} 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	1.96×10^5	583	701

Observed 1^-, T=1

$\bar{E} = 19.8$

S = 44

FIGURE 4.--Ca^{40} $(0f_{7/2}\text{-}0d_{3/2}^{-1})$ Multiplet.

A = exp.

B = KK

C = KK-MS

D = Sussex

E = Sussex-MS

F = .65 KK-RPA MS

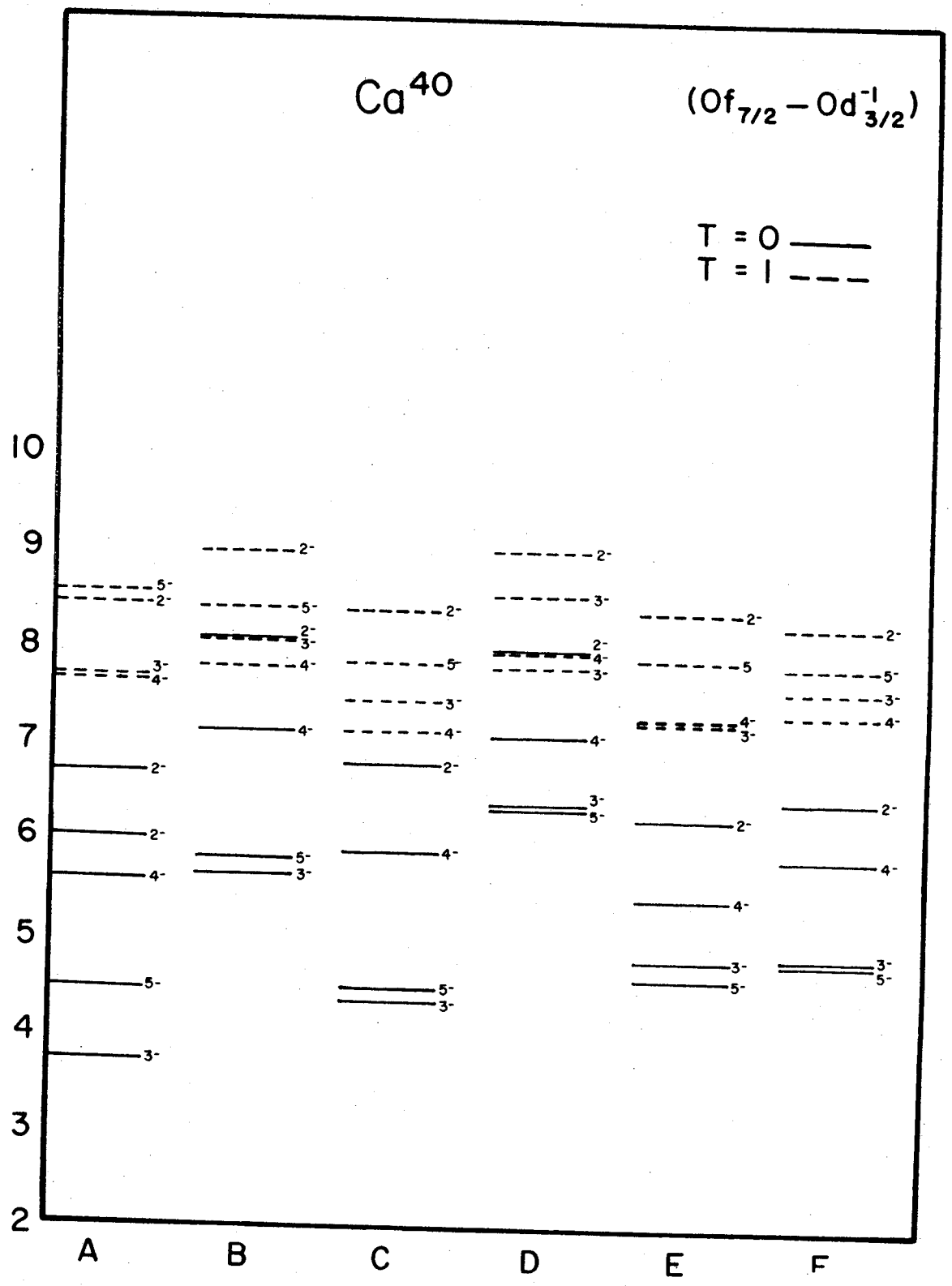

Ca40
(0f7/2 – 0d3/2-1)
T = 0
T = 1
10
9
8
7
6
5
4
3
2
A
B
C
D
E
F

FIGURE 5.--Ca^{40} $(1p_{3/2}\text{-}0d^{-1}_{3/2})$, $(0f_{7/2}\text{-}1s^{-1}_{1/2})$ Multiplets.

A = exp.

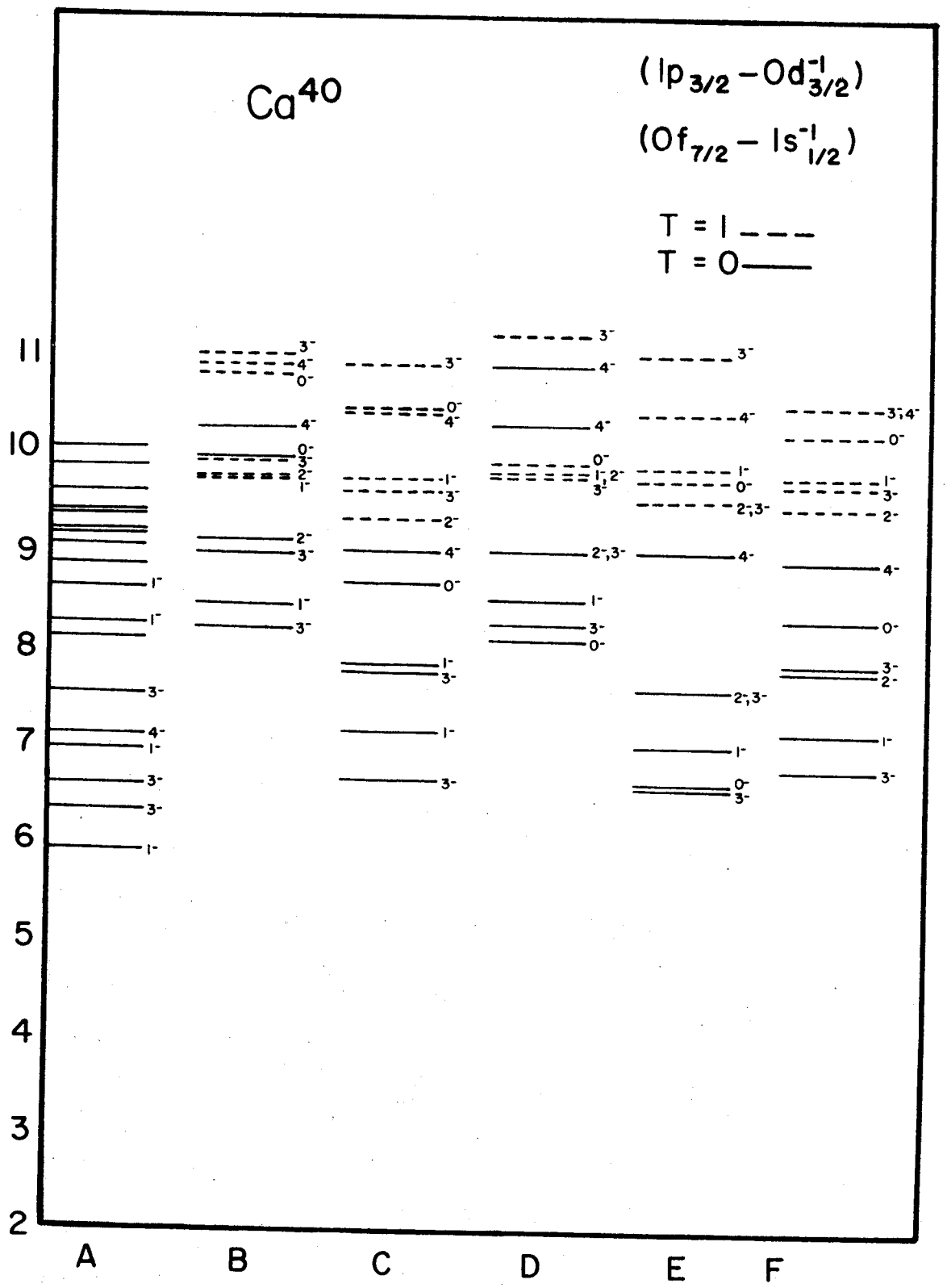
B = KK

C = KK-MS

D = Sussex

E = Sussex-MS

F = .65 KK-RPA MS


Ca40
(1p3/2 − 0d5/2−1)
(0f7/2 − 1s1/2−1)
T = 1
T = 0
11
10
9
8
7
6
5
4
3
2
A
B
C
D
E
F

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 $2^+(3.830)$ $B(E2)=45.7\ e^2f^4$, $3^-(4.50)$ $B(E3)=1.05\times10^3 e^2f^6$ and the $5^-(4.49)$ $B(E5)=7.77\times10^5\ e^2f^{10}$ 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≠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 consiting of multiparticle-multihole states. This is not necessary in Ca^{48} since lowest nn^{-1} configuration is $(1p_{3/2}\text{-}0f_{7/2}^{-1})$ 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-multihole 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}	$(0f_{7/2}\text{-}0d_{3/2}^{-1})$	5.33 MeV
pp^{-1}	$(0f_{7/2}\text{-}1s_{1/2}^{-1})$	5.70 MeV
nn^{-1}	$(1p_{7/2}\text{-}0f_{7/2}^{-1})$	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 3.8 30 MeV with a B(E2)=45.7 e^2f^4. The nn^{-1} $(1p_{3/2}\text{-}0f_{7/2}^{-1})$ configuration with the K-K interaction and no monopole shift places the 2^+ energy at 4.52 with a B(E2)=.34 e^2f^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^2f^4. More serious is what the other members of the nn^{-1} $(1p_{3/2}\text{-}0f_{7/2}^{-1})$ 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 $(0f_{7/2}\text{-}0d_{3/2}^{-1})$ and $(0f_{7/2}\text{-}1s_{1/2}^{-1})$ proton configurations which are almost degenerate. The lowest observed negative parity state is the 3^- at 4.50 MeV with an observed B(E3)=1.05x$10^3e^2f^6$. 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, $B(E3)=1.27\times10^{3}e^{2}f^{6}$ which is slightly higher than the experimental value of $1.05\times10^{3}e^{2}f^{6}$. 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, $B(E3)=2.16\times10^{3}e^{2}f^{6}$. 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 componant the lowest energy particle-hole configuration, $(0f_{7/2}\text{-}0d_{3/2}^{-1})$ but instead its main componant (50%) is the 2nd lowest configuration $(0f_{7/2}\text{-}1s_{1/2}^{-1})$. 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 $(0f_{7/2}\text{-}1s_{1/2}^{-1})$ 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 $B(E5)=2.9\text{x}10^5e^2f^{10}$ which is approximately four times bigger than the reported experimental value of $7.74\text{x}10^4e^2f^{10}$. 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}, $(0f_{7/2}\text{-}0p_{3/2}^{-1})$ 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 discrepency is that experimentally a 2^+ level is the lowest state with the 3^- state above it. The 3^- state is also less collective then 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 Ca^{48} for Explanation of (Maj Comp See Appendices C and D).

Exp.		BJ(Exp)	E (maj comp) BJ		KK-MS E (Maj comp) BJ		Remarks
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	7.7×10^4	5.04 2.91×10^5	(7/6,1)	4.16 2.92×10^5	(7/6,1)	
(2^+)	6.10						probably deformed, not seen
3^-	7.65		836 .096	(8/6,3)	7.39 9.05	(8/6,3)	T=0 excitation

TABLE 5.4.--Ca^{48} Centroid Energies, Energy Dispersions and Sum Rules for Representative $T_<$ 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	1.7×10^4	2.2×10^4	9.5×10^4	886	3.9×10^5	1.6×10^8

Observed 1^-

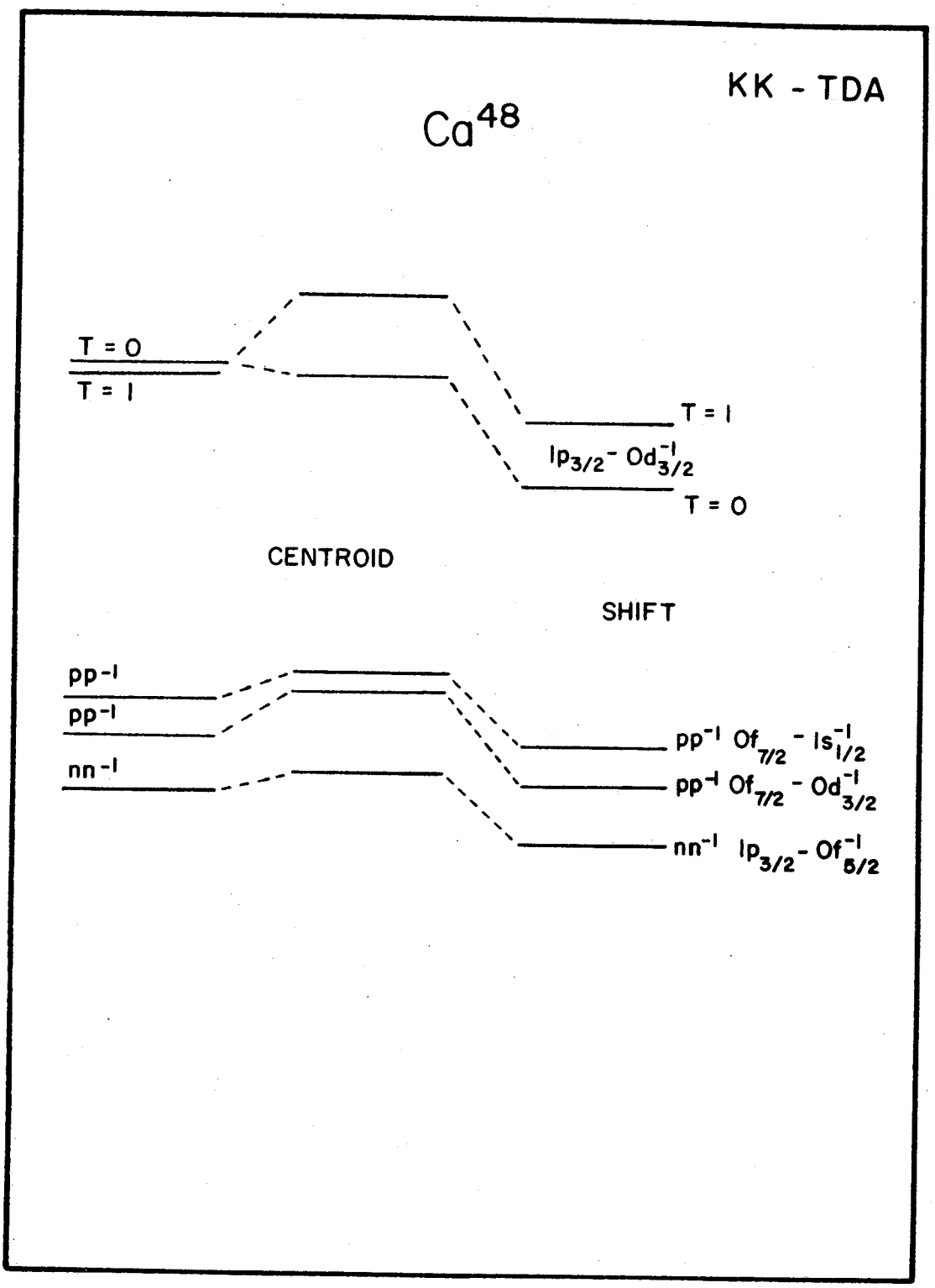


FIGURE 6.--Ca^{48} Monopole Shifts.

FIGURE 7.--Ca^{48} Energy Levels.

A = exp.

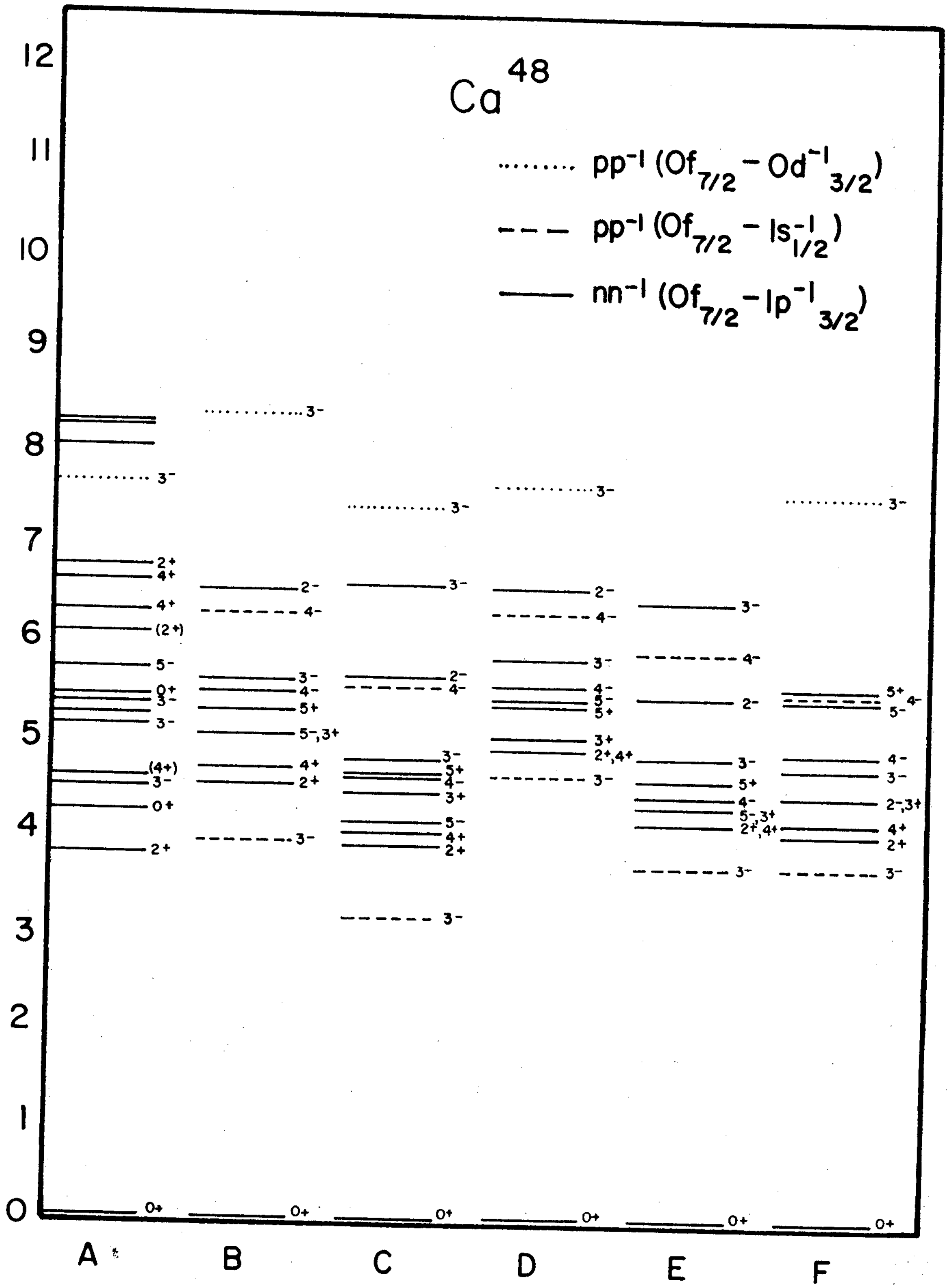
B = KK

C = KK-MS

D = Sussex

E = Sussex-MS

F = 65% KK-MS RPA


Ca48
pp-1 (Of7/2 - Od-1 3/2)
pp-1 (Of7/2 - Is-1 1/2)
nn-1 (Of7/2 - Ip-1 3/2)
12
11
10
9
8
7
6
5
4
3
2
1
0
A
B
C
D
E
F

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 1p-1h states incorporating a $1p_{1/2}$ proton have been observed in the $Y^{89}(He^3,d)Sr^{88}$ reaction and the $Y^{89}(t,\alpha)Sr^{88}$ reaction. Neutron 1p-1h states based on a $0g_{9/2}$ hole have been studied by the $Sr^{87}(d,p)Sr^{88}$ reaction. The neutron 2p-2h and 1p-1h components of the levels have been studied by the $Sr^{86}(t,p)Sr^{88}$ 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 $Y^{89}(He^3,d)Sr^{88}$ reaction and the $Y^{89}(t,\alpha)Sr^{88}$ 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 $\varepsilon_{1/A}$=.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 1p-1h 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^2f^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^2f^4 and is about twice the single configuration value. The RPA increases the transition rate to B(E2)=83 e^2f^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^2f^4. So while the two hole basis does slightly better for the

TABLE 6.1.--Sr^{88} 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 $Sr^{86}(t,p)Sr^{88}$ reaction is much smaller for 2_1^+ then the cross section for the higher lying 2^+ states which would indicate a very small 2p-2h neutron component to the state. From the $Y^{89}(d,He^3)Sr^{88}$ reaction Kavalaske (Ka67) et al. concluded that the $(1p_{1/2}\text{-}1p_{3/2}^{-1})$ and $(1p_{1/2}\text{-}0f_{5/2}^{-1})$ 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 $Sr^{86}(t,p)Sr^{88}$.

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 $(1d_{5/2}\text{-}0g_{9/2}^{-1})$. 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 1p-1h 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 1p-1h shell model breaks down in other ways besides not being able to deduce the correct number of 2^+ states. The 1p-1h model predicts a low lying 5^- state at 3.36 MeV (K-K interaction with monopole shift) whose major component is a $(0g_{9/2}\text{-}1p_{3/2}^{-1})$ 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 $Rb^{87}(He^3,d)Sr^{88}$ 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 1p-1h

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 1p-1h 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) (exp)=$8960e^2f^6$. B(E3)(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 E(maj comp) BJ		KK-MS E(maj comp) BJ		Remarks
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 Ca^{48}
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 8.13×10^3	(12/11,2)	4.08 9.24×10^2	(12/11,2)	not predict enough 4^+ states, possibility of deformed state
2^+6^+	4.41		$4.67(6^+)$ 1.6×10^5	(11/11,2)	$4.316(6^+)$ 1.8×10^5	(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.--Sr^{88} Centroid Energies, Energy Dispersions and Sum Rules for Representative $T_<$ 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	5.4×10^4	5.8×10^4	4.0×10^5	1834

Observed 1^- (in Zr^{90})

$\bar{E}$ = 16.5 MeV

S $\simeq$ 100 MeV f^2

FIGURE 8.--Sr^{88} Energy Levels.

A = exp.

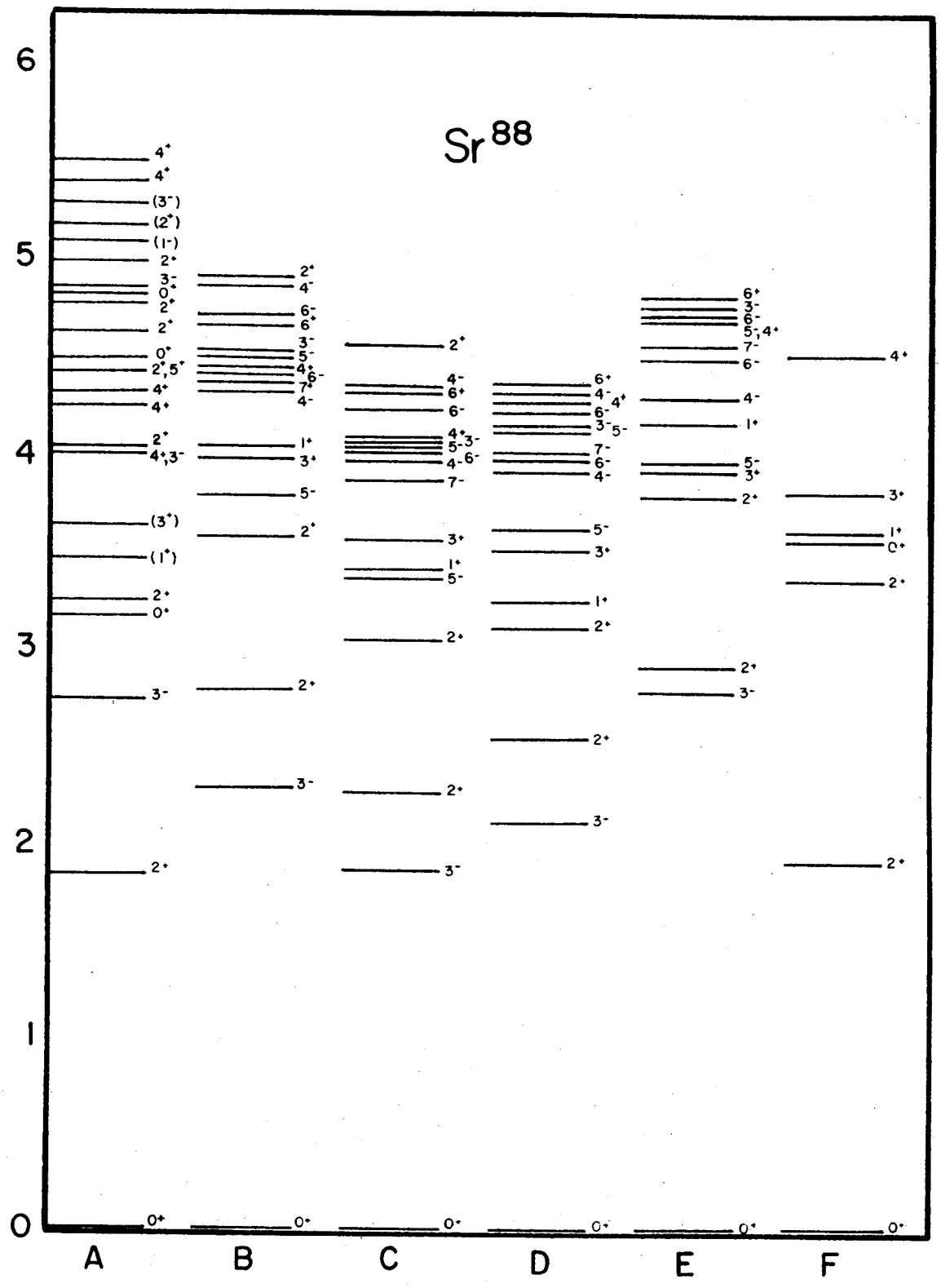
B = KK-TDA

C = KK-TPA MS

D = 65% KK-RPA MS

E = Sussex-TDA

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


Sr 88
6
5
4
3
2
1
0
A
B
C
D
E
F
4+
4+
(3-)
(2+)
(1-)
2+
3-
0+
2+
2+
0+
2+,5+
4+
4+
2+
4+,3-
(3+)
(1+)
2+
0+
3-
2+
2+
2+
4-
6+
6-
4+
5-
3-
4-6-
7-
3+
1+
5-
2+
3-
2+
6+
4-
6-
4+
3-5-
7-
6-
4-
5-
3+
1+
2+
2+
3-
6+
3-
6-
5-,4+
7-
6-
4-
1+
5-
3+
2+
2+
3-
4+
3+
1+
0+
2+
2+
0+
0+
0+
0+
0+
0+

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 persistant 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. Nalcioglu, 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) $A^{+}(ph^{-1},JM) = \sum_{m_p m_h} \langle pm_p h{-}m_h | JM\rangle a^{+}_{pm_p} a_{hm_h} (-1)^{h-m_h}$

b) $A^{+}(ph^{-1},JMTM_T) = \sum_{m_p m_h} \langle pm_p h{-}m_h | JM\rangle \langle \tfrac{1}{2}t_p \tfrac{1}{2}{-}t_h | TM_T\rangle a^{+}_{pm_h\ \frac{1}{2}t_p} a_{hm_h\ \frac{1}{2}t_h} \times (-1)^{h-m_h+\frac{1}{2}-t_h}$

2. RPA Basis Vector

a) $Q^{+JM}(n) = \sum_{ph} [X^n_J(ph) A^{+}(ph^{-1},JM) - (-1)^{J-M} Y^n_J(ph) A(ph^{-1},JM)]$

b) $Q^{+JM}_{TM_T}(n) = \sum_{ph} [X^n_{JT}(ph) A^{+}(ph^{-1},JMTM_T) - (-1)^{J+T-M-M_T} Y^n_{JT}(ph) A(ph^{-1},JMTM_T)]$

3. RPA Matrices

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

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

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

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

4. Transitions

The phase relation between the X and Y amplitudes is

a) $X + (-1)^{J}Y$

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

5. Single Particle Transition Operators

$$M(EJ,M)=\sum_k e(\tfrac{1}{2}-t_z(k))r_k^J Y_{JM}(\Omega_k)$$

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

6. Centroid Energies, Dispersions and Sum Rule Formulas

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

$$s = \sum_i t_i E_i$$

APPENDIX B

MONOPOLE SHIFT

1. Equivelence between the monopole term and a single particle moving in a spherical potental

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

ignoring exchange terms

$$= \sum_L (-1)^{j_1+j_2-J} \hat{j}_1 \hat{j}_2 W(j_1 j_2 j_1 j_2; JL) M^L_{j_1 j_1} M^L_{j_2 j_2} I_1$$

where

$$M^L_{j_1 j_1} = \langle j_1 || C_L(1) || j_1 \rangle$$

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

therefore

$$\alpha^L_{j_1 j_2} = \frac{1}{\hat{L}} M^L_{j_1 j_1} M^L_{j_2 j_2} I_L$$

the monopole componant is

$$\alpha^o_{j_1 j_2} = M^o_{j_1 j_1} M^o_{j_2 j_2} I_o = I_o = \int \phi^*(j_1) U(r_1) \phi(j_1) d^3 r_1$$

where $U(r_1) = \int \phi^*(j_2) v_o(r_1,r_2) \phi(j_2) d^2 r_2$ 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.

$$E_s = \varepsilon_n + \Delta - \varepsilon_p$$

$$\varepsilon_h = \varepsilon_o + \frac{4\varepsilon_1}{A}\langle \square^{\times} | \vec{t}_n \cdot \vec{T}_A | \square^{\times} \rangle = \varepsilon_o + \frac{2\varepsilon_1}{A}$$

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

$$= \varepsilon_o + \frac{2\varepsilon_1}{A} T_o$$

$$\varepsilon_p = \Delta + \varepsilon_o + 4\,\frac{\varepsilon 1}{A}\langle \square^{\times} | \vec{t}_p \cdot \vec{T}_A | \square^{\times} \rangle$$

$$= \Delta + \varepsilon_o + 4\frac{\varepsilon_1}{A}\left[\frac{2T_o}{2T_o+1}\langle (\tfrac{1}{2},T_o)T_o-\tfrac{1}{2},T_o-\tfrac{1}{2}|\vec{t}_p\cdot\vec{T}_A|(\tfrac{1}{2},T_o)T-\tfrac{1}{2},T_o-\tfrac{1}{2}\rangle\right.$$

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

upon resolving $\square^{\times}$ into state of good T_A i.e. $T_o \pm \tfrac{1}{2}$

$$= \Delta + \varepsilon_o - \frac{2\varepsilon_1}{A} T_o$$

The symmetry energy is therefore

$$E_s = E_h + \Delta - \varepsilon_p = 4\,\frac{\varepsilon_1}{A}\,T_o$$

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

$$\varepsilon_A - \varepsilon_{A+1} = \frac{4\varepsilon_1}{A} \langle A|\vec{t}_p \cdot \vec{T}_{A-1}|A\rangle - \langle A+1|\vec{t}_p \cdot \vec{T}_A|A+1\rangle]$$

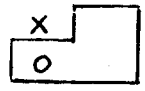
where $|A\rangle$ is a T=1 state

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

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

$$\varepsilon_A - \varepsilon_{A+1} = \frac{4\varepsilon_1}{2A}(2-3/4-3/4-3/4-3/4) = \frac{\varepsilon_1}{A}$$

4. N≠Z pp^{-1} excitation



$$\varepsilon_A = \varepsilon_o - \frac{2\varepsilon_1}{A}(T_o+3/2)$$

$$\varepsilon_{A+1} = \varepsilon_o - \frac{2\varepsilon_1}{A}(T_o+1)$$

$$\varepsilon - \varepsilon_{A+1} = -\varepsilon_1/A$$

5. N≠Z, T=0 excitation

$$|A\rangle = \frac{1}{\sqrt{2}}\left|\begin{array}{l}x\\o\end{array} + \begin{array}{l}x\\o\end{array}\right\rangle$$

$$\varepsilon_{A+1} = \tfrac{1}{2}(\varepsilon_p+\varepsilon_n)$$

$$\varepsilon_n = \varepsilon_o + \frac{4\varepsilon_1}{A}\left\langle \begin{array}{l}x\\ \square\end{array} \middle| \vec{t}\cdot\vec{T}_A \middle| \begin{array}{l}x\\ \square\end{array} \right\rangle \qquad \vec{T}_{A+1} = \vec{T}_o + \vec{\tfrac{1}{2}}$$

$$= \varepsilon_o + 2T_o \frac{\varepsilon_1}{A}$$

$$\varepsilon_p = \varepsilon_o + \frac{4\varepsilon_1}{A}\langle \overset{\times}{\square} | \vec{t}\cdot\vec{T}_A | \overset{\times}{\square} \rangle$$

expanding with Clebsch-Gordon coefficients

$$|\overset{\times}{\square}\rangle = -\sqrt{\frac{2T_o}{2T_o+1}}\,|T_o-\tfrac{1}{2},T_o-\tfrac{1}{2}\rangle + \frac{1}{2T_o+1}|T_o+\tfrac{1}{2},T_o-\tfrac{1}{2}\rangle$$

$$\varepsilon_p = \varepsilon_o - 2T_o\,\frac{\varepsilon_1}{A}$$

Therefore $\varepsilon_{A+1} = \varepsilon_o$

ε_A evaluation

$$|\square_o\rangle = -\sqrt{\frac{2T_o}{2T_o+1}}\,|T_o-\tfrac{1}{2},T_o-\tfrac{1}{2}\rangle + \sqrt{\frac{1}{2T_o+1}}\,|T_o+\tfrac{1}{2},T_o-\tfrac{1}{2}\rangle$$

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

$$|A\rangle = \frac{1}{\sqrt{2}}|(\tfrac{1}{2},T_o+p)T_o\rangle - \frac{1}{\sqrt{2}}\sqrt{\frac{2T_o}{2T_o+1}}\,|(\tfrac{1}{2},T_o-\tfrac{1}{2})T_o\rangle + \frac{1}{\sqrt{2}}\sqrt{\frac{1}{2T_o+1}}\,|(\tfrac{1}{2},T_o+\tfrac{1}{2})T_o\rangle$$

then

$$\varepsilon_A = \varepsilon_o - \frac{3\varepsilon_1}{A}$$

and

$$\varepsilon_A - \varepsilon_{A+1} = -\frac{3\varepsilon_1}{A}$$

6. N≠Z nucleus

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

i.e.

$$|A> = |(t_p t_h)^1 T_o; T_o> = \sqrt{3} \sum_\tau \sqrt{2\tau+1} \begin{Bmatrix} \frac{1}{2} & \frac{1}{2} & 1 \\ T_o & T_o & \tau \end{Bmatrix} |t_p (t_h T_o)^\tau; T_o>$$

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

therefore

$$\varepsilon_A = \varepsilon_o + \frac{4\varepsilon_1}{A} <A| \vec{t}_p \cdot \vec{T}_{A-1} |A>$$

$$= \varepsilon_o + \frac{2\varepsilon_1}{A} [T_o(T_o+1) - 3/4 - 3 \sum_\tau (2\tau+1) \begin{Bmatrix} T_o & T_o & 1 \\ \frac{1}{2} & \frac{1}{2} & \tau \end{Bmatrix}^2 \tau(\tau+1)]$$

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

$$\tau = T_o + \tfrac{1}{2}.\ 6\text{-J} = \frac{T_o}{6(T_o+1)(2T_o+1)}$$

and

$$\varepsilon_A = \varepsilon_o - \frac{\varepsilon_1}{A}$$

$$\varepsilon_{A+1} = \varepsilon_o \text{ see N≠Z, T=0 excitation}$$

therefore

$$\varepsilon_A - \varepsilon_{A+1} = -\frac{\varepsilon_1}{A}$$

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	$0\ell_{19/2}$

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 soley 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-	3.49E-04 8.27E-02 5/ 3,3 10.624	1.12E-04 8.27E-02 5/ 3,3 7.416	.00E 00 8.27E-02 5/ 3,3 7.431	4.16E-04 8.27E-02 5/ 3,3 10.413	2.00E-04 8.27E-02 5/ 3,3 7.112	2.39E-04 8.27E-02 5/ 3,3 7.978	3.19E-04 8.27E-02 5/ 3,3 10.713	7.45E-05 8.27E-02 5/ 3,3 6.694	4.91E-04 8.27E-02 5/ 3,3 10.212	1.77E-04 8.27E-02 5/ 3,3 6.538
1-	1.67E-04 1.65E-01 5/ 2,3 16.768	4.54E-03 1.65E-01 5/ 2,3 13.597	.00E 00 1.65E-01 5/ 2,3 13.552	1.81E-04 1.65E-01 5/ 2,3 16.750	4.87E-03 1.65E-01 5/ 2,3 13.579	4.04E-03 1.65E-01 5/ 2,3 13.522	1.53E-05 1.65E-01 5/ 2,3 18.373	4.69E-04 1.65E-01 5/ 2,3 15.032	1.15E-06 1.65E-01 5/ 2,3 18.793	5.19E-04 1.65E-01 5/ 2,3 14.962
1-	1.12E-02 4.14E-01 6/ 3,3 17.987	2.00E-04 4.14E-01 6/ 3,3 15.131	.00E 00 4.14E-01 6/ 3,3 15.137	1.07E-02 4.14E-01 6/ 3,3 17.945	1.97E-04 4.14E-01 6/ 3,3 15.096	2.94E-04 4.14E-01 6/ 3,3 14.518	4.84E-04 4.14E-01 6/ 3,3 20.781	2.76E-04 4.14E-01 6/ 3,3 17.111	9.98E-04 1.65E-01 5/ 2,3 20.661	2.09E-04 4.14E-01 6/ 3,3 16.903
1-	1.90E-03 8.27E-02 6/ 2,3 24.422	7.60E-05 8.27E-02 6/ 2,3 21.092	2.28E-02 4.14E-01 6/ 3,3 17.149	1.17E-03 8.27E-02 6/ 2,3 24.359	1.65E-04 8.27E-02 6/ 2,3 21.019	2.27E-04 8.27E-02 6/ 2,3 20.183	1.24E-04 8.27E-02 6/ 2,3 27.123	3.75E-04 8.27E-02 6/ 2,3 23.437	7.66E-05 8.27E-02 6/ 2,3 27.100	5.12E-04 8.27E-02 6/ 2,3 23.409
1-	3.22E-02 8.27E-02 5/ 3,5 13.846	2.69E-02 8.27E-02 5/ 3,5 13.169	.00E 00 8.27E-02 6/ 2,3 21.093	3.01E-02 8.27E-02 5/ 3,5 13.826	2.46E-02 8.27E-02 5/ 3,5 13.141	3.52E-02 8.27E-02 5/ 3,5 13.245	2.52E-02 8.27E-02 5/ 3,5 13.183	2.23E-02 8.27E-02 5/ 3,5 13.117	2.34E-02 8.27E-02 5/ 3,5 13.145	2.11E-02 8.27E-02 5/ 3,5 13.076
1-	1.03E-02 4.14E-01 6/ 3,5 18.179	2.30E-02 4.14E-01 6/ 3,5 17.156	3.15E-02 8.27E-02 5/ 3,5 13.208	8.59E-03 4.14E-01 6/ 3,5 18.142	2.05E-02 4.14E-01 6/ 3,5 17.107	4.20E-02 4.14E-01 6/ 3,5 17.473	4.50E-02 4.14E-01 6/ 3,5 17.836	2.68E-02 4.14E-01 6/ 3,5 17.844	3.82E-02 4.14E-01 6/ 3,5 17.724	2.24E-02 4.14E-01 6/ 3,5 17.740
1-	1.48E-02 1.65E-01 5/ 2,5 20.211	8.33E-03 1.65E-01 5/ 2,5 19.554	8.45E-03 1.65E-01 5/ 2,5 19.545	1.30E-02 1.65E-01 5/ 2,5 20.187	6.37E-03 1.65E-01 5/ 2,5 19.527	2.55E-03 1.65E-01 5/ 2,5 19.547	5.02E-04 1.65E-01 5/ 2,5 20.444	8.02E-05 1.65E-01 5/ 2,5 20.131	6.86E-05 1.65E-01 5/ 2,5 20.364	8.41E-04 1.65E-01 5/ 2,5 20.083
1-	1.11E 00 7.44E-01 4/ 2,5 23.537	1.12E 00 7.44E-01 4/ 2,5 22.623	1.12E 00 7.44E-01 4/ 2,5 22.622	9.55E-01 7.44E-01 4/ 2,5 23.161	9.52E-01 7.44E-01 4/ 2,5 22.235	1.06E 00 7.44E-01 4/ 2,5 21.115	1.35E 00 7.44E-01 4/ 2,5 22.451	1.36E 00 7.44E-01 4/ 2,5 22.091	1.19E 00 7.44E-01 4/ 2,5 22.276	1.20E 00 7.44E-01 4/ 2,5 21.915
1-	3.03E-01 8.27E-02 6/ 2,5 26.368	3.06E-01 8.27E-02 6/ 2,5 25.458	3.06E-01 8.27E-02 6/ 2,5 25.457	2.20E-01 8.27E-02 6/ 2,5 26.156	2.21E-01 8.27E-02 6/ 2,5 25.239	1.58E-01 8.27E-02 6/ 2,5 24.687	6.71E-02 8.27E-02 6/ 2,5 26.105	7.39E-02 8.27E-02 6/ 2,5 25.496	7.23E-02 8.27E-02 6/ 2,5 25.694	7.92E-02 8.27E-02 6/ 2,5 25.069

2-	4.15E-02 1.97E-02 4/ 3,3 12.250	2.18E-02 1.97E-02 4/ 3,3 8.869	1.40E-02 1.97E-02 4/ 3,3 8.875	3.40E-02 1.97E-02 4/ 3,3 12.211	1.46E-02 1.97E-02 4/ 3,3 8.821	2.76E-02 1.97E-02 4/ 3,3 8.488	2.20E-02 1.97E-02 4/ 3,3 12.122	1.28E-02 1.97E-02 4/ 3,3 7.963	1.38E-02 1.97E-02 4/ 3,3 12.000	6.07E-03 1.97E-02 4/ 3,3 7.794
2-	8.63E-02 3.44E-03 6/ 3,3 16.734	9.12E-02 3.44E-03 6/ 3,3 13.868	9.24E-02 3.44E-03 6/ 3,3 13.873	8.71E-02 3.44E-03 6/ 3,3 16.705	9.24E-02 3.44E-03 6/ 3,3 13.833	6.34E-02 3.44E-03 6/ 3,3 13.534	1.13E-01 3.44E-03 6/ 3,3 16.429	1.04E-01 1.38E-01 4/ 2,3 12.861	1.23E-01 3.44E-03 6/ 3,3 16.367	1.21E-01 1.38E-01 4/ 2,3 12.762
2-	1.06E-01 1.38E-01 4/ 2,3 18.563	6.90E-02 1.38E-01 4/ 2,3 15.505	7.92E-02 1.38E-01 4/ 2,3 15.515	1.08E-01 1.38E-01 4/ 2,3 18.531	6.96E-02 1.38E-01 4/ 2,3 15.474	1.24E-01 1.38E-01 4/ 2,3 14.893	6.11E-02 1.38E-01 4/ 2,3 17.634	2.40E-02 3.44E-03 6/ 3,3 14.015	5.43E-02 1.38E-01 4/ 2,3 17.551	1.98E-02 3.44E-03 6/ 3,3 13.929
2-	1.94E-01 2.12E-02 5/ 2,3 19.698	1.00E-01 2.12E-02 5/ 2,3 16.449	7.09E-02 2.12E-02 5/ 2,3 16.463	1.97E-01 2.12E-02 5/ 2,3 19.659	8.42E-02 2.12E-02 5/ 2,3 16.405	5.69E-02 2.12E-02 5/ 2,3 15.677	2.93E-01 2.12E-02 5/ 2,3 20.559	7.67E-02 2.12E-02 5/ 2,3 16.320	2.63E-01 2.12E-02 5/ 2,3 20.514	6.04E-02 2.12E-02 5/ 2,3 16.264
2-	1.99E-02 1.59E-04 6/ 2,3 23.276	2.60E-02 1.59E-04 6/ 2,3 19.935	7.85E-03 1.59E-04 6/ 2,3 19.936	1.58E-02 1.59E-04 6/ 2,3 23.253	3.50E-02 1.59E-04 6/ 2,3 19.907	6.59E-03 1.59E-04 6/ 2,3 19.527	2.01E-02 1.59E-04 6/ 2,3 23.271	3.36E-03 1.59E-04 6/ 2,3 19.582	1.88E-02 1.59E-04 6/ 2,3 23.147	9.22E-04 1.59E-04 6/ 2,3 19.428
2-	3.55E-01 1.26E 00 4/ 3,5 13.236	3.82E-01 1.26E 00 4/ 3,5 12.312	3.84E-01 1.26E 00 4/ 3,5 12.306	2.97E-01 1.26E 00 4/ 3,5 13.162	3.17E-01 1.26E 00 4/ 3,5 12.231	4.86E-01 1.26E 00 4/ 3,5 12.487	5.86E-01 1.26E 00 4/ 3,5 13.479	6.89E-01 1.26E 00 4/ 3,5 12.533	5.08E-01 1.26E 00 4/ 3,5 13.375	5.91E-01 1.26E 00 4/ 3,5 12.422
2-	2.77E-02 2.01E-02 6/ 3,5 17.988	5.38E-02 2.01E-02 6/ 3,5 17.033	4.75E-02 2.01E-02 6/ 3,5 17.026	2.23E-02 2.01E-02 6/ 3,5 17.936	4.48E-02 2.01E-02 6/ 3,5 16.976	2.03E-02 2.01E-02 6/ 3,5 17.289	3.42E-02 2.01E-02 6/ 3,5 16.832	7.14E-03 2.01E-02 6/ 3,5 16.881	3.10E-02 2.01E-02 6/ 3,5 16.807	5.71E-03 2.01E-02 6/ 3,5 16.855
2-	1.51E-02 6.08E-01 5/ 2,5 19.351	8.63E-02 6.08E-01 5/ 2,5 18.642	8.16E-02 6.08E-01 5/ 2,5 18.629	7.31E-03 6.08E-01 5/ 2,5 19.314	1.01E-01 1.66E 00 4/ 2,5 18.584	2.90E-01 1.66E 00 4/ 2,5 18.745	3.23E-02 6.08E-01 5/ 2,5 18.919	1.10E-01 1.66E 00 4/ 2,5 18.567	2.92E-02 1.66E 00 4/ 2,5 18.877	9.94E-02 1.66E 00 4/ 2,5 18.520
2-	2.26E 00 1.66E 00 4/ 2,5 20.939	2.24E 00 6.08E-01 5/ 2,5 20.131	2.30E 00 6.08E-01 5/ 2,5 20.122	1.99E 00 6.08E-01 5/ 2,5 20.819	1.96E 00 6.08E-01 5/ 2,5 20.019	2.01E 00 6.08E-01 5/ 2,5 19.770	2.22E 00 1.66E 00 4/ 2,5 20.134	2.34E 00 6.08E-01 5/ 2,5 19.846	2.02E 00 1.66E 00 4/ 2,5 20.074	2.13E 00 6.08E-01 5/ 2,5 19.788

2-	6.78E-01 1.51E-01 6/ 2,5 24.057	7.05E-01 1.51E-01 6/ 2,5 23.145	7.08E-01 1.51E-01 6/ 2,5 23.144	5.32E-01 1.51E-01 6/ 2,5 23.985	5.46E-01 1.51E-01 6/ 2,5 23.068	3.43E-01 1.51E-01 6/ 2,5 23.320	4.03E-01 1.51E-01 6/ 2,5 24.292	4.19E-01 1.51E-01 6/ 2,5 23.630	3.18E-01 1.51E-01 6/ 2,5 24.210	3.27E-01 1.51E-01 6/ 2,5 23.545
3-	7.13E 01 3.17E 01 4/ 3,3 8.464	6.97E 01 3.17E 01 4/ 3,3 5.082	6.79E 01 3.17E 01 4/ 3,3 5.085	1.47E 02 3.17E 01 4/ 3,3 7.051	3.67E 02 3.17E 01 4/ 3,3 2.120	1.04E 02 3.17E 01 4/ 3,3 5.678	7.28E 01 3.17E 01 4/ 3,3 9.591	6.95E 01 3.17E 01 4/ 3,3 5.352	1.17E 02 3.17E 01 4/ 3,3 3.795	1.80E 02 3.17E 01 4/ 3,3 3.864
3-	1.70E 01 2.53E 01 4/ 2,3 16.368	1.97E 01 2.53E 01 4/ 2,3 13.264	1.67E 01 2.53E 01 4/ 2,3 13.260	2.07E 01 2.53E 01 4/ 2,3 16.198	2.64E 01 2.53E 01 4/ 2,3 13.028	3.21E 01 2.53E 01 4/ 2,3 13.252	2.14E 01 2.53E 01 4/ 2,3 17.324	2.35E 01 2.53E 01 4/ 2,3 13.487	2.42E 01 2.53E 01 4/ 2,3 17.208	2.88E 01 2.53E 01 4/ 2,3 13.327
3-	1.20E 01 3.80E 01 6/ 2,3 22.114	1.20E 01 3.80E 01 6/ 2,3 18.786	1.04E 01 3.80E 01 6/ 2,3 18.786	1.40E 01 3.80E 01 6/ 2,3 22.004	1.45E 01 3.80E 01 6/ 2,3 18.660	2.24E 01 3.80E 01 6/ 2,3 18.549	8.10E 00 3.80E 01 6/ 2,3 23.519	7.93E 00 3.80E 01 6/ 2,3 19.809	9.47E 00 3.80E 01 6/ 2,3 23.443	9.81E 00 3.80E 01 6/ 2,3 19.713
3-	1.93E 01 3.17E 01 4/ 3,5 13.225	1.82E 01 3.17E 01 4/ 3,5 12.312	2.22E 01 3.17E 01 4/ 3,5 12.314	1.68E 01 3.17E 01 4/ 3,5 13.140	1.39E 01 3.17E 01 4/ 3,5 12.219	1.79E 01 3.17E 01 4/ 3,5 12.419	1.95E 01 3.17E 01 4/ 3,5 13.308	1.98E 01 3.17E 01 4/ 3,5 12.371	1.76E 01 3.17E 01 4/ 3,5 13.238	1.68E 01 3.17E 01 4/ 3,5 12.296
3-	2.57E 01 2.53E 01 4/ 2,5 18.829	2.53E 01 2.53E 01 4/ 2,5 17.892	2.72E 01 2.53E 01 4/ 2,5 17.893	2.24E 01 2.53E 01 4/ 2,5 19.769	2.14E 01 2.53E 01 4/ 2,5 17.830	2.02E 01 2.53E 01 4/ 2,5 18.185	2.51E 01 2.53E 01 4/ 2,5 18.908	2.47E 01 2.53E 01 4/ 2,5 18.447	2.18E 01 2.53E 01 4/ 2,5 18.848	2.12E 01 2.53E 01 4/ 2,5 18.388
3-	4.47E 01 3.80E 01 6/ 2,5 25.105	4.50E 01 3.80E 01 6/ 2,5 24.191	4.56E 01 3.80E 01 6/ 2,5 24.191	3.85E 01 3.80E 01 6/ 2,5 24.978	3.87E 01 3.80E 01 6/ 2,5 24.058	3.85E 01 3.80E 01 6/ 2,5 24.041	4.32E 01 3.80E 01 6/ 2,5 24.704	4.47E 01 3.80E 01 6/ 2,5 24.045	3.85E 01 3.80E 01 6/ 2,5 24.584	3.92E 01 3.80E 01 6/ 2,5 23.920
4-	5.72E 01 2.92E 01 4/ 2,3 18.833	3.65E 01 2.92E 01 4/ 2,3 15.793	2.92E 01 2.92E 01 4/ 2,3 15.794	5.54E 01 2.92E 01 4/ 2,3 18.803	3.37E 01 2.92E 01 4/ 2,3 15.758	3.27E 01 2.92E 01 4/ 2,3 15.104	2.86E 00 2.92E 01 4/ 2,3 19.312	3.69E 01 2.92E 01 4/ 2,3 15.504	1.45E 00 2.92E 01 4/ 2,3 19.246	3.26E 01 2.92E 01 4/ 2,3 15.422
4-	8.09E 02 8.37E 02 4/ 2,5 19.713	8.30E 02 8.37E 02 4/ 2,5 18.773	8.37E 02 8.37E 02 4/ 2,5 18.772	7.34E 02 8.37E 02 4/ 2,5 19.625	7.51E 02 8.37E 02 4/ 2,5 18.681	7.80E 02 8.37E 02 4/ 2,5 18.768	8.64E 02 8.37E 02 4/ 2,5 18.787	8.30E 02 8.37E 02 4/ 2,5 18.356	8.31E 02 8.37E 02 4/ 2,5 18.772	7.98E 02 8.37E 02 4/ 2,5 18.341

1♦	1.18E-15 2.37E-15 5/ 1,3 44.117	1.18E-15 2.37E-15 5/ 1,3 41.477	4.63E-16 2.37E-15 5/ 1,3 41.554	1.18E-15 2.37E-15 5/ 1,3 44.094	.00E 00 2.37E-15 5/ 1,3 41.452	.00E 00 2.37E-15 5/ 1,3 40.366	1.18E-15 2.37E-15 5/ 1,3 43.779	1.18E-15 2.37E-15 5/ 1,3 40.277	.00E 00 2.37E-15 5/ 1,3 43.651	1.18E-15 2.37E-15 5/ 1,3 40.132
1♦	.00E 00 .00E 00 6/ 1,3 47.642	.00E 00 .00E 00 6/ 1,3 44.457	.00E 00 .00E 00 6/ 1,3 44.464	.00E 00 .00E 00 6/ 1,3 47.639	.00E 00 .00E 00 6/ 1,3 44.454	.00E 00 .00E 00 6/ 1,3 43.845	7.40E-17 .00E 00 6/ 1,3 47.433	6.66E-16 .00E 00 6/ 1,3 44.015	1.66E-16 .00E 00 6/ 1,3 47.417	4.63E-18 .00E 00 6/ 1,3 43.993
1♦	1.18E-15 .00E 00 5/ 1,5 45.748	2.96E-14 .00E 00 5/ 1,5 43.016	4.26E-14 .00E 00 5/ 1,5 42.939	1.18E-15 .00E 00 5/ 1,5 45.673	4.74E-15 .00E 00 5/ 1,5 42.936	1.90E-14 .00E 00 5/ 1,5 43.076	1.18E-15 .00E 00 5/ 1,5 44.512	.00E 00 .00E 00 5/ 1,5 42.738	5.89E-14 .00E 00 5/ 1,5 44.438	.00E 00 .00E 00 5/ 1,5 42.666
1♦	.00E 00 .00E 00 6/ 1,5 48.421	.00E 00 .00E 00 6/ 1,5 47.540	.00E 00 .00E 00 6/ 1,5 47.534	.00E 00 .00E 00 6/ 1,5 48.410	.00E 00 .00E 00 6/ 1,5 47.528	.00E 00 .00E 00 6/ 1,5 47.597	1.18E-15 .00E 00 6/ 1,5 48.290	.00E 00 .00E 00 6/ 1,5 47.869	4.74E-15 .00E 00 6/ 1,5 48.213	.00E 00 .00E 00 6/ 1,5 47.797
2♦	2.78E 00 1.74E 00 4/ 1,3 36.905	2.76E 00 1.74E 00 4/ 1,3 33.701	2.68E 00 1.74E 00 4/ 1,3 33.704	3.03E 00 1.74E 00 4/ 1,3 36.781	3.02E 00 1.74E 00 4/ 1,3 33.565	2.76E 00 1.74E 00 4/ 1,3 35.243	2.95E 00 1.74E 00 4/ 1,3 37.782	2.89E 00 1.74E 00 4/ 1,3 33.704	3.11E 00 1.74E 00 4/ 1,3 37.720	3.06E 00 1.74E 00 4/ 1,3 33.635
2♦	3.14E-01 1.16E 00 6/ 1,3 46.340	5.78E-01 1.16E 00 6/ 1,3 43.153	2.20E-01 1.16E 00 6/ 1,3 43.140	3.25E-01 1.16E 00 6/ 1,3 46.328	5.71E-01 1.16E 00 6/ 1,3 43.139	9.44E-02 1.16E 00 6/ 1,3 42.714	3.81E-03 1.16E 00 6/ 1,3 48.775	1.67E-01 1.16E 00 6/ 1,3 45.153	5.66E-03 1.16E 00 6/ 1,3 48.770	1.71E-01 1.16E 00 6/ 1,3 45.148
2♦	1.42E 00 1.74E 00 4/ 1,5 43.717	1.15E 00 1.74E 00 4/ 1,5 42.841	1.53E 00 1.74E 00 4/ 1,5 42.854	1.38E 00 1.74E 00 4/ 1,5 43.698	1.12E 00 1.74E 00 4/ 1,5 42.822	1.82E 00 1.74E 00 4/ 1,5 42.818	1.34E 00 1.74E 00 4/ 1,5 43.885	1.36E 00 1.74E 00 4/ 1,5 43.199	1.30E 00 1.74E 00 4/ 1,5 43.864	1.33E 00 1.74E 00 4/ 1,5 43.178
2♦	1.29E 00 1.16E 00 6/ 1,5 48.719	1.32E 00 1.16E 00 6/ 1,5 47.854	1.36E 00 1.16E 00 6/ 1,5 47.850	1.24E 00 1.16E 00 6/ 1,5 48.700	1.27E 00 1.16E 00 6/ 1,5 47.835	1.22E 00 1.16E 00 6/ 1,5 47.793	1.51E 00 1.16E 00 6/ 1,5 48.105	1.39E 00 1.16E 00 6/ 1,5 47.819	1.49E 00 1.16E 00 6/ 1,5 48.085	1.37E 00 1.16E 00 6/ 1,5 47.798
3♦	2.12E 00 5.21E-01 4/ 1,3 42.549	8.29E-01 5.21E-01 4/ 1,3 39.366	5.21E-01 5.21E-01 4/ 1,3 39.374	2.12E 00 5.21E-01 4/ 1,3 42.545	8.27E-01 5.21E-01 4/ 1,3 39.362	7.74E-01 5.21E-01 4/ 1,3 38.754	9.70E 00 5.21E-01 4/ 1,3 42.701	7.74E-01 5.21E-01 4/ 1,3 38.514	.00E 00 .00E 00 0/ 0,3 42.828	7.75E-01 5.21E-01 4/ 1,3 38.506

```
3+      1.33E 01  1.46E 01  1.49E 01  1.30E 01  1.43E 01  1.44E 01  5.74E 00  1.47E 01  .00E 00  1.45E 01
        1.49E 01  1.49E 01  1.49E 01  1.49E 01  1.49E 01  1.49E 01  1.49E 01  1.49E 01  .00E 00  1.49E 01
         4/ 1,5    4/ 1,5    4/ 1,5    4/ 1,5    4/ 1,5    4/ 1,5    4/ 1,5    4/ 1,5   0/ 0,0    4/ 1,5
          43.335    42.451    42.444    43.322    42.438    42.507    43.002    42.187     .000    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.	

	a	b	c	d	e	f	g	h	i
1-	1.73E-04 4.19E-02 8/ 6,3 8.450	6.02E-05 4.19E-02 8/ 6,3 7.190	4.51E-04 4.19E-02 8/ 6,3 8.217	2.95E-04 4.19E-02 8/ 6,3 6.917	1.48E-04 4.19E-02 8/ 6,3 7.645	1.93E-04 4.19E-02 8/ 6,3 8.500	5.01E-05 4.19E-02 8/ 6,3 7.006	5.83E-04 4.19E-02 8/ 6,3 8.410	3.69E-04 4.19E-02 8/ 6,3 6.894
1-	8.30E-04 5.24E-01 8/ 5,3 10.073	3.88E-05 2.10E-01 10/ 6,3 8.677	8.67E-04 5.24E-01 8/ 5,3 9.970	1.13E-05 4.19E-02 8/ 6,3 8.641	2.71E-05 2.10E-01 10/ 6,3 8.321	5.88E-04 5.24E-01 8/ 5,3 10.348	9.46E-07 5.24E-01 8/ 5,3 8.702	7.12E-04 5.24E-01 8/ 5,3 10.294	3.02E-05 5.24E-01 8/ 5,3 8.641
1-	6.38E-03 2.62E-01 10/ 5,3 13.978	3.54E-04 5.24E-01 8/ 5,3 8.957	6.01E-03 2.62E-01 10/ 5,3 13.969	7.04E-04 5.24E-01 8/ 5,3 8.828	5.32E-04 5.24E-01 8/ 5,3 9.551	3.20E-04 2.10E-01 10/ 6,3 10.923	6.52E-04 2.10E-01 10/ 6,3 9.302	3.74E-04 4.19E-02 8/ 6,3 10.899	7.95E-04 2.10E-01 10/ 6,3 9.249
1-	1.22E-03 3.77E-01 8/ 4,3 14.060	1.56E-03 3.77E-01 8/ 4,3 12.844	1.91E-03 3.77E-01 8/ 4,3 14.026	1.63E-03 3.77E-01 8/ 4,3 12.808	2.96E-02 2.62E-01 10/ 5,3 12.672	3.00E-04 3.77E-01 8/ 4,3 15.068	5.01E-03 3.77E-01 8/ 4,3 13.561	4.20E-04 3.77E-01 8/ 4,3 15.038	5.89E-03 3.77E-01 8/ 4,3 13.513
1-	4.23E-02 9.43E-02 9/ 4,3 20.801	1.27E-02 2.62E-01 10/ 5,3 12.910	3.18E-03 2.62E-01 10/ 5,3 14.631	1.29E-02 2.62E-01 10/ 5,3 12.904	1.46E-03 3.77E-01 8/ 4,3 12.801	1.88E-02 2.62E-01 10/ 5,3 15.762	4.49E-04 2.62E-01 10/ 5,3 14.318	1.30E-02 2.62E-01 10/ 5,3 15.730	3.39E-03 2.62E-01 10/ 5,3 14.256
1-	1.21E-03 4.19E-02 8/ 6,5 9.710	9.90E-05 1.32E 00 9/ 6,3 13.651	3.41E-02 9.43E-02 9/ 4,3 20.746	1.02E-04 2.62E-01 10/ 5,3 13.617	6.07E-04 2.62E-01 10/ 5,3 13.137	1.96E-01 1.32E 00 9/ 6,3 16.754	1.65E-03 1.32E 00 9/ 6,3 15.357	2.26E-01 3.77E-01 8/ 4,3 16.663	4.63E-03 1.32E 00 9/ 6,3 15.234
1-	1.08E-03 4.19E-02 8/ 6,5 10.262	3.77E-02 9.43E-02 9/ 4,3 19.488	1.13E-03 4.19E-02 8/ 6,5 9.680	2.60E-02 9.43E-02 9/ 4,3 19.434	1.16E-02 9.43E-02 9/ 4,3 18.280	1.11E-02 9.43E-02 9/ 4,3 22.999	4.57E-02 9.43E-02 9/ 4,3 21.175	6.20E-03 9.43E-02 9/ 4,3 22.961	7.00E-02 9.43E-02 9/ 4,3 21.024
1-	3.89E-02 2.10E-01 10/ 6,5 12.326	2.54E-03 4.19E-02 8/ 6,5 9.737	1.46E-03 4.19E-02 8/ 6,5 10.241	2.58E-03 4.19E-02 8/ 6,5 9.724	6.70E-03 4.19E-02 8/ 6,5 9.776	2.20E-03 4.19E-02 8/ 6,5 9.794	2.44E-03 4.19E-02 8/ 6,5 9.846	2.19E-03 4.19E-02 8/ 6,5 9.759	2.77E-03 4.19E-02 8/ 6,5 9.827
1-	7.45E-02 5.24E-01 8/ 5,5 13.163	1.14E-02 2.10E-01 10/ 6,5 11.996	3.57E-02 2.10E-01 10/ 6,5 12.296	9.17E-03 2.10E-01 10/ 6,5 11.957	3.65E-02 2.10E-01 10/ 6,5 11.919	3.43E-02 2.10E-01 10/ 6,5 12.020	2.88E-02 2.10E-01 10/ 6,5 11.937	3.22E-02 2.10E-01 10/ 6,5 11.985	2.67E-02 2.10E-01 10/ 6,5 11.901

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 14.880	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	3.20E-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 15.096	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	1.40E-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	3.86E 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•98E-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 00 6•72E-02 8/ 5,3 13•186	8•18E-03 6•72E-02 8/ 5,3 11•158	2•44E 00 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•345	1•30E 00 5•99E-02 9/ 6,3 14•371	8•78E-02 5•99E-02 9/ 6,3 13•304	1•84E-01 5•99E-02 9/ 6,3 12•857	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•816	6•84E-01 6•98E-02 8/ 4,3 15•139	2•10E-02 6•98E-02 8/ 4,3 13•582	5•14E-01 6•98E-02 8/ 4,3 15•108	1•88E-02 6•98E-02 8/ 4,3 13•552
2•	1•63E-01 •00E 00 9/ 5,3 16•781	7•21E-01 •00E 00 9/ 5,3 15•600	1•18E-01 •00E 00 9/ 5,3 16•751	4•85E-01 •00E 00 9/ 5,3 15•574	1•85E-03 •00E 00 9/ 5,3 15•325	1•87E-02 •00E 00 9/ 5,3 16•634	1•48E-02 •00E 00 9/ 5,3 15•294	3•56E-02 •00E 00 9/ 5,3 16•608	4•17E-03 •00E 00 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 9•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•66E-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-03 1.02E-02 10/ 6,5 11.989	3.98E-03 1.02E-02 10/ 6,5 11.639	4.80E-03 1.02E-02 10/ 6,5 11.980	5.83E-06 1.02E-02 10/ 6,5 11.627	9.13E-04 1.02E-02 10/ 6,5 11.696	2.38E 00 1.92E 00 8/ 5,5 12.539	2.06E-01 1.02E-02 10/ 6,5 11.606	2.08E 00 1.92E 00 8/ 5,5 12.508	2.40E-01 1.02E-02 10/ 6,5 11.585
2.	3.51E 00 1.92E 00 8/ 5,5 13.189	4.23E 00 1.92E 00 8/ 5,5 12.330	3.45E 00 1.92E 00 8/ 5,5 13.175	4.08E 00 1.92E 00 8/ 5,5 12.310	4.90E 00 1.92E 00 8/ 5,5 12.399	6.52E-01 7.80E-02 9/ 6,5 14.302	4.09E 00 1.92E 00 8/ 5,5 12.200	6.12E-01 7.80E-02 9/ 6,5 14.286	3.93E 00 1.92E 00 8/ 5,5 12.176
2.	8.53E-01 7.80E-02 9/ 6,5 14.234	1.67E 00 7.80E-02 9/ 6,5 13.675	7.57E-01 7.80E-02 9/ 6,5 14.213	1.55E 00 7.80E-02 9/ 6,5 13.649	2.01E 00 4.11E 00 7/ 4,5 13.747	3.87E 00 4.11E 00 7/ 4,5 14.700	7.11E-01 7.80E-02 9/ 6,5 14.119	3.21E 00 4.11E 00 7/ 4,5 14.622	8.75E-01 7.80E-02 9/ 6,5 14.101
2.	3.58E 00 4.11E 00 7/ 4,5 15.306	3.71E 00 4.11E 00 7/ 4,5 14.705	3.08E 00 4.11E 00 7/ 4,5 15.229	3.07E 00 4.11E 00 7/ 4,5 14.606	2.92E 00 7.80E-02 9/ 6,5 14.405	2.13E 00 8.43E-01 8/ 4,5 15.977	4.10E 00 4.11E 00 7/ 4,5 14.364	1.78E 00 8.43E-01 8/ 4,5 15.956	3.12E 00 4.11E 00 7/ 4,5 14.284
2.	1.99E 00 8.43E-01 8/ 4,5 15.948	1.29E 00 8.43E-01 8/ 4,5 15.547	1.53E 00 8.43E-01 8/ 4,5 15.924	1.10E 00 8.43E-01 8/ 4,5 15.528	1.32E 00 8.43E-01 8/ 4,5 15.586	6.32E-03 .00E 00 9/ 5,5 17.205	2.22E 00 8.43E-01 8/ 4,5 15.707	4.46E-03 .00E 00 9/ 5,5 17.167	1.90E 00 8.43E-01 8/ 4,5 15.687
2.	2.02E-01 .00E 00 9/ 5,5 17.494	3.04E-01 .00E 00 9/ 5,5 17.092	1.56E-01 .00E 00 9/ 5,5 17.452	2.17E-01 .00E 00 9/ 5,5 17.042	9.97E-02 .00E 00 9/ 5,5 17.000	1.16E 00 6.38E-01 10/ 4,5 17.866	7.27E-03 .00E 00 9/ 5,5 16.809	1.00E 00 6.38E-01 10/ 4,5 17.837	2.08E-03 .00E 00 9/ 5,5 16.791
2.	3.18E 00 6.38E-01 10/ 4,5 18.319	3.16E 00 6.38E-01 10/ 4,5 17.985	2.85E 00 6.38E-01 10/ 4,5 18.300	2.83E 00 6.38E-01 10/ 4,5 17.964	2.28E 00 6.38E-01 10/ 4,5 17.829	1.82E 00 6.38E-01 10/ 4,5 18.322	2.93E 00 6.38E-01 10/ 4,5 17.862	1.65E 00 6.38E-01 10/ 4,5 18.293	2.60E 00 6.38E-01 10/ 4,5 17.827
2.	1.49E 00 4.58E-01 9/ 4,5 20.813	1.71E 00 4.58E-01 9/ 4,5 20.197	1.17E 00 4.58E-01 9/ 4,5 20.763	1.35E 00 4.58E-01 9/ 4,5 20.139	9.70E-01 4.58E-01 9/ 4,5 20.090	1.15E 00 4.58E-01 9/ 4,5 20.847	1.36E 00 4.58E-01 9/ 4,5 20.230	8.12E-01 4.58E-01 9/ 4,5 20.769	9.75E-01 4.58E-01 9/ 4,5 20.146
3.	8.69E 02 6.62E 01 7/ 6,3 5.640	8.46E 02 6.62E 01 7/ 6,3 4.340	3.19E 03 6.62E 01 7/ 6,3 3.309	.00E 00 .00E 00 0/ 0,0 .000	1.12E 03 6.62E 01 7/ 6,3 4.838	8.38E 02 6.62E 01 7/ 6,3 6.416	7.83E 02 6.62E 01 7/ 6,3 4.785	1.97E 03 6.62E 01 7/ 6,3 5.173	2.87E 03 6.62E 01 7/ 6,3 2.975

3•	2•46E 01 2•21E 02 7/ 5,3 8•984	1•57E 02 1•24E 02 8/ 6,3 6•560	1•55E 01 1•24E 02 8/ 6,3 8•914	1•25E 02 6•62E 01 7/ 6,3 6•419	4•10E 02 1•24E 02 8/ 6,3 6•760	1•40E 02 1•24E 02 8/ 6,3 8•271	1•99E 02 1•24E 02 8/ 6,3 6•583	1•21E 02 1•24E 02 8/ 6,3 8•212	1•63E 02 1•24E 02 8/ 6,3 6•437
3•	1•44E 02 1•99E 02 7/ 4,3 11•836	4•70E 01 2•21E 02 7/ 5,3 7•747	1•51E 02 1•99E 02 7/ 4,3 11•723	3•74E 01 2•21E 02 7/ 5,3 7•676	1•08E 02 2•21E 02 7/ 5,3 7•842	5•89E 01 2•21E 02 7/ 5,3 9•046	7•94E 01 2•21E 02 7/ 5,3 7•573	4•95E 01 2•21E 02 7/ 5,3 8•976	7•00E 01 2•21E 02 7/ 5,3 7•507
3•	5•38E-01 1•19E 02 9/ 6,3 13•415	4•61E-02 1•99E 02 7/ 4,3 10•471	4•83E-01 1•19E 02 9/ 6,3 13•407	2•67E 00 1•99E 02 7/ 4,3 10•322	4•06E 00 1•19E 02 9/ 6,3 12•334	2•15E 02 1•99E 02 7/ 4,3 12•27	1•58E 01 1•99E 02 7/ 4,3 10•670	2•25E 02 1•99E 02 7/ 4,3 12•165	2•98E 01 1•99E 02 7/ 4,3 10•531
3•	1•08E 01 1•19E 02 9/ 6,3 14•014	1•94E-01 1•19E 02 9/ 6,3 12•500	1•14E 01 1•19E 02 9/ 6,3 14•004	2•58E-01 1•19E 02 9/ 6,3 12•492	5•60E 01 8•24E 01 8/ 4,3 13•328	6•19E 01 1•19E 02 9/ 6,3 14•307	4•08E 00 1•19E 02 9/ 6,3 12•725	8•01E 01 1•19E 02 9/ 6,3 14•275	5•17E 00 1•19E 02 9/ 6,3 12•678
3•	1•85E 00 8•24E 01 8/ 4,3 14•453	2•60E 01 8•24E 01 8/ 4,3 13•273	1•36E-01 8•24E 01 8/ 4,3 14•417	3•61E 01 8•24E 01 8/ 4,3 13•246	1•05E 02 1•65E 02 9/ 5,3 14•845	1•38E 02 8•24E 01 8/ 4,3 15•147	5•21E 01 8•24E 01 8/ 4,3 13•580	1•26E 02 8•24E 01 8/ 4,3 15•121	5•31E 01 8•24E 01 8/ 4,3 13•560
3•	1•12E 02 1•65E 02 9/ 5,3 16•225	4•71E 01 1•65E 02 9/ 5,3 14•946	1•17E 02 1•65E 02 9/ 5,3 16•190	5•63E 01 1•65E 02 9/ 5,3 14•904	7•83E 01 1•03E 02 10/ 4,3 15•559	1•09E 02 1•65E 02 9/ 5,3 16•676	2•91E 00 8•24E 01 8/ 4,3 13•683	1•09E 02 1•65E 02 9/ 5,3 16•626	2•59E 00 8•24E 01 8/ 4,3 13•648
3•	2•40E 01 1•03E 02 10/ 4,3 16•882	5•95E 01 1•03E 02 10/ 4,3 15•583	2•38E 01 1•03E 02 10/ 4,3 16•865	5•74E 01 1•03E 02 10/ 4,3 15•570	9•16E 01 7•94E 01 9/ 4,3 18•119	7•77E 01 1•03E 02 10/ 4,3 17•675	1•13E 01 1•65E 02 9/ 5,3 15•156	7•67E 01 1•03E 02 10/ 4,3 17•652	2•02E 01 1•65E 02 9/ 5,3 15•103
3•	8•01E 01 7•94E 01 9/ 4,3 19•596	8•74E 01 7•94E 01 9/ 4,3 18•292	8•14E 01 7•94E 01 9/ 4,3 19•555	8•76E 01 7•94E 01 9/ 4,3 18•250	9•39E 00 6•62E 01 7/ 6,5 7•601	1•45E 02 7•94E 01 9/ 4,3 20•300	1•03E 01 1•03E 02 10/ 4,3 15•949	1•40E 02 7•94E 01 9/ 4,3 20•227	1•26E 01 1•03E 02 10/ 4,3 15•927
3•	8•18E 01 6•62E 01 7/ 6,5 7•749	8•28E 00 6•62E 01 7/ 6,5 7•466	6•88E 01 6•62E 01 7/ 6,5 7•644	8•17E 00 6•62E 01 7/ 6,5 7•413	3•31E 01 1•24E 02 8/ 6,5 9•686	4•11E 01 6•62E 01 7/ 6,5 7•824	6•72E 01 7•94E 01 9/ 4,3 18•942	2•97E 01 6•62E 01 7/ 6,5 7•742	7•10E 01 7•94E 01 9/ 4,3 18•876

3.	9.63E 01	2.06E 01	8.19E 01	2.05E 01	4.50E-01	2.36E 01	1.79E 00	2.35E 01	2.38E 00
	6.62E 01	1.24E 02	6.62E 01	1.24E 02	2.21E 02	1.24E 02	6.62E 01	1.24E 02	6.62E 01
	7/ 6,5	8/ 6,5	7/ 6,5	8/ 6,5	7/ 5,5	8/ 6,5	7/ 6,5	8/ 6,5	7/ 6,5
	8.199	9.617	8.151	9.604	10.506	9.744	7.257	9.734	7.201
3.	2.36E 01	2.46E 02	2.29E 01	2.28E 02	3.57E 02	1.21E 02	1.50E 01	9.83E 01	1.51E 01
	1.24E 02	2.21E 02	1.24E 02	2.21E 02	2.21E 02	2.21E 02	1.24E 02	2.21E 02	1.24E 02
	8/ 6,5	7/ 5,5	8/ 6,5	7/ 5,5	7/ 5,5	7/ 5,5	8/ 6,5	7/ 5,5	8/ 6,5
	9.930	10.898	9.915	10.823	10.838	11.193	9.504	11.114	9.491
3.	9.78E 01	2.93E 01	7.48E 01	2.65E 01	4.32E 01	1.28E 00	3.22E 02	8.32E-01	2.96E 02
	2.21E 02	1.19E 02	2.21E 02	1.19E 02	1.99E 02	1.19E 02	2.21E 02	1.19E 02	2.21E 02
	7/ 5,5	9/ 6,5	7/ 5,5	9/ 6,5	7/ 4,5	9/ 6,5	7/ 5,5	9/ 6,5	7/ 5,5
	10.990	13.310	10.906	13.297	13.486	13.593	11.070	13.562	11.002
3.	2.97E 02	2.50E 02	2.67E 02	2.07E 02	1.88E 02	1.59E 02	2.68E 02	1.06E 02	2.24E 02
	1.99E 02	1.99E 02	1.99E 02	1.99E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02	1.19E 02
	7/ 4,5	7/ 4,5	7/ 4,5	7/ 4,5	9/ 6,5	9/ 6,5	9/ 6,5	9/ 6,5	9/ 6,5
	14.695	14.096	14.624	14.004	14.007	14.432	14.266	14.382	14.216
3.	3.14E 01	7.70E 01	1.94E 01	6.44E 01	3.14E 01	4.62E 00	1.06E 02	1.77E 00	9.15E 01
	8.24E 01	8.24E 01	8.24E 01	8.24E 01	8.24E 01	8.24E 01	8.24E 01	8.24E 01	8.24E 01
	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5	8/ 4,5
	15.518	15.212	15.496	15.197	15.339	15.693	15.468	15.675	15.451
3.	7.84E 01	6.50E 01	6.93E 01	5.39E 01	6.89E 01	5.98E 00	6.25E 01	4.38E 00	5.61E 01
	1.65E 02	1.65E 02	1.65E 02	1.65E 02	1.65E 02	1.65E 02	1.65E 02	1.65E 02	1.65E 02
	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5	9/ 5,5
	17.185	16.819	17.161	16.792	16.908	17.199	16.931	17.174	16.908
3.	1.72E 02	1.50E 02	1.39E 02	1.22E 02	1.24E 02	1.33E 02	1.77E 02	1.10E 02	1.53E 02
	1.03E 02	1.03E 02	1.03E 02	1.03E 02	1.03E 02	1.03E 02	1.03E 02	1.03E 02	1.03E 02
	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5	10/ 4,5
	18.091	17.787	18.054	17.753	17.733	18.216	17.884	18.183	17.850
3.	1.70E 02	2.01E 02	1.28E 02	1.55E 02	1.16E 02	4.25E 01	1.40E 02	2.53E 01	1.08E 02
	7.94E 01	7.94E 01	7.94E 01	7.94E 01	7.94E 01	7.94E 01	7.94E 01	7.94E 01	7.94E 01
	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5	9/ 4,5
	20.863	20.304	20.780	20.215	20.129	20.878	20.174	20.810	20.086
4.	9.16E 01	3.54E 01	7.25E 01	2.71E 01	3.11E 01	5.54E 01	1.82E 01	4.35E 01	1.24E 01
	3.43E 00	3.43E 00	3.43E 00	3.43E 00	3.43E 00	3.43E 00	3.43E 00	3.43E 00	3.43E 00
	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3	7/ 6,3
	7.150	5.905	7.130	5.887	5.844	7.114	5.437	7.082	5.396

4-	7.33E 02 1.19E 02 7/ 5,3 10.228	4.62E 00 1.19E 02 7/ 5,3 9.079	6.35E 02 1.19E 02 7/ 5,3 10.204	1.40E 01 1.19E 02 7/ 5,3 9.059	1.84E 01 1.19E 02 7/ 5,3 8.885	4.81E 03 1.19E 02 7/ 5,3 10.923	2.77E 00 1.19E 02 7/ 5,3 9.031	4.72E 03 1.19E 02 7/ 5,3 10.893	1.20E 01 1.19E 02 7/ 5,3 8.993
4-	1.14E 03 1.98E 02 7/ 4,3 13.326	7.28E 02 1.98E 02 7/ 4,3 12.265	1.06E 03 1.98E 02 7/ 4,3 13.297	6.69E 02 1.98E 02 7/ 4,3 12.238	6.16E 02 1.98E 02 7/ 4,3 12.035	1.04E 03 1.98E 02 7/ 4,3 12.933	4.21E 02 1.98E 02 7/ 4,3 11.520	9.60E 02 1.98E 02 7/ 4,3 12.902	4.06E 02 1.98E 02 7/ 4,3 11.484
4-	1.50E 02 2.76E 00 9/ 6,3 14.055	3.85E 01 2.76E 00 9/ 6,3 13.078	1.76E 02 2.76E 00 9/ 6,3 14.030	3.40E 01 2.76E 00 9/ 6,3 13.056	1.62E 01 2.76E 00 9/ 6,3 12.730	2.46E 02 2.76E 00 9/ 6,3 14.343	6.19E 01 2.76E 00 9/ 6,3 12.709	2.36E 02 2.76E 00 9/ 6,3 14.316	5.63E 01 2.76E 00 9/ 6,3 12.684
4-	1.81E 03 9.51E 01 8/ 4,3 15.372	6.06E 02 9.51E 01 8/ 4,3 14.227	1.60E 03 9.51E 01 8/ 4,3 15.352	4.09E 02 9.51E 01 8/ 4,3 14.210	2.62E 02 9.51E 01 8/ 4,3 13.968	1.41E 03 9.51E 01 8/ 4,3 16.172	4.19E 02 9.51E 01 8/ 4,3 14.268	1.38E 03 9.51E 01 8/ 4,3 16.145	3.73E 02 9.51E 01 8/ 4,3 14.238
4-	1.39E 02 2.55E-01 9/ 4,3 19.455	2.58E 01 2.55E-01 9/ 4,3 18.222	1.11E 02 2.55E-01 9/ 4,3 19.444	1.81E 01 2.55E-01 9/ 4,3 18.213	7.17E 00 2.55E-01 9/ 4,3 18.141	3.94E 01 2.55E-01 9/ 4,3 19.413	8.36E 00 2.55E-01 9/ 4,3 17.929	2.60E 01 2.55E-01 9/ 4,3 19.376	4.45E 00 2.55E-01 9/ 4,3 17.885
4-	1.07E 02 7.40E 02 7/ 6,5 7.818	1.85E 02 7.40E 02 7/ 6,5 7.151	8.29E 01 7.40E 02 7/ 6,5 7.804	1.44E 02 7.40E 02 7/ 6,5 7.133	2.54E 02 7.40E 02 7/ 6,5 7.378	2.27E 02 7.40E 02 7/ 6,5 7.993	3.10E 02 7.40E 02 7/ 6,5 7.282	2.05E 02 7.40E 02 7/ 6,5 7.966	2.72E 02 7.40E 02 7/ 6,5 7.254
4-	5.01E 03 3.40E 03 7/ 5,5 10.867	5.55E 03 3.40E 03 7/ 5,5 10.429	4.67E 03 3.40E 03 7/ 5,5 10.842	5.13E 03 3.40E 03 7/ 5,5 10.399	6.01E 03 3.40E 03 7/ 5,5 10.500	2.07E 03 3.40E 03 7/ 5,5 10.318	6.81E 03 3.40E 03 7/ 5,5 10.421	1.78E 03 3.40E 03 7/ 5,5 10.294	6.42E 03 3.40E 03 7/ 5,5 10.399
4-	1.88E 03 3.15E 03 7/ 4,5 14.141	2.65E 03 3.15E 03 7/ 4,5 13.528	1.58E 03 3.15E 03 7/ 4,5 14.106	2.32E 03 3.15E 03 7/ 4,5 13.485	2.60E 03 3.15E 03 7/ 4,5 13.563	5.96E 02 1.61E 01 9/ 6,5 13.487	2.22E 03 3.15E 03 7/ 4,5 13.345	5.88E 02 1.61E 01 9/ 6,5 13.474	2.03E 03 3.15E 03 7/ 4,5 13.322
4-	2.14E 02 1.61E 01 9/ 6,5 14.822	2.12E 02 1.61E 01 9/ 6,5 14.190	1.78E 02 1.61E 01 9/ 6,5 14.791	2.50E 02 1.61E 01 9/ 6,5 14.154	2.43E 02 1.61E 01 9/ 6,5 14.160	1.45E 03 3.15E 03 7/ 4,5 13.979	7.12E 02 1.61E 01 9/ 6,5 13.970	1.24E 03 3.15E 03 7/ 4,5 13.952	6.00E 02 1.61E 01 9/ 6,5 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 5.979	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•	6.00E 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 20.870	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	8.23E 04 1.06E 05 9/ 4,5 20.202	7.96E 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	9.36E 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 06	3.97E 06	2.90E 06	3.68E 06	3.97E 06	4.61E 06	3.56E 06	4.42E 06	3.59E 06
	4.74E 06	4.74E 06	4.74E 06	4.74E 06	4.74E 06	4.74E 06	4.74E 06	4.74E 06	4.74E 06
	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
	14.411	13.776	14.378	13.736	13.726	13.562	13.515	13.553	13.497
1*	1.18E-15	2.96E-14	1.18E-15	1.07E-14	.00E 00	1.18E-15	1.07E-14	1.07E-14	1.90E-14
	7.40E-17	7.40E-17	7.40E-17	7.40E-17	7.40E-17	7.40E-17	7.40E-17	7.40E-17	7.40E-17
	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3
	13.805	12.480	13.796	12.469	12.228	13.295	11.780	13.280	11.759
1*	4.27E-13	2.32E-13	9.59E-14	2.00E-13	1.18E-13	4.26E-14	5.80E-14	7.58E-14	2.00E-13
	7.11E-15	7.11E-15	7.11E-15	7.11E-15	7.11E-15	7.11E-15	7.11E-15	7.11E-15	7.11E-15
	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3
	18.985	17.748	18.977	17.739	17.672	18.915	17.379	15.899	17.360
1*	2.00E-13	9.59E-14	2.00E-13	4.26E-14	2.32E-13	7.58E-14	1.18E-13	2.96E-14	3.42E-13
	4.74E-15	4.74E-15	4.74E-15	4.74E-15	4.74E-15	4.74E-15	4.74E-15	4.74E-15	4.74E-15
	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5
	14.661	14.413	14.643	14.395	14.209	14.557	14.389	14.547	14.379
1*	.00E 00	3.03E-13	3.03E-13	3.03E-13	3.03E-13	3.03E-13	.00E 00	.00E 00	.00E 00
	2.84E-14	2.84E-14	2.84E-14	2.84E-14	2.84E-14	2.84E-14	2.84E-14	2.84E-14	2.84E-14
	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5
	20.634	20.429	20.598	20.393	20.140	20.757	20.688	20.705	20.637
2*	2.76E 00	2.55E 00	2.77E 00	2.56E 00	1.65E 00	1.07E 00	8.11E-01	9.74E-01	6.72E-01
	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01
	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3
	13.071	11.729	13.051	11.707	11.745	13.485	12.144	13.471	12.122
2*	2.72E 01	2.42E 01	3.20E 01	2.93E 01	1.83E 01	1.55E 01	1.36E 01	1.66E 01	1.46E 01
	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00
	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3
	14.728	13.419	14.657	13.348	13.913	15.667	13.912	15.655	13.900
2*	9.61E 00	1.18E 01	9.43E 00	1.14E 01	2.32E 01	2.50E 01	2.67E 01	2.39E 01	2.79E 01
	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01
	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
	16.022	14.799	15.927	14.691	15.482	17.103	15.509	17.087	15.473
2*	2.78E 00	3.18E 00	2.94E 00	3.38E 00	3.25E 00	2.51E 00	2.31E 00	2.63E 00	2.45E 00
	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00
	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3
	18.215	16.980	18.192	16.957	17.153	18.900	17.394	18.886	17.379

2+	6.91E-02	1.41E 00	9.93E-02	1.31E 00	3.66E-01	5.78E-04	1.87E-02	1.11E-03	1.13E-02
	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01	7.45E-01
	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5
	14.022	13.804	14.018	13.799	13.793	14.074	13.724	14.060	13.716
2+	4.08E 00	2.57E 00	3.94E 00	2.48E 00	3.79E 00	4.09E 00	2.90E 00	6.16E 00	2.95E 00
	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00	6.52E 00
	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5
	16.807	16.611	16.803	16.607	16.617	16.938	16.325	16.923	16.822
2+	2.21E 00	2.50E 00	2.16E 00	2.46E 00	2.28E 00	7.82E-01	1.24E 00	7.23E-01	1.18E 00
	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00	2.98E 00
	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5
	19.998	19.797	19.990	19.788	19.754	19.940	19.841	19.935	19.835
2+	2.76E 01	2.81E 01	2.70E 01	2.77E 01	2.62E 01	2.74E 01	2.88E 01	2.81E 01	2.96E 01
	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01	2.79E 01
	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
	21.222	20.965	21.215	20.958	20.364	20.960	20.862	20.956	20.857
3+	6.71E-01	7.34E-04	6.56E-01	2.18E-03	1.64E-01	1.17E 00	2.26E 00	1.13E 00	2.28E 00
	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03	4.42E-03
	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3
	13.103	11.850	13.100	11.846	11.801	12.894	11.364	12.885	11.353
3+	2.83E 01	1.01E 01	2.75E 01	1.01E 01	1.02E 01	1.12E 02	1.14E 01	1.09E 02	1.13E 01
	2.94E 00	2.94E 00	2.94E 00	2.94E 00	2.94E 00	1.95E 00	2.94E 00	1.95E 00	2.94E 00
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	12/ 5,3	11/ 6,3	12/ 5,3	11/ 6,3
	13.480	12.154	13.470	12.143	11.877	16.922	12.245	16.918	12.229
3+	1.40E 01	2.81E 00	1.43E 01	2.49E 00	3.76E 00	3.48E 01	2.49E 00	3.44E 01	2.14E 00
	1.95E 00	1.95E 00	1.95E 00	1.95E 00	1.95E 00	1.20E 01	1.95E 00	1.20E 01	1.95E 00
	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	12/ 5,3	11/ 4,3	12/ 5,3	11/ 4,3	12/ 5,3
	16.212	15.028	16.209	15.025	14.848	18.350	14.866	18.345	14.860
3+	4.74E 01	2.75E 01	4.68E 01	2.74E 01	2.69E 01	1.96E 01	2.59E 01	2.03E 01	2.64E 01
	1.20E 01	1.20E 01	1.20E 01	1.20E 01	1.20E 01	1.69E 00	1.20E 01	1.69E 00	1.20E 01
	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3	12/ 4,3	11/ 4,3	12/ 4,3	11/ 4,3
	18.821	17.645	18.815	17.638	17.471	19.050	16.846	19.047	16.839
3+	2.46E 01	8.05E 00	2.48E 01	8.32E 00	5.35E 00	5.33E 01	5.23E 00	5.26E 01	5.66E 00
	1.69E 00	1.69E 00	1.69E 00	1.69E 00	1.69E 00	4.12E 00	1.69E 00	4.12E 00	1.69E 00
	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 6,5	12/ 4,3	12/ 6,5	12/ 4,3
	19.208	18.058	19.205	18.055	17.893	13.658	17.591	13.645	17.586

3+	1.50E 00	3.67E 00	1.38E 00	3.46E 00	4.64E 00	1.51E 01	1.69E 01	1.29E 01	1.77E 01
	4.12E 00	4.12E 00	4.12E 00	4.12E 00	4.12E 00	4.12E 00	4.12E 00	4.12E 00	4.12E 00
	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5
	13.749	13.424	13.744	13.419	13.555	13.933	13.621	13.930	13.616
3+	5.69E 01	7.45E 01	5.19E 01	6.83E 01	9.07E 01	4.11E 01	8.28E 01	3.68E 01	7.42E 01
	1.47E 02	1.47E 02	1.47E 02	1.47E 02	1.47E 02	1.47E 02	1.47E 02	1.47E 02	1.47E 02
	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5
	14.294	13.970	14.272	13.946	13.792	14.356	13.839	14.337	13.818
3+	1.72E 02	1.81E 02	1.68E 02	1.78E 02	1.83E 02	7.34E 01	1.78E 02	7.32E 01	1.75E 02
	5.59E 01	5.59E 01	5.59E 01	5.59E 01	5.59E 01	5.59E 01	5.59E 01	5.59E 01	5.59E 01
	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5	12/ 5,5
	16.860	16.556	16.855	16.551	16.570	16.261	16.390	16.255	16.385
3+	9.17E 01	1.24E 02	8.44E 01	1.14E 02	1.23E 02	5.03E 01	5.20E 01	4.65E 01	4.87E 01
	1.11E 02	1.11E 02	1.11E 02	1.11E 02	1.11E 02	1.11E 02	1.11E 02	1.11E 02	1.11E 02
	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
	19.826	19.523	19.806	19.503	19.408	19.579	19.445	19.564	19.432
3+	6.44E 01	7.02E 01	6.15E 01	6.96E 01	3.95E 01	1.00E 02	1.24E 02	9.52E 01	1.18E 02
	2.41E 01	2.41E 01	2.41E 01	2.41E 01	2.41E 01	2.41E 01	2.41E 01	2.41E 01	2.41E 01
	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5
	19.928	19.636	19.920	19.629	19.647	19.844	19.693	19.836	19.686
4+	1.06E 04	1.02E 04	1.19E 04	1.15E 04	6.18E 03	1.24E 03	3.21E 02	1.28E 03	2.77E 02
	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3
	12.438	11.073	12.377	11.005	11.200	12.696	11.167	12.668	11.135
4+	6.30E 02	2.21E 02	9.92E 02	5.79E 02	3.36E 03	6.33E 03	6.94E 03	7.17E 03	7.94E 03
	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03
	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	12/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3
	12.553	11.187	12.518	11.147	11.351	12.970	11.375	12.944	11.337
4+	8.71E 03	6.88E 03	9.25E 03	7.41E 03	8.04E 03	9.99E 03	7.34E 03	1.03E 04	8.05E 03
	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03
	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3
	14.765	13.473	14.714	13.424	13.654	15.092	13.571	15.070	13.547
4+	4.18E 03	4.40E 03	4.28E 03	4.57E 03	5.24E 03	8.27E 03	7.14E 03	8.32E 03	7.23E 03
	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03
	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
	18.109	16.914	18.084	16.887	16.950	18.522	17.033	18.509	17.019

4+	2.04E 03	1.49E 03	2.09E 03	1.53E 03	1.63E 03	1.01E 03	7.07E 02	1.02E 03	7.25E 02
	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03
	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3	12/ 4,3
	18.745	17.564	18.736	17.555	17.564	19.204	17.872	19.199	17.865
4+	3.27E 00	1.27E 02	6.27E 00	3.10E 02	2.48E 01	9.81E 02	3.39E 01	9.76E 02	3.84E 01
	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03	1.86E 03
	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5	11/ 6,5
	13.424	13.105	13.415	13.092	13.240	13.519	13.054	13.506	13.048
4+	8.92E 02	2.54E 03	8.69E 02	2.45E 03	3.45E 03	4.77E 02	3.02E 03	4.77E 02	2.73E 03
	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03	3.14E 03
	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5	12/ 6,5
	14.012	13.819	14.010	13.815	13.817	13.887	13.706	13.884	13.702
4+	3.05E 03	2.96E 03	2.98E 03	2.88E 03	3.48E 03	3.21E 03	3.65E 03	3.28E 03	3.73E 03
	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03	6.78E 03
	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5	11/ 5,5
	16.367	16.203	16.365	16.200	16.213	16.515	16.397	16.512	16.394
4+	3.34E 03	4.33E 03	3.67E 03	4.34E 03	4.92E 03	4.54E 03	4.20E 03	4.57E 03	4.20E 03
	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03	4.79E 03
	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
	19.560	19.286	19.555	19.279	19.260	19.582	19.420	19.579	19.416
4+	2.76E 03	3.20E 03	2.22E 03	2.98E 03	1.29E 03	2.21E 02	2.94E 03	2.18E 02	2.95E 03
	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03	1.57E 03
	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5	12/ 4,5
	19.573	19.315	19.570	19.311	19.443	19.808	19.553	19.801	19.548
5+	7.32E 03	2.14E 03	7.00E 03	2.12E 03	1.96E 03	7.81E 03	1.93E 03	7.73E 03	2.00E 03
	2.85E 02	2.85E 02	2.85E 02	2.85E 02	2.85E 02	2.85E 02	2.85E 02	2.85E 02	2.85E 02
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3
	12.705	11.450	12.700	11.445	11.405	12.778	11.134	12.768	11.122
5+	4.70E 04	3.51E 02	4.73E 04	2.33E 02	7.48E 02	2.23E 05	1.01E 02	2.18E 05	2.41E 01
	5.74E 03	5.74E 03	5.74E 03	5.74E 03	5.74E 03	5.74E 03	5.74E 03	5.74E 03	5.74E 03
	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3
	15.751	14.580	15.744	14.573	14.419	16.430	14.567	16.424	14.555
5+	6.72E 04	2.59E 04	6.58E 04	2.61E 04	2.25E 04	3.78E 04	1.39E 04	3.77E 04	1.45E 04
	7.09E 03	7.09E 03	7.09E 03	7.09E 03	7.09E 03	7.09E 03	7.09E 03	7.09E 03	7.09E 03
	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
	18.872	17.749	18.864	17.743	17.550	18.522	17.091	18.516	17.084

5+	5.84E 04 3.69E 03 12/ 4,3 19.341	1.36E 04 3.69E 03 12/ 4,3 18.211	5.85E 04 3.69E 03 12/ 4,3 19.338	1.39E 04 3.69E 03 12/ 4,3 18.208	9.80E 03 3.69E 03 12/ 4,3 17.998	4.48E 04 3.69E 03 12/ 4,3 20.074	1.47E 04 3.69E 03 12/ 4,3 18.265	4.36E 04 3.69E 03 12/ 4,3 20.069	1.56E 04 3.69E 03 12/ 4,3 18.254
5+	6.02E 03 3.50E 04 11/ 6,5 13.341	1.18E 04 3.50E 04 11/ 6,5 12.941	5.32E 03 3.50E 04 11/ 6,5 13.333	1.06E 04 3.50E 04 11/ 6,5 12.933	1.62E 04 3.50E 04 11/ 6,5 13.105	1.13E 04 3.50E 04 11/ 6,5 13.469	1.83E 04 3.50E 04 11/ 6,5 13.024	1.04E 04 3.50E 04 11/ 6,5 13.463	1.74E 04 3.50E 04 11/ 6,5 13.018
5+	2.65E 05 1.64E 05 11/ 5,5 16.385	3.07E 05 1.64E 05 11/ 5,5 16.094	2.53E 05 1.64E 05 11/ 5,5 16.374	2.97E 05 1.64E 05 11/ 5,5 16.082	3.28E 05 1.64E 05 11/ 5,5 16.140	1.34E 05 1.64E 05 11/ 5,5 15.810	3.55E 05 1.64E 05 11/ 5,5 16.046	1.32E 05 1.64E 05 11/ 5,5 15.801	3.49E 05 1.64E 05 11/ 5,5 16.041
5+	1.05E 05 1.22E 05 11/ 4,5 19.588	1.46E 05 1.22E 05 11/ 4,5 19.233	9.50E 04 1.22E 05 11/ 4,5 19.571	1.35E 05 1.22E 05 11/ 4,5 19.215	1.32E 05 1.22E 05 11/ 4,5 19.227	3.59E 01 1.22E 05 11/ 4,5 19.196	5.47E 04 1.22E 05 11/ 4,5 19.033	7.52E-01 1.22E 05 11/ 4,5 19.190	5.26E 04 1.22E 05 11/ 4,5 19.028
5+	1.29E 05 1.06E 05 12/ 4,5 20.016	1.78E 05 1.06E 05 12/ 4,5 19.707	1.21E 05 1.06E 05 12/ 4,5 20.008	1.70E 05 1.06E 05 12/ 4,5 19.698	1.52E 05 1.06E 05 12/ 4,5 19.696	2.26E 05 1.06E 05 12/ 4,5 19.418	2.26E 05 1.06E 05 12/ 4,5 19.579	2.22E 05 1.06E 05 12/ 4,5 19.411	2.20E 05 1.06E 05 12/ 4,5 19.576
6+	5.61E 06 3.83E 06 11/ 6,3 12.014	5.07E 06 3.83E 06 11/ 6,3 10.623	6.05E 06 3.83E 06 11/ 6,3 11.954	5.55E 06 3.83E 06 11/ 6,3 10.557	5.35E 06 3.83E 06 11/ 6,3 10.850	5.72E 06 3.83E 06 11/ 6,3 12.596	4.86E 06 3.83E 06 11/ 6,3 10.858	6.11E 06 3.83E 06 11/ 6,3 12.539	5.31E 06 3.83E 06 11/ 6,3 10.794
6+	2.26E 06 1.49E 06 11/ 4,3 18.358	1.68E 06 1.49E 06 11/ 4,3 17.210	2.31E 06 1.49E 06 11/ 4,3 18.346	1.74E 06 1.49E 06 11/ 4,3 17.197	1.80E 06 1.49E 06 11/ 4,3 17.194	3.13E 06 1.49E 06 11/ 4,3 18.786	1.96E 06 1.49E 06 11/ 4,3 17.479	3.12E 06 1.49E 06 11/ 4,3 18.781	1.95E 06 1.49E 06 11/ 4,3 17.473
6+	2.15E 06 3.83E 06 11/ 6,5 13.719	2.67E 06 3.83E 06 11/ 6,5 13.455	2.14E 06 3.83E 06 11/ 6,5 13.718	2.67E 06 3.83E 06 11/ 6,5 13.452	2.66E 06 3.83E 06 11/ 6,5 13.438	1.75E 06 3.83E 06 11/ 6,5 13.915	2.61E 06 3.83E 06 11/ 6,5 13.561	1.76E 06 3.83E 06 11/ 6,5 13.914	2.63E 06 3.83E 06 11/ 6,5 13.559
6+	6.01E 05 1.49E 06 11/ 4,5 19.165	1.21E 06 1.49E 06 11/ 4,5 18.833	5.80E 05 1.49E 06 11/ 4,5 19.162	1.18E 06 1.49E 06 11/ 4,5 18.829	1.13E 06 1.49E 06 11/ 4,5 18.989	2.37E 04 1.49E 06 11/ 4,5 19.390	1.21E 06 1.49E 06 11/ 4,5 19.058	2.38E 04 1.49E 06 11/ 4,5 19.386	1.20E 06 1.49E 06 11/ 4,5 19.054

```
7*      1.09E 08  3.90E 07  1.09E 08  3.92E 07  3.31E 07  2.05E 07  4.92E 07  2.07E 07  5.02E 07
        8.59E 06  8.59E 06  8.59E 06  8.59E 06  8.59E 06  8.59E 06  8.59E 06  8.59E 06  8.59E 06
        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 08  2.15E 08  1.38E 08  2.07E 08  2.16E 08  2.34E 08  2.05E 08  2.32E 08  2.03E 08
        2.46E 08  2.46E 08  2.46E 08  2.46E 08  2.46E 08  2.46E 08  2.46E 08  2.46E 08  2.46E 08
        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 14.802
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	7.11E-03	3.66E-01	2.45E-02	5.92E-06
	1.72E-01	2.15E-01	1.72E-01	2.15E-01	3.43E-02
	10/ 6,4	10/ 5,4	10/ 6,4	10/ 5,4	8/ 6,4
	11.384	9.987	11.186	10.527	9.167
1-	8.35E-03	1.86E-01	1.84E-02	3.91E-01	1.24E-03
	1.72E-01	1.72E-01	2.15E-01	1.08E 00	1.72E-01
	10/ 6,4	10/ 6,4	10/ 5,4	9/ 6,4	10/ 6,4
	12.825	10.274	11.768	11.635	11.459
1-	2.07E-02	1.91E-03	3.38E-01	1.91E-01	7.81E-03
	2.15E-01	1.72E-01	1.08E 00	3.09E-01	2.15E-01
	10/ 5,4	10/ 6,4	9/ 6,4	8/ 4,4	10/ 5,4
	13.171	11.882	12.690	12.555	11.674
1-	2.16E-01	2.67E-01	1.54E-01	1.90E 00	9.42E-01
	3.09E-01	3.09E-01	3.09E-01	1.72E-01	1.08E 00
	8/ 4,4	8/ 4,4	8/ 4,4	10/ 6,4	9/ 6,4
	13.913	12.736	13.594	13.090	12.264
1-	2.88E 00	2.97E 00	9.44E-01	1.14E 00	1.87E 00
	3.09E-01	3.09E-01	3.09E-01	3.09E-01	3.09E-01
	8/ 4,4	8/ 4,4	8/ 4,4	8/ 4,4	8/ 4,4
	15.328	14.111	15.114	13.966	13.106
1-	9.05E-01	9.17E-01	2.32E-01	2.55E-01	4.74E-01
	7.73E-02	7.73E-02	7.73E-02	7.73E-02	7.73E-02
	9/ 4,4	9/ 4,4	9/ 4,4	9/ 4,4	9/ 4,4
	17.741	16.254	17.502	16.116	15.298
2-	5.01E-01	4.55E-01	7.35E-01	8.10E-01	7.11E-01
	2.48E 00	2.48E 00	2.48E 00	2.48E 00	2.48E 00
	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1
	6.549	5.667	6.570	5.460	5.460
2-	2.49E 00	2.66E 00	2.79E 00	4.93E 00	1.58E 00
	3.93E 00	5.26E-01	3.93E 00	3.93E 00	3.93E 00
	7/ 4,1	11/ 7,2	7/ 4,1	7/ 4,1	7/ 4,1
	10.230	7.772	10.251	9.797	9.101
2-	1.12E 00	1.80E-02	9.06E-01	2.01E-01	3.33E-02
	5.26E-01	8.27E-05	5.26E-01	5.26E-01	5.26E-01
	11/ 7,2	8/ 6,3	11/ 7,2	11/ 7,2	11/ 7,2
	8.547	8.655	8.231	7.601	8.166

2-	5.50E-02	1.44E 00	7.00E-04	8.56E-01	1.67E-03
	8.27E-05	6.88E-02	8.27E-05	8.27E-05	8.27E-05
	8/ 6,3	8/ 5,3	8/ 6,3	8/ 6,3	8/ 6,3
	8.673	9.378	8.604	7.213	7.557
2-	1.75E-01	7.97E-01	8.09E-01	3.24E-01	6.70E-02
	1.79E-03	1.79E-03	1.79E-03	6.88E-02	1.79E-03
	10/ 6,3	10/ 6,3	10/ 6,3	8/ 5,3	10/ 6,3
	10.900	11.115	10.661	9.123	9.809
2-	1.30E-01	9.35E-02	2.86E 00	6.50E-03	1.21E-01
	7.15E-02	.00E 00	6.88E-02	1.79E-03	7.15E-02
	8/ 4,3	9/ 5,3	8/ 5,3	10/ 6,3	8/ 4,3
	11.893	11.290	10.992	9.481	10.739
2-	3.88E-01	1.87E-01	2.47E-01	4.19E-01	7.15E-02
	6.14E-02	6.14E-02	6.14E-02	6.14E-02	.00E 00
	9/ 6,3	9/ 6,3	9/ 6,3	9/ 6,3	9/ 5,3
	12.105	12.229	11.171	10.160	11.231
2-	1.96E-01	7.26E-01	1.41E-01	1.10E-01	1.04E 00
	.00E 00	7.15E-02	.00E 00	.00E 00	1.02E-02
	9/ 5,3	8/ 4,3	9/ 5,3	9/ 5,3	10/ 4,3
	12.397	12.707	12.967	11.770	12.977
2-	6.13E-02	1.34E 00	1.31E 00	5.75E-01	1.77E-01
	.00E 00	1.02E-02	4.96E-04	1.02E-02	4.96E-04
	9/ 5,3	10/ 4,3	9/ 4,3	10/ 4,3	9/ 4,3
	12.685	13.215	15.608	13.060	14.543
2-	1.47E 00	1.41E-01	5.98E-01	1.27E-02	3.48E 00
	1.02E-02	4.96E-04	1.02E-02	4.96E-04	1.58E 00
	10/ 4,3	9/ 4,3	10/ 4,3	9/ 4,3	8/ 5,4
	14.375	14.801	16.753	14.480	7.835
2-	2.89E-01	3.96E-04	1.82E 00	7.14E-01	1.22E-02
	4.96E-04	6.26E-02	1.58E 00	1.02E-02	6.26E-02
	9/ 4,3	8/ 6,4	8/ 5,4	10/ 4,3	8/ 6,4
	15.985	7.515	9.211	15.394	8.709
2-	1.25E 00	7.59E-01	1.32E-02	2.48E 00	3.27E 00
	1.58E 00	1.58E 00	6.26E-02	1.58E 00	1.58E 00
	8/ 5,4	8/ 5,4	8/ 6,4	8/ 5,4	8/ 5,4
	9.416	8.073	9.714	7.741	9.560

2-	9.97E-04	1.61E 00	3.34E-01	3.36E-02	4.84E-01
	6.26E-02	6.40E-02	.00E 00	6.26E-02	6.40E-02
	8/ 6,4	9/ 6,4	9/ 5,4	8/ 6,4	9/ 6,4
	9.804	9.776	11.674	8.597	10.287
2-	2.35E 00	4.77E-01	3.15E-02	3.59E-01	3.15E-01
	1.58E 00	8.34E-03	.00E 00	.00E 00	.00E 00
	8/ 5,4	10/ 6,4	9/ 5,4	9/ 5,4	9/ 5,4
	11.002	9.856	11.904	10.546	10.866
2-	1.31E 00	1.57E 00	7.39E-02	4.46E-02	3.19E-04
	.00E 00	.00E 00	8.34E-03	.00E 00	8.34E-03
	9/ 5,4	9/ 5,4	10/ 6,4	9/ 5,4	10/ 6,4
	11.526	10.330	12.232	10.721	11.413
2-	1.57E-01	5.93E-02	9.87E-02	1.01E-01	1.95E-01
	6.40E-02	6.91E-01	6.40E-02	8.34E-03	6.40E-02
	9/ 6,4	8/ 4,4	9/ 6,4	10/ 6,4	9/ 6,4
	13.375	10.763	12.341	11.138	11.853
2-	7.90E-01	1.39E-01	1.06E 00	1.09E-06	6.20E-01
	6.91E-01	8.34E-03	6.91E-01	6.40E-02	6.91E-01
	8/ 4,4	10/ 6,4	8/ 4,4	9/ 6,4	8/ 4,4
	13.824	11.627	13.875	11.229	12.607
2-	4.18E-01	8.19E-01	6.52E-01	1.14E 00	4.97E-01
	3.76E-01	3.76E-01	5.23E-01	6.91E-01	3.76E-01
	9/ 4,4	9/ 4,4	10/ 4,4	8/ 4,4	9/ 4,4
	15.558	14.182	14.384	12.669	14.076
2-	1.48E 00	1.32E 00	1.48E-01	1.52E 00	9.16E-01
	5.23E-01	5.23E-01	3.76E-01	3.76E-01	5.23E-01
	10/ 4,4	10/ 4,4	9/ 4,4	9/ 4,4	10/ 4,4
	16.623	15.454	15.855	14.265	15.212
3-	1.27E 03	1.28E 03	1.23E 03	1.25E 03	2.16E 03
	4.74E 02	4.74E 02	4.74E 02	4.74E 02	4.74E 02
	7/ 5,1	7/ 5,1	7/ 5,1	7/ 5,1	7/ 5,1
	3.941	3.141	4.633	3.686	3.711
3-	2.27E-01	3.18E 00	7.84E-04	1.37E 01	1.59E 01
	1.42E 02	1.42E 02	1.42E 02	1.42E 02	1.42E 02.
	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1
	5.618	4.787	5.829	4.825	4.871

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

3-	4.31E-01	1.03E 02	3.98E 02	2.84E 01	1.32E 02
	1.42E 02	1.02E 02	1.06E 02	1.02E 02	1.02E 02
	9/ 5,4	9/ 6,4	8/ 6,4	9/ 6,4	9/ 6,4
	11.452	9.908	10.024	10.208	9.961
3-	8.94E 01	4.91E 00	3.74E 01	1.76E 02	5.03E 01
	1.42E 02	1.42E 02	1.02E 02	7.08E 01	1.42E 02
	9/ 5,4	9/ 5,4	9/ 6,4	8/ 4,4	9/ 5,4
	12.578	10.335	11.247	10.964	11.314
3-	9.35E 01	7.44E 01	1.78E 02	2.16E 01	9.69E 01
	7.08E 01	1.42E 02	7.08E 01	1.42E 02	7.08E 01
	8/ 4,4	9/ 5,4	8/ 4,4	9/ 5,4	8/ 4,4
	13.125	11.348	12.142	11.272	12.131
3-	1.72E-01	8.14E 01	3.96E 00	8.10E 01	6.76E 00
	6.83E 01	7.08E 01	1.42E 02	6.83E 01	6.83E 01
	9/ 4,4	8/ 4,4	9/ 5,4	9/ 4,4	9/ 4,4
	15.715	11.985	12.592	14.170	14.344
3-	3.32E 02	3.16E 02	6.64E 01	1.28E 02	2.54E 02
	8.85E 01	8.85E 01	6.83E 01	8.85E 01	8.85E 01
	10/ 4,4	10/ 4,4	9/ 4,4	10/ 4,4	10/ 4,4
	16.371	15.107	15.585	15.282	14.949
4-	1.39E 00	1.42E 01	1.41E 01	5.83E 01	3.38E 01
	4.54E 02	4.54E 02	4.54E 02	4.54E 02	4.54E 02
	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1
	5.487	4.617	5.574	4.478	4.730
4-	1.84E 03	1.81E 03	2.08E 03	2.05E 03	1.87E 03
	2.58E 03	2.58E 03	2.58E 03	2.58E 03	2.58E 03
	7/ 5,1	7/ 5,1	7/ 5,1	7/ 5,1	7/ 5,1
	6.287	5.557	6.319	5.492	5.458
4-	3.76E 03	3.61E 03	3.83E 03	3.69E 03	3.23E 03
	2.65E 03	2.65E 03	2.65E 03	2.65E 03	2.65E 03
	7/ 4,1	7/ 4,1	7/ 4,1	7/ 4,1	7/ 4,1
	9.892	9.125	9.571	8.785	8.927
4-	3.61E 01	5.34E 00	7.63E-01	3.04E 01	5.31E 01
	7.56E 02	7.56E 02	7.56E 02	7.56E 02	7.56E 02
	11/ 7,2	11/ 7,2	11/ 7,2	11/ 7,2	11/ 7,2
	9.085	8.410	8.678	7.957	8.425

4-	1.37E 03	6.77E 01	4.61E 02	3.17E 02	1.33E 03
	1.02E 02	2.96E 00	2.96E 00	2.96E 00	1.02E 02
	8/ 4,3	9/ 6,3	9/ 6,3	9/ 6,3	8/ 4,3
	12.104	11.857	12.633	11.587	10.861
4-	5.36E 01	1.83E 03	1.76E 03	2.05E 03	4.66E 01
	2.74E-01	1.02E 02	1.02E 02	1.02E 02	2.96E 00
	9/ 4,3	8/ 4,3	8/ 4,3	8/ 4,3	9/ 6,3
	15.429	12.820	13.978	12.720	11.610
4-	3.05E 01	8.52E 00	9.76E 01	1.29E 02	4.69E 01
	1.38E 01	2.74E-01	2.74E-01	2.74E-01	2.74E-01
	9/ 6,4	9/ 4,3	9/ 4,3	9/ 4,3	9/ 4,3
	11.781	14.289	15.094	14.116	14.220
4-	8.69E 01	6.18E 01	1.28E 02	1.60E 02	3.40E 01
	1.38E 01	1.38E 01	1.38E 01	1.38E 01	1.38E 01
	9/ 6,4	9/ 6,4	9/ 6,4	9/ 6,4	9/ 6,4
	12.880	10.526	11.263	10.238	10.443
4-	2.08E 03	1.68E 03	1.16E 03	1.07E 03	2.00E 03
	2.34E 03	2.34E 03	2.34E 03	2.34E 03	2.34E 03
	8/ 4,4	8/ 4,4	8/ 4,4	8/ 4,4	8/ 4,4
	13.926	11.005	11.984	10.796	12.687
4-	4.57E 02	6.36E 02	1.92E 02	1.74E 02	3.54E 02
	2.07E 02	2.07E 02	2.07E 02	2.07E 02	2.07E 02
	9/ 4,4	9/ 4,4	9/ 4,4	9/ 4,4	9/ 4,4
	14.940	13.499	15.485	13.716	13.677
5-	2.91E 05	2.92E 05	2.91E 05	2.92E 05	3.31E 05
	2.24E 05	2.24E 05	2.24E 05	2.24E 05	2.24E 05
	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1	7/ 6,1
	5.037	4.157	5.429	4.318	4.409
5-	6.70E 04	6.08E 04	8.33E 04	7.14E 04	6.25E 04
	9.61E 04	9.61E 04	9.61E 04	9.61E 04	9.61E 04
	7/ 4,1	7/ 4,1	7/ 4,1	7/ 4,1	7/ 4,1
	9.398	8.677	9.472	8.695	8.633
5-	1.36E 04	1.95E 04	9.91E 03	2.26E 04	3.25E 04
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	11/ 7,2	11/ 7,2	11/ 7,2	11/ 7,2	11/ 7,2
	8.488	7.764	8.985	8.246	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	1.49E 01	1.21E 01	1.28E 01	1.43E 01
	2.93E 01	2.93E 01	2.93E 01	2.93E 01	2.93E 01
	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3
	13.942	12.973	15.169	13.917	13.576
2+	3.63E 01	3.67E 01	4.01E 01	3.92E 01	4.08E 01
	2.34E 01	2.34E 01	2.34E 01	2.34E 01	2.34E 01
	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4
	19.845	18.669	19.620	18.584	18.168
3+	9.78E 01	9.56E 01	1.14E 02	1.11E 02	1.94E 01
	4.07E 01	4.07E 01	4.07E 01	4.07E 01	4.07E 01
	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2
	5.076	4.443	5.021	4.289	4.434
3+	1.03E 02	1.02E 02	1.18E 02	1.18E 02	9.87E 01
	1.08E 02	1.08E 02	1.08E 02	1.08E 02	1.08E 02
	10/ 7,2	10/ 7,2	10/ 7,2	10/ 7,2	10/ 7,2
	7.350	6.675	7.406	6.609	6.570
3+	2.90E 01	2.95E 01	1.72E 01	1.67E 01	2.31E 01
	2.32E 01	2.32E 01	2.32E 01	2.32E 01	2.32E 01
	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2
	9.268	8.430	9.315	8.315	8.391
3+	2.54E 01	2.65E 01	4.03E 01	3.66E 01	2.69E 01
	3.08E 00	3.08E 00	3.08E 00	3.08E 00	3.08E 00
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3
	13.601	12.444	13.791	12.411	12.231
3+	4.32E 01	4.93E 01	6.98E 01	9.95E-02	3.30E 01
	1.26E 01	1.26E 01	1.26E 01	1.26E 01	1.26E 01
	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3	11/ 4,3
	16.327	15.271	15.849	14.726	15.013
3+	4.33E 01	4.24E 01	9.19E 00	8.19E 01	6.37E 01
	1.23E 02	1.23E 02	3.08E 00	1.23E 02	1.23E 02
	11/ 6,4	11/ 6,4	11/ 6,3	11/ 6,4	11/ 6,4
	15.851	14.678	16.012	14.566	14.487
3+	1.44E 02	1.38E 02	1.30E 02	1.32E 02	1.26E 02
	9.29E 01	9.29E 01	9.29E 01	9.29E 01	9.29E 01
	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4
	19.196	18.091	18.873	17.766	17.906

4+	8.32E 01	9.18E 01	1.45E 01	1.62E 01	1.09E 02
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2
	4.693	4.059	4.913	4.181	4.171
4+	1.49E 02	1.70E 02	7.38E 01	8.79E 01	1.64E 02
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	10/ 7,2	10/ 7,2	10/ 7,2	10/ 7,2	10/ 7,2
	6.809	6.133	7.023	6.221	6.226
4+	5.30E 02	5.84E 02	3.55E 02	4.18E 02	4.43E 02
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2
	8.830	7.979	9.045	8.033	8.128
4+	3.25E 03	3.24E 03	1.19E 03	1.47E 03	3.15E 03
	7.46E 03	7.46E 03	7.46E 03	7.46E 03	7.46E 03
	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3
	12.332	11.271	12.637	11.434	11.385
4+	5.72E 02	4.19E 02	1.14E 03	1.30E 03	2.00E 02
	2.05E 03	2.05E 03	2.05E 03	2.05E 03	2.05E 03
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3
	12.777	11.622	13.113	11.730	11.665
4+	7.52E 03	4.80E 03	6.03E 02	3.10E 03	4.04E 03
	5.28E 03	5.28E 03	2.05E 03	5.28E 03	5.28E 03
	11/ 4,3	11/ 4,3	11/ 6,3	11/ 4,3	11/ 4,3
	14.880	15.096	15.147	15.039	14.891
4+	4.67E 03	5.55E 03	3.32E 03	7.71E 02	3.55E 03
	5.28E 03	1.64E 03	5.28E 03	1.64E 03	1.64E 03
	11/ 4,3	11/ 6,4	11/ 4,3	11/ 6,4	11/ 6,4
	16.157	13.786	16.235	13.810	13.898
4+	3.38E 02	2.23E 03	9.79E 03	9.25E 03	7.13E 03
	1.64E 03	5.97E 03	5.97E 03	5.97E 03	5.97E 03
	11/ 6,4	11/ 5,4	11/ 5,4	11/ 5,4	11/ 5,4
	15.009	13.887	15.276	14.177	14.021
4+	9.52E 03	9.51E 03	1.01E 04	1.02E 04	9.26E 03
	4.22E 03	4.22E 03	4.22E 03	4.22E 03	4.22E 03
	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4
	18.681	17.561	18.844	17.731	17.575

5+	2.46E 04	2.40E 04	2.87E 04	2.83E 04	1.15E 05
	1.44E 05	1.44E 05	1.44E 05	1.44E 05	1.44E 05
	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2	8/ 7,2
	5.292	4.659	5.346	4.614	4.559
5+	8.66E 03	8.43E 03	6.29E 03	6.14E 03	8.09E 03
	1.18E 04	1.18E 04	1.18E 04	1.18E 04	1.18E 04
	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2
	8.918	8.079	8.969	7.973	8.171
5+	2.68E 04	1.63E 04	3.91E 04	1.15E 04	1.50E 04
	3.14E 02	3.14E 02	3.14E 02	3.14E 02	3.14E 02
	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3	11/ 6,3
	12.671	11.525	12.731	11.383	11.608
5+	2.00E 05	2.10E 05	1.14E 05	2.38E 05	2.03E 05
	6.32E 03	6.32E 03	6.32E 03	6.32E 03	6.32E 03
	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3	11/ 5,3
	13.187	12.097	15.676	12.070	11.989
5+	8.82E 04	5.86E 04	1.27E 04	1.21E 04	6.89E 04
	7.81E 03	6.32E 03	7.81E 03	7.81E 03	7.81E 03
	11/ 4,3	11/ 5,3	11/ 4,3	11/ 4,3	11/ 4,3
	16.163	14.534	15.871	14.684	14.947
5+	9.73E 02	1.01E 05	2.27E 05	4.79E 03	2.46E 03
	3.08E 04	7.81E 03	1.45E 05	3.08E 04	3.08E 04
	11/ 6,4	11/ 4,3	11/ 5,4	11/ 6,4	11/ 6,4
	14.917	15.099	13.269	13.667	13.856
5+	6.44E 04	1.84E 03	3.08E 03	1.23E 05	9.35E 04
	1.45E 05	3.08E 04	3.08E 04	1.45E 05	1.45E 05
	11/ 5,4	11/ 6,4	11/ 6,4	11/ 5,4	11/ 5,4
	15.620	13.757	14.988	14.512	14.472
5+	1.31E 05	1.26E 05	1.14E 05	1.20E 05	1.14E 05
	1.08E 05	1.08E 05	1.08E 05	1.08E 05	1.08E 05
	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4	11/ 4,4
	19.006	17.922	18.698	17.567	17.813
6+	2.59E 05	2.89E 05	2.50E 05	3.00E 05	2.35E 05
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2	9/ 7,2
	8.580	7.723	8.761	7.734	7.955

```
6+      1.05E 06  9.98E 05  5.15E 05  7.00E 05  9.86E 05
        4.42E 06  4.42E 06  4.42E 06  4.42E 06  4.42E 06
        11/ 6,3   11/ 6,3   11/ 6,3   11/ 6,3   11/ 6,3
          12.548    11.399    13.093    11.677    11.459

6+      1.34E 06  1.23E 06  1.16E 06  6.44E 05  5.22E 05
        1.72E 06  1.72E 06  1.72E 06  1.72E 06  1.72E 06
        11/ 4,3   11/ 4,3   11/ 4,3   11/ 4,3   11/ 4,3
          15.819    14.730    16.093    14.910    14.695

6+      5.45E 06  5.61E 06  3.39E 06  6.00E 06  6.72E 06
        3.54E 06  3.54E 06  1.72E 06  3.54E 06  3.54E 06
        11/ 6,4   11/ 6,4   11/ 4,3   11/ 6,4   11/ 6,4
          14.943    13.792    18.857    13.995    13.891

6+      2.95E 06  2.93E 06  5.74E 06  3.41E 06  2.98E 06
        1.38E 06  1.38E 06  3.54E 06  1.38E 06  1.38E 06
        11/ 4,4   11/ 4,4   11/ 6,4   11/ 4,4   11/ 4,4
          18.543    17.453    15.276    17.706    17.524

7+      6.28E 07  7.11E 07  1.45E 08  1.56E 08  6.01E 07
        9.93E 06  2.27E 08  9.93E 06  9.93E 06  9.93E 06
        11/ 4,3   11/ 4,4   11/ 4,3   11/ 4,3   11/ 4,3
          16.243    15.170    19.119    17.947    15.026

7+      1.74E 08  1.66E 08  9.29E 07  8.17E 07  1.71E 08
        2.27E 08  2.27E 08  2.27E 08  2.27E 08  2.27E 08
        11/ 4,4   11/ 4,4   11/ 4,4   11/ 4,4   11/ 4,4
          19.132    18.050    16.185    15.054    17.917
*STOP* 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 7.808	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 7.624
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	4.89E-03	9.37E-02	1.88E-01	6.87E-02
	1.05E-01	4.40E-01	1.05E-01	1.32E 00	1.05E-01
	13/ 7,3	15/ 9,3	13/ 7,3	12/ 8,4	13/ 7,3
	12.177	9.881	10.922	8.070	13.803
1-	4.11E-02	6.45E-04	2.35E-04	1.32E-01	8.46E-02
	1.32E 00	1.05E-01	1.32E 00	2.69E-02	1.32E 00
	12/ 8,4	13/ 7,3	12/ 8,4	12/ 9,4	12/ 8,4
	8.580	11.581	7.465	9.020	7.474
1-	1.22E-02	1.22E-02	4.10E-02	4.41E-01	6.62E-02
	2.69E-02	2.69E-02	2.69E-02	2.43E 00	2.69E-02
	12/ 9,4	12/ 9,4	12/ 9,4	13/ 9,4	12/ 9,4
	8.936	8.282	8.209	9.592	8.296
1-	7.20E-01	5.10E-01	1.06E 00	1.69E-01	4.71E-01
	2.43E 00	2.43E 00	1.32E 00	4.19E-01	2.43E 00
	13/ 9,4	13/ 9,4	12/ 8,4	14/ 8,4	13/ 9,4
	9.766	9.036	8.670	10.529	8.955
1-	1.16E-03	1.63E-03	1.19E-02	1.57E-03	3.03E-02
	4.19E-01	4.19E-01	4.19E-01	4.19E-01	4.19E-01
	14/ 8,4	14/ 8,4	14/ 8,4	14/ 8,4	14/ 8,4
	10.480	9.534	9.543	10.814	9.802
1-	1.38E-01	9.27E-02	2.63E 00	1.93E 00	6.87E-02
	1.47E-01	1.47E-01	2.43E 00	5.39E-01	1.47E-01
	15/ 8,4	15/ 8,4	13/ 9,4	12/ 7,4	15/ 8,4
	11.228	10.407	10.128	11.005	10.082
1-	6.42E-01	1.41E 00	4.84E-01	8.45E-01	1.86E 00
	5.39E-01	5.39E-01	1.47E-01	3.77E-01	5.39E-01
	12/ 7,4	12/ 7,4	15/ 8,4	15/ 9,4	12/ 7,4
	11.576	10.896	10.430	11.218	10.398
1-	8.70E-01	3.87E-01	1.80E-01	2.22E-03	1.11E 00
	3.77E-01	3.77E-01	5.39E-01	1.47E-01	3.77E-01
	15/ 9,4	15/ 9,4	12/ 7,4	15/ 8,4	15/ 9,4
	11.644	10.948	10.753	11.438	10.608
1-	5.01E 00	4.78E 00	3.43E 00	5.24E 00	5.21E 00
	3.77E-01	3.77E-01	3.77E-01	3.77E-01	3.77E-01
	15/ 9,4	15/ 9,4	15/ 9,4	15/ 9,4	15/ 9,4
	13.127	12.439	11.511	12.606	12.025

1-	2.74E 00	3.01E 00	1.45E 00	3.43E-01	4.03E-01
	8.98E-02	8.98E-02	8.98E-02	8.98E-02	8.98E-02
	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4
	14.262	13.405	12.373	13.865	13.091
2-	1.21E-01	8.66E-02	3.75E-01	2.98E-02	7.04E-02
	5.05E 00	5.05E 00	5.05E 00	5.05E 00	5.05E 00
	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1
	5.414	4.920	4.828	5.462	4.825
2-	4.00E 00	3.86E 00	4.29E 00	4.06E 00	3.80E 00
	8.78E 00	8.78E 00	8.78E 00	8.78E 00	8.78E 00
	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1
	6.671	6.235	6.369	6.400	5.891
2-	2.62E 00	7.29E 00	3.14E 00	3.11E 00	3.25E 00
	1.55E 00	8.78E 00	1.55E 00	1.55E 00	1.55E 00
	12/10,2	11/ 7,1	12/10,2	12/10,2	12/10,2
	5.763	8.085	5.178	5.764	5.059
2-	6.78E-03	2.60E 00	1.37E-01	6.38E-05	9.90E-01
	9.70E-02	1.55E 00	9.70E-02	9.70E-02	9.70E-02
	15/10,2	12/10,2	15/10,2	15/10,2	15/10,2
	8.264	5.243	7.794	7.912	7.872
2-	1.49E-01	7.15E-02	6.94E-01	7.12E-01	3.73E 00
	2.85E-01	9.70E-02	2.85E-01	9.70E-02	5.00E-01
	12/ 8,3	15/10,2	12/ 8,3	15/10,2	16/11,2
	7.200	7.824	6.567	8.123	8.225
2-	5.21E-03	4.33E-01	2.47E-03	5.45E 00	3.15E-01
	1.61E-04	2.85E-01	1.61E-04	5.00E-01	2.85E-01
	12/ 9,3	12/ 8,3	12/ 9,3	16/11,2	12/ 8,3
	7.487	6.678	6.821	8.787	6.195
2-	1.55E-03	4.59E-03	1.76E-02	1.37E-01	1.32E-01
	.00E 00	1.61E-04	.00E 00	2.85E-01	1.61E-04
	13/ 8,3	12/ 9,3	13/ 8,3	12/ 8,3	12/ 9,3
	8.312	6.865	7.619	6.911	6.699
2-	3.98E-02	3.99E-02	4.33E-01	6.17E-02	9.23E-02
	3.14E-01	.00E 00	3.14E-01	1.61E-04	.00E 00
	13/ 9,3	13/ 8,3	13/ 9,3	12/ 9,3	13/ 8,3
	9.150	7.723	8.353	7.404	7.548

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

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

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

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

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

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

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

4-	5.71E 02	2.76E 02	2.07E 02	4.10E 02	4.09E 02
	1.45E 02	1.45E 02	1.45E 02	1.45E 02	1.45E 02
	13/ 8,4	13/ 8,4	13/ 8,4	13/ 8,4	13/ 8,4
	9.082	8.422	8.500	9.138	8.473
4-	3.92E 02	3.67E 02	1.86E 02	1.95E 02	3.29E 02
	1.25E 02	1.25E 02	1.25E 02	1.25E 02	1.25E 02
	13/ 9,4	13/ 9,4	13/ 9,4	13/ 9,4	13/ 9,4
	9.846	9.059	9.030	9.481	8.920
4-	3.50E 03	4.12E 03	4.61E 03	4.33E 03	5.30E 03
	4.90E 03	4.90E 03	4.90E 03	4.90E 03	4.90E 03
	12/ 7,4	12/ 7,4	12/ 7,4	12/ 7,4	12/ 7,4
	10.851	10.211	10.230	10.841	10.206
4-	4.15E 02	4.97E 02	2.39E 02	1.98E 02	2.42E 02
	2.50E 01	2.50E 01	2.50E 01	2.50E 01	2.50E 01
	15/ 9,4	15/ 9,4	15/ 9,4	15/ 9,4	15/ 9,4
	11.413	10.771	10.736	11.220	10.618
4-	1.20E 03	1.28E 03	1.02E 03	1.66E 03	2.15E 03
	1.03E 03	1.03E 03	1.03E 03	1.03E 03	1.03E 03
	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4
	11.991	11.169	11.194	12.115	11.279
4-	4.22E 03	3.91E 03	4.39E 03	3.42E 03	3.71E 03
	3.71E 03	3.71E 03	3.71E 03	3.71E 03	3.71E 03
	14/ 7,4	14/ 7,4	14/ 7,4	14/ 7,4	14/ 7,4
	12.887	12.287	12.291	12.916	12.282
4-	4.21E 03	4.39E 03	2.71E 03	2.77E 03	3.08E 03
	1.15E 03	1.15E 03	1.15E 03	1.15E 03	1.15E 03
	15/ 7,4	15/ 7,4	15/ 7,4	15/ 7,4	15/ 7,4
	13.499	12.851	12.862	13.539	12.832
5-	2.32E 06	2.48E 06	2.45E 06	1.94E 06	2.19E 06
	7.64E 05	7.64E 05	7.64E 05	7.64E 05	7.64E 05
	11/ 8,1	11/ 8,1	11/ 8,1	11/ 8,1	11/ 8,1
	3.786	3.363	3.593	3.966	3.474
5-	3.77E 05	2.38E 05	5.38E 05	4.48E 05	2.12E 05
	5.32E 05	5.32E 05	5.32E 05	5.32E 05	5.32E 05
	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1
	4.490	4.003	4.099	4.671	4.049

5-	7.75E 05	7.90E 05	1.64E 06	2.35E 04	1.57E 05
	7.98E 05	7.98E 05	7.98E 05	7.98E 05	7.98E 05
	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1
	6.050	5.556	5.838	6.877	6.335
5-	6.20E 03	1.78E 04	2.14E 04	2.41E 02	3.79E 02
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	7.711	7.511	7.482	7.745	7.481
5-	1.48E 04	9.20E 02	1.95E 03	1.21E 06	1.11E 06
	5.92E 05	5.92E 05	5.92E 05	5.92E 05	5.92E 05
	12/ 9,3	12/ 9,3	12/ 9,3	12/ 9,3	12/ 9,3
	6.934	6.386	6.492	6.440	5.777
5-	5.90E 04	1.53E 03	3.16E 04	1.94E 04	1.39E 04
	7.64E 05	7.64E 05	7.64E 05	7.64E 05	7.64E 05
	13/ 8,3	13/ 8,3	13/ 8,3	13/ 8,3	13/ 8,3
	8.012	7.216	7.169	8.101	7.229
5-	7.11E 03	9.63E 03	1.92E 04	3.75E 05	3.79E 05
	2.47E 05	2.47E 05	2.47E 05	2.47E 05	2.47E 05
	13/ 9,3	13/ 9,3	13/ 9,3	13/ 9,3	13/ 9,3
	8.282	7.783	7.769	8.552	8.071
5-	1.34E 05	1.70E 05	9.10E 04	1.96E 05	2.05E 05
	2.37E 05	2.37E 05	2.37E 05	2.37E 05	2.37E 05
	12/ 7,3	12/ 7,3	12/ 7,3	12/ 7,3	12/ 7,3
	9.480	8.992	8.970	9.953	9.265
5-	1.68E 05	2.01E 05	4.20E 04	8.01E 04	1.55E 05
	2.85E 05	2.85E 05	2.85E 05	2.85E 05	2.85E 05
	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3
	10.628	10.082	9.980	11.082	10.328
5-	2.32E 05	5.83E 02	2.24E 04	2.20E 02	1.65E 03
	2.85E 05	5.52E 05	5.52E 05	5.52E 05	5.52E 05
	13/ 7,3	15/ 7,3	15/ 7,3	15/ 7,3	15/ 7,3
	10.714	11.513	11.517	12.651	11.849
5-	3.10E 05	6.80E 05	7.27E 05	6.29E 05	5.81E 05
	5.52E 05	5.07E 05	5.07E 05	5.07E 05	5.07E 05
	15/ 7,3	12/ 9,4	12/ 9,4	12/ 9,4	12/ 9,4
	12.055	8.089	8.051	8.675	7.982

5-	7.18E 05	4.75E 04	3.42E 05	1.43E 05	2.05E 05
	5.07E 05	6.55E 05	6.55E 05	6.55E 05	6.55E 05
	12/ 9,4	13/ 8,4	13/ 8,4	13/ 8,4	13/ 8,4
	8.732	8.601	8.650	9.343	8.688
5-	1.78E 05	7.46E 05	7.22E 05	4.19E 05	3.10E 05
	6.55E 05	2.12E 05	2.12E 05	2.12E 05	2.12E 05
	13/ 8,4	13/ 9,4	13/ 9,4	13/ 9,4	13/ 9,4
	9.282	8.792	8.835	9.511	8.887
5-	6.00E 05	1.96E 05	3.44E 05	2.43E 05	2.04E 05
	2.12E 05	2.03E 05	2.03E 05	2.03E 05	2.03E 05
	13/ 9,4	12/ 7,4	12/ 7,4	12/ 7,4	12/ 7,4
	9.635	9.988	10.114	10.787	10.148
5-	1.37E 05	4.81E 05	5.44E 05	4.29E 05	4.41E 05
	2.44E 05	2.44E 05	2.44E 05	2.44E 05	2.44E 05
	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4
	12.204	11.273	11.264	12.139	11.281
5-	1.02E 06	1.01E 06	9.17E 05	9.01E 05	8.93E 05
	4.73E 05	4.73E 05	4.73E 05	4.73E 05	4.73E 05
	15/ 7,4	15/ 7,4	15/ 7,4	15/ 7,4	15/ 7,4
	13.721	13.059	13.000	13.826	13.119
6-	9.96E 06	5.58E 06	1.10E 07	1.23E 07	1.70E 06
	2.31E 07	2.31E 07	2.31E 07	2.31E 07	1.42E 06
	11/ 8,1	11/ 8,1	11/ 8,1	11/ 8,1	11/ 9,1
	4.416	3.982	3.979	4.484	3.934
6-	7.80E 06	1.20E 07	7.44E 06	7.35E 06	1.79E 07
	1.42E 06	1.42E 06	1.42E 06	1.42E 06	2.31E 07
	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1	11/ 8,1
	4.694	4.222	4.210	4.690	4.128
6-	1.36E 07	1.39E 07	1.30E 07	1.22E 07	1.24E 07
	1.46E 07	1.46E 07	1.46E 07	1.46E 07	1.46E 07
	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1
	7.158	6.724	6.653	6.870	6.410
6-	1.01E 07	9.38E 06	7.85E 06	1.14E 07	1.09E 07
	6.04E 06	6.04E 06	6.04E 06	6.04E 06	6.04E 06
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	7.956	7.571	7.536	7.752	7.357

6-	2.01E 05	3.64E 05	2.47E 05	3.36E 02	2.92E 01
	9.23E 03	9.23E 03	9.23E 03	9.23E 03	9.23E 03
	13/ 9,3	13/ 9,3	13/ 9,3	13/ 9,3	13/ 9,3
	8.751	8.262	8.090	8.638	8.060
6-	2.38E 06	3.47E 06	2.68E 06	4.34E 06	3.13E 06
	9.21E 05	9.21E 05	9.21E 05	9.21E 05	9.21E 05
	12/ 7,3	12/ 7,3	12/ 7,3	12/ 7,3	12/ 7,3
	9.904	9.349	9.217	10.016	9.314
6-	1.93E 05	3.04E 05	2.41E 05	6.37E 06	4.40E 06
	1.28E 03	1.28E 03	1.28E 03	1.28E 03	1.28E 03
	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3
	10.680	10.016	10.017	10.619	9.895
6-	2.31E 05	7.08E 04	6.00E 04	4.21E 05	4.23E 05
	4.61E 04	4.61E 04	4.61E 04	4.61E 04	4.61E 04
	13/ 9,4	13/ 9,4	13/ 9,4	13/ 9,4	13/ 9,4
	9.953	9.169	9.106	9.543	8.950
6-	2.71E 07	2.63E 07	2.61E 07	1.82E 07	2.16E 07
	2.26E 07	2.26E 07	2.26E 07	2.26E 07	2.26E 07
	12/ 7,4	12/ 7,4	12/ 7,4	12/ 7,4	12/ 7,4
	11.019	10.376	10.330	11.015	10.350
6-	2.18E 06	2.36E 06	1.62E 06	1.36E 06	1.31E 06
	1.04E 06	1.04E 06	1.04E 06	1.04E 06	1.04E 06
	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4
	11.779	10.959	11.063	11.955	11.081
7-	2.12E 09	2.12E 09	2.26E 09	2.13E 09	2.13E 09
	1.67E 09	1.67E 09	1.67E 09	1.67E 09	1.67E 09
	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1	11/ 9,1
	4.361	3.843	4.011	4.570	3.897
7-	3.24E 08	3.35E 08	4.57E 08	4.40E 08	4.51E 08
	4.94E 08	4.94E 08	4.94E 08	4.94E 08	4.94E 08
	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1
	6.687	6.250	6.359	6.967	6.503
7-	5.48E 07	4.52E 07	1.02E 07	9.67E 06	5.82E 06
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	7.762	7.377	7.390	7.910	7.512

7-	2.31E 08	1.98E 08	3.22E 08	1.28E 08	1.05E 08
	8.65E 08	8.65E 08	8.65E 08	8.65E 08	8.65E 08
	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3	13/ 7,3
	10.196	9.587	9.666	10.519	9.777
7-	1.04E 09	1.07E 09	1.20E 09	1.06E 09	1.08E 09
	7.41E 08	7.41E 08	7.41E 08	7.41E 08	7.41E 08
	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4	13/ 7,4
	12.321	11.450	11.378	12.283	11.396
8-	3.45E 10	3.54E 10	3.76E 10	4.09E 10	4.15E 10
	4.56E 10	4.56E 10	4.56E 10	4.56E 10	4.56E 10
	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1	11/ 7,1
	7.335	6.902	6.775	7.315	6.859
8-	3.51E 10	3.42E 10	2.86E 10	2.87E 10	2.81E 10
	2.40E 10	2.40E 10	2.40E 10	2.40E 10	2.40E 10
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	7.996	7.618	7.563	7.772	7.383
9-	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	7.706	7.329	7.382	7.935	7.546
10-	6.93E 13	6.93E 13	6.69E 13	6.93E 13	6.93E 13
	6.93E 13	6.93E 13	6.93E 13	6.93E 13	6.93E 13
	16/11,2	16/11,2	16/11,2	16/11,2	16/11,2
	8.140	7.763	7.660	8.110	7.721
1+	2.36E-02	2.37E-02	2.11E-02	2.35E-02	2.36E-02
	2.47E-02	2.47E-02	2.47E-02	2.47E-02	2.47E-02
	10/ 8,1	10/ 8,1	10/ 8,1	10/ 8,1	10/ 8,1
	4.025	3.391	3.229	4.167	3.375
1+	5.81E-03	5.76E-03	4.72E-03	5.98E-03	5.91E-03
	4.77E-03	4.77E-03	4.77E-03	4.77E-03	4.77E-03
	13/11,2	13/11,2	13/11,2	13/11,2	13/11,2
	7.645	7.149	6.539	7.387	6.778
2+	6.17E 01	6.32E 01	8.27E 01	5.70E 01	5.97E 01
	2.84E 01	2.74E 01	2.74E 01	2.84E 01	2.74E 01
	10/ 9,1	10/ 8,1	10/ 8,1	10/ 9,1	10/ 8,1
	2.756	2.259	2.522	2.903	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	6.69E 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	3.891	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	4.88E-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	2.73E 01	2.56E 01	2.84E 01	2.81E 01
	1.97E 02	1.97E 02	1.97E 02	1.97E 02	1.97E 02
	15/11,2	15/11,2	15/11,2	15/11,2	15/11,2
	7.956	7.569	7.410	7.912	7.442
3+	1.64E 01	1.85E 01	1.84E 01	2.87E 01	2.52E 01
	8.57E 00	8.57E 00	8.57E 00	8.57E 00	8.57E 00
	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3
	11.076	10.447	10.227	11.297	10.464
3+	1.84E-01	5.63E-01	7.78E-02	3.98E 01	1.85E 01
	4.42E 01	4.42E 01	4.42E 01	4.42E 01	4.42E 01
	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3
	12.863	12.346	12.158	12.561	11.848
3+	1.64E 02	1.62E 02	2.34E 02	1.67E 02	2.07E 02
	3.68E 02	3.68E 02	3.68E 02	3.68E 02	3.68E 02
	16/ 9,4	16/ 9,4	16/ 9,4	16/ 9,4	16/ 9,4
	12.444	11.733	11.525	12.439	11.669
3+	5.40E 02	5.43E 02	4.37E 02	4.73E 02	4.59E 02
	2.58E 02	2.58E 02	2.58E 02	2.58E 02	2.58E 02
	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4
	14.455	13.744	13.517	14.260	13.644
4+	2.01E 04	9.24E 03	6.22E 03	2.26E 04	1.97E 04
	2.03E 04	.00E 00	.00E 00	2.03E 04	2.03E 04
	10/ 7,1	12/11,2	12/11,2	10/ 7,1	10/ 7,1
	5.573	4.067	4.249	5.909	5.356
4+	8.13E 03	1.82E 04	2.02E 04	2.91E 03	3.66E 03
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	12/11,2	13/11,2	13/11,2	12/11,2	12/11,2
	4.435	5.122	5.267	4.674	4.254
4+	5.59E 03	7.09E 03	8.72E 03	3.69E 03	6.92E 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
	6.193	5.731	5.679	6.192	5.611
4+	7.52E 02	4.37E 02	2.84E 01	2.00E 03	1.35E 03
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	14/11,2	14/11,2	14/11,2	14/11,2	14/11,2
	6.743	6.387	6.402	6.844	6.427

4+	5.00E 01	1.11E 02	2.47E 02	4.08E 02	5.91E 02
	.00E 00	.00E 00	.00E 00	.00E 00	.00E 00
	15/11,2	15/11,2	15/11,2	15/11,2	15/11,2
	7.494	7.104	7.113	7.605	7.130
4+	3.48E 04	3.37E 04	3.77E 04	3.07E 04	3.14E 04
	4.52E 04	4.52E 04	4.52E 04	4.52E 04	4.52E 04
	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3
	9.236	8.686	8.850	9.554	8.872
4+	3.83E 03	3.45E 03	3.10E 03	7.36E 03	4.87E 03
	5.25E 03	5.25E 03	5.25E 03	5.25E 03	5.25E 03
	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3
	10.429	9.785	9.763	10.723	9.903
4+	9.15E 02	2.97E 02	4.81E 02	1.76E 02	2.62E 02
	2.62E 04	2.62E 04	2.62E 04	2.62E 04	2.62E 04
	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3
	12.342	11.813	11.784	12.602	11.904
4+	1.67E 04	1.37E 04	2.53E 04	1.32E 04	6.68E 03
	3.87E 04	3.87E 04	3.87E 04	3.87E 04	3.87E 04
	16/ 8,4	16/ 8,4	16/ 8,4	16/ 8,4	16/ 8,4
	11.296	10.654	10.684	11.421	10.730
4+	2.44E 04	2.76E 04	3.13E 04	3.29E 04	4.11E 04
	4.50E 03	4.50E 03	4.50E 03	4.50E 03	3.87E 04
	16/ 9,4	16/ 9,4	16/ 9,4	16/ 9,4	16/ 8,4
	11.817	11.157	11.105	11.883	11.193
4+	4.75E 04	4.88E 04	4.40E 04	4.66E 04	4.62E 04
	2.25E 04	2.25E 04	2.25E 04	2.25E 04	2.25E 04
	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4
	14.191	13.473	13.366	14.109	13.502
5+	2.52E 04	2.48E 04	1.39E 05	3.53E 04	3.50E 04
	2.62E 05	2.62E 05	2.62E 05	2.62E 05	2.62E 05
	12/11,2	12/11,2	12/11,2	12/11,2	12/11,2
	4.881	4.530	4.518	4.824	4.417
5+	2.72E 04	2.99E 04	3.37E 04	6.26E 04	5.92E 04
	6.54E 04	6.54E 04	6.54E 04	6.54E 04	6.54E 04
	13/11,2	13/11,2	13/11,2	13/11,2	13/11,2
	5.927	5.432	5.461	5.995	5.387

5+	6.02E 05	5.83E 05	6.59E 05	6.15E 05	5.95E 05
	8.45E 05	8.45E 05	8.45E 05	8.45E 05	8.45E 05
	14/11,2	14/11,2	14/11,2	14/11,2	14/11,2
	6.917	6.569	6.544	6.964	6.557
5+	2.69E 05	2.78E 05	2.15E 05	2.50E 05	2.74E 05
	1.61E 05	1.61E 05	1.61E 05	1.61E 05	1.61E 05
	15/11,2	15/11,2	15/11,2	15/11,2	15/11,2
	7.507	7.125	7.126	7.505	7.040
5+	5.18E 05	4.95E 05	4.62E 05	5.20E 05	4.97E 05
	5.12E 05	5.12E 05	5.12E 05	5.12E 05	5.12E 05
	16/10,2	16/10,2	16/10,2	16/10,2	16/10,2
	8.578	8.185	8.147	8.623	8.161
5+	1.03E 05	9.81E 04	9.01E 04	1.28E 05	9.49E 04
	2.87E 04	2.87E 04	2.87E 04	2.87E 04	2.87E 04
	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3
	10.079	9.494	9.457	10.018	9.326
5+	8.22E 04	1.07E 05	6.10E 04	1.15E 05	1.22E 05
	1.87E 03	1.87E 03	1.87E 03	1.87E 03	1.87E 03
	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3
	10.554	9.923	9.834	10.630	9.807
5+	3.45E 04	6.60E 04	2.65E 04	3.67E 05	1.31E 04
	4.37E 04	4.37E 04	4.37E 04	4.24E 05	4.37E 04
	16/ 7,3	16/ 7,3	16/ 7,3	16/ 8,4	16/ 7,3
	12.801	12.279	12.159	11.124	11.843
5+	2.99E 05	2.57E 05	3.53E 05	2.48E 05	3.49E 05
	4.24E 05	4.24E 05	4.24E 05	1.97E 05	4.24E 05
	16/ 8,4	16/ 8,4	16/ 8,4	16/ 9,4	16/ 8,4
	11.122	10.504	10.562	11.734	10.529
5+	3.09E 05	3.34E 05	3.33E 05	1.50E 04	3.03E 05
	1.97E 05	1.97E 05	1.97E 05	4.37E 04	1.97E 05
	16/ 9,4	16/ 9,4	16/ 9,4	16/ 7,3	16/ 9,4
	11.689	10.992	10.996	12.528	10.950
5+	7.37E 05	7.20E 05	5.90E 05	6.29E 05	6.32E 05
	4.52E 05	4.52E 05	4.52E 05	4.52E 05	4.52E 05
	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4	16/ 7,4
	14.034	13.340	13.303	13.852	13.242

6+	1•60E 05	1•83E 05	1•43E 05	2•50E 04	3•20E 04
	•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•668	4•316	4•376	4•801	4•392
6+	8•06E 05	8•22E 05	6•56E 05	6•51E 05	6•89E 05
	•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
	5•776	5•281	5•369	5•898	5•291
6+	1•27E 06	1•44E 06	8•89E 05	6•53E 05	7•71E 05
	•00E 00	•00E 00	•00E 00	•00E 00	•00E 00
	15/11,2	15/11,2	15/11,2	15/11,2	15/11,2
	7•300	6•912	7•013	7•471	6•999
6+	1•17E 06	1•38E 06	1•08E 06	4•61E 05	5•49E 05
	•00E 00	•00E 00	•00E 00	•00E 00	•00E 00
	16/10,2	16/10,2	16/10,2	16/10,2	16/10,2
	8•343	7•954	7•979	8•449	7•992
6+	1•52E 07	1•47E 07	1•48E 07	1•09E 07	1•33E 07
	2•05E 07	2•05E 07	2•05E 07	2•05E 07	2•05E 07
	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3	16/ 8,3
	9•740	9•170	9•218	9•912	9•225
6+	5•20E 06	4•26E 06	4•46E 06	7•90E 06	4•70E 06
	1•32E 07	1•32E 07	1•32E 07	1•32E 07	1•32E 07
	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3	16/ 9,3
	10•271	9•635	9•649	10•534	9•716
6+	6•56E 05	4•44E 05	1•84E 06	1•22E 06	1•82E 06
	1•75E 07	1•75E 07	1•75E 07	1•75E 07	1•75E 07
	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3	16/ 7,3
	12•439	11•919	11•910	12•768	12•086
6+	1•58E 07	1•47E 07	1•90E 07	1•48E 07	1•19E 07
	1•75E 07	1•75E 07	1•75E 07	1•75E 07	1•75E 07
	16/ 8,4	16/ 8,4	16/ 8,4	16/ 8,4	16/ 8,4
	11•053	10•438	10•510	11•122	10•505
6+	2•55E 07	2•67E 07	2•66E 07	2•67E 07	3•01E 07
	1•13E 07	1•13E 07	1•13E 07	1•13E 07	1•13E 07
	16/ 9,4	16/ 9,4	16/ 9,4	16/ 9,4	16/ 9,4
	11•670	10•968	10•987	11•699	10•928

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

```
8+      1.75E 09   1.85E 09   1.62E 09   2.31E 09   2.52E 09
         .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
          5.653      5.154      5.280      5.748      5.130

8+      3.23E 10   3.09E 10   3.06E 10   2.51E 10   2.60E 10
        5.23E 10   5.23E 10   5.23E 10   5.23E 10   5.23E 10
        16/ 9,3    16/ 9,3    16/ 9,3    16/ 9,3    16/ 9,3
          9.951      9.317      9.421     10.417      9.566

8+      1.26E 07   8.95E 07   4.52E 08   4.23E 07   4.29E 07
        1.43E 10   1.43E 10   1.43E 10   1.43E 10   1.43E 10
        16/ 7,3    16/ 7,3    16/ 7,3    16/ 7,3    16/ 7,3
          12.551     12.017     11.993     12.870     12.196

8+      6.38E 10   6.44E 10   7.05E 10   6.43E 10   6.41E 10
        4.48E 10   4.48E 10   4.48E 10   4.48E 10   4.48E 10
        16/ 9,4    16/ 9,4    16/ 9,4    16/ 9,4    16/ 9,4
          11.790     11.076     11.063     11.941     11.163

8+      2.58E 10   2.64E 10   2.43E 10   3.17E 10   3.08E 10
        1.22E 10   1.22E 10   1.22E 10   1.22E 10   1.22E 10
        16/ 7,4    16/ 7,4    16/ 7,4    16/ 7,4    16/ 7,4
          13.710     13.022     13.106     13.824     13.199

9+      2.02E 11   4.07E 11   2.58E 11   1.12E 12   9.18E 11
        1.78E 11   1.78E 11   1.78E 11   1.78E 11   1.78E 11
        16/ 7,3    16/ 7,3    16/ 7,3    16/ 7,3    16/ 7,3
          12.941     12.410     12.264     13.079     12.424

9+      4.35E 12   4.14E 12   4.19E 12   3.44E 12   3.64E 12
        4.37E 12   4.37E 12   4.37E 12   4.37E 12   4.37E 12
        16/ 7,4    16/ 7,4    16/ 7,4    16/ 7,4    16/ 7,4
          14.107     13.422     13.368     13.942     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 componant 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 dehancement due to configuration mixing.

Density Function

to be ignored.

```
O16-TDA    K.K.

ISPIN(G.S.)= 0    ITORP=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-TO-H=1.241E-01       (PH)-TO-O(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   ITORP=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-TO-H=1.241E-01      (PH)-TO-O(G.S.)=8.271E-02

DENSITY FUNCTION
CSTORE( 2)=-9.618E-01
CSTORE( 4)= 5.576E-01
```

```
816-TDA   K.K.

ISPIN(G.S.)= 0   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-TO-H=2.481E-01      (PH)-TO-O(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=0   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-TO-H=3.102E-01      (PH)-TO-O(G.S.)=4.135E-01

DENSITY FUNCTION
CSTORE( 2)= 1.606E-01
CSTORE( 4)= 3.765E-02
```

```
816-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-TO-H=3.102E-01      (PH)-TO-O(G.S.)=4.135E-01

DENSITY FUNCTION
CSTORE( 2)= 2.728E-01
CSTORE( 4)=-1.126E-02
```

```
816-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-TO-H=2.481E-01      (PH)-TO-O(G.S.)=1.654E-01

DENSITY FUNCTION
CSTORE( 2)=-1.390E 00
CSTORE( 4)= 6.735E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITORP=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-TO-H=3.722E-01      (PH)-TO-O(G.S.)=7.444E-01

DENSITY FUNCTION
CSTORE( 2)=-4.516E-01
CSTORE( 4)= 1.199E 00
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITORP=0   IA=16   IZ= 8   HW=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-TO-H=6.203E-02     (PH)-TO-O(G.S.)=8.271E-02

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

```
O16-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-TO-H=6.203E-02        (PH)-TO-O(G.S.)=8.271E-02

DENSITY FUNCTION
CSTORE( 2)= 2.149E-01
CSTORE( 4)=-6.161E-01
```

```
O16+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-TO-H=1.637E-02      (PH)-TO-O(G.S.)=1.965E-02


DENSITY FUNCTION
CSTORE( 2)=-4.206E-02
CSTORE( 4)=-1.795E-01
```

O16-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-TO-H=1.049E 00 (PH)-TO-O(G.S.)=1.259E 00

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

```
O16-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-TO-H=4.306E-03        (PH)-TO-O(G.S.)=3.444E-03


DENSITY FUNCTION
CSTORE( 2)= 2.267E-02
CSTORE( 4)= 2.741E-01
```

```
O16-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-TO-H=2.511E-02        (PH)-TO-O(G.S.)=2.009E-02


DENSITY FUNCTION
CSTORE( 2)= 1.074E-01
CSTORE( 4)= 1.174E-01
```

```
816-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-TO-H=1.148E-01      (PH)-TO-O(G.S.)=1.377E-01

DENSITY FUNCTION
CSTORE( 2)= 5.083E-01
CSTORE( 4)= 1.105E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   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-TO-H=1.519E 00     (PH)-TO-O(G.S.)=6.076E-01


DENSITY FUNCTION
CSTORE( 2)=-2.352E 00
CSTORE( 4)= 1.059E 00
```

```
O16-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-TO-H=5.306E-02      (PH)-TO-O(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-TO-H=1.386E 00      (PH)-TO-O(G.S.)=1.663E 00


DENSITY FUNCTION
CSTORE( 2)=-2.048E 00
CSTORE( 4)= 2.268E 00
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITDRP=0   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-TO-H=1.991E-04      (PH)-TO-O(G.S.)=1.593E-04


DENSITY FUNCTION
CSTORE( 2)=-2.340E-02
CSTORE( 4)= 1.454E-01
```

```
816-TDA   K.K.

ISPIN(G.S.)= 0   ITDRP=0   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-TO-H=1.884E-01      (PH)-TO-O(G.S.)=1.507E-01

DENSITY FUNCTION
CSTORE( 2)=-3.945E-01
CSTORE( 4)= 9.514E-01
```

```
O16-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-TO-H=3.694E 01      (PH)-TO-O(G.S.)=3.166E 01

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

```
O16-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-TO-H=3.694E 01      (PH)-TO-O(G.S.)=3.166E 01

DENSITY FUNCTION
CSTORE( 4)=-3.876E-01
```

```
816-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-TO-H=2.955E 01      (PH)-TO-O(G.S.)=2.533E 01

DENSITY FUNCTION
CSTORE( 4)=-3.644E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITDRP=0   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-TO-H=2.955E 01      (PH)-TO-O(G.S.)=2.533E 01

DENSITY FUNCTION
CSTORE( 4)=-4.477E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITORP=0   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-TO-H=6.649E 01        (PH)-TO-O(G.S.)=3.800E 01

DENSITY FUNCTION
CSTORE( 4)= 3.061E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITORP=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-TO-H=6.649E 01        (PH)-TO-O(G.S.)=3.800E 01

DENSITY FUNCTION
CSTORE( 4)= 5.905E-01
```

```
O16-TDA   K.K.

ISPIN(G.S.)= 0   ITORP=0   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-TO-H=4.388E 01      (PH)-TO-O(G.S.)=2.925E 01

DENSITY FUNCTION
CSTORE( 4)=-6.680E-01
```

```
O16-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-TO-H=1.256E 03      (PH)=TO-O(G.S.)=8.374E 02

DENSITY FUNCTION
CSTORE( 4)=-2.512E 00
```

```
O16-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-TO-H=1.241E-01     (PH)-TO-O(G.S.)=8.271E-02


DENSITY FUNCTION
CSTORE( 2)=-5.976E-02
CSTORE( 4)= 3.410E-02
```

```
816-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   IA=16   IZ= 8   HW=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-TO-H=1.241E-01      (PH)-TO-O(G.S.)=8.271E-02

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

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   IA=16   IZ= 8      HW=13.30
IPU=0
J= 1-      E=13.597      N=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-TO-H=2.481E-01        (PH)-TO-O(G.S.)=1.654E-01

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

```
O16-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-H=3.102E-01      (PH)-T0-0(G.S.)=4.135E-01

DENSITY FUNCTION
CSTORE( 2)=-1.983E-02
CSTORE( 4)= 2.156E-02
```

```
O16-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-TO-H=3.102E-01        (PH)-TO-O(G.S.)=4.135E-01

DENSITY FUNCTION
CSTORE( 2)= 2.862E-01
CSTORE( 4)= 3.183E-02
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   IA=16   IZ= 8      HW=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-TO-H=2.481E-01      (PH)-TO-O(G.S.)=1.654E-01


DENSITY FUNCTION
CSTORE( 2)=-1.388E 00
CSTORE( 4)= 6.433E-01
```

```
816-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=6.203E-02        (PH)-TO-O(G.S.)=8.271E-02

DENSITY FUNCTION
CSTORE( 2)=-7.351E-03
CSTORE( 4)= 1.134E-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=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-TO-H=3.722E-01      (PH)-TO-O(G.S.)=7.444E-01

DENSITY FUNCTION
CSTORE( 2)=-4.866E-01
CSTORE( 4)= 1.215E 00
```

```
O16-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-TO-H=6.203E-02        (PH)-TO-O(G.S.)=8.271E-02


DENSITY FUNCTION
CSTORE( 2)= 2.266E-01
CSTORE( 4)=-6.239E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   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-TO-H=1.637E-02      (PH)-TO-O(G.S.)=1.965E-02


DENSITY FUNCTION
CSTORE( 2)=-1.248E-02
CSTORE( 4)=-1.373E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=1.049E 00      (PH)-TO-O(G.S.)=1.259E 00


DENSITY FUNCTION
CSTORE( 2)=-2.338E-01
CSTORE( 4)=-5.023E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=4.306E-03      (PH)-TO-O(G.S.)=3.444E-03


DENSITY FUNCTION
COSORE( 2)= 1.384E-02
COSORE( 4)= 2.856E-01
```

```
O16-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-TO-H=1.148E-01      (PH)-TO-O(G.S.)=1.377E-01

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

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=0   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-TO-H=5.306E-02      (PH)-TO-O(G.S.)=2.122E-02


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

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=0   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-TO-H=2.511E-02        (PH)-TO-O(G.S.)=2.009E-02


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

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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)=8.63CE-02


MAJOR COMPONENT  P= 5   H= 2   TYPE=5

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

DENSITY FUNCTION
CSTORE( 2)= 2.288E 00
CSTORE( 4)=-6.320E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=1.991E-04      (PH)-TO-O(G.S.)=1.593E-04


DENSITY FUNCTION
CSTORE( 2)=-8.277E-02
CSTORE( 4)= 1.886E-01
```

```
O16-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-TO-H=1.519E 00     (PH)-TO-O(G.S.)=6.076E-01

DENSITY FUNCTION
CSTORE( 2)=-2.292E 00
CSTORE( 4)= 2.361E 00
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=0   IA=16   IZ= 8      HW=13.30
IPU=0
J= 2-      E=23.145      N=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-TO-H=1.884E-01      (PH)-TO-O(G.S.)=1.507E-01


DENSITY FUNCTION
CSTORE( 2)=-4.244E-01
CSTORE( 4)= 9.789E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=3.694E 01      (PH)-TO-O(G.S.)=3.166E 01

DENSITY FUNCTION
CSTORE( 4)=-7.375E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=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-TO-H=3.694E 01      (PH)-TO-O(G.S.)=3.166E 01

DENSITY FUNCTION
CSTORE( 4)=-3.767E-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=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-TO-H=2.955E 01        (PH)-TO-O(G.S.)=2.533E 01

DENSITY FUNCTION
CSTORE( 4)=-3.926E-01
```

```
816-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=0   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-TO-H=2.955E 01      (PH)-TO-O(G.S.)=2.533E 01


DENSITY FUNCTION
CSTORE( 4)=-4.444E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=6.649E 01        (PH)-TO-O(G.S.)=3.800E 01

DENSITY FUNCTION
CSTORE( 4)= 3.064E-01
```

```
O16-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=4.388E 01       (PH)-TO-O(G.S.)=2.925E 01

DENSITY FUNCTION
CSTORE( 4)=-5.339E-01
```

```
016-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-TO-H=1.256E 03      (PH)-TO-C(G.S.)=8.374E 02


DENSITY FUNCTION
CSTORE( 4)=-2.545E 00
```

```
O16=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-TO-H=6.649E 01        (PH)-TO-O(G.S.)=3.800E 01

DENSITY FUNCTION
CSTORE( 4)= 5.924E-01
```

CA40-TDA K.K. MENSPOLE SHIFT

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

TYPE-3

10/ 6 7/ 4	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 5	8/ 4	7/ 6
.001 .176	.016	.029	.012	.015	-.079	.080	.018	.958

TYPE-5

10/ 6 7/ 4	10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 5	8/ 4	7/ 6
.000 .033	.004	-.006	.004	.009	-.020	.024	.005	.185

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

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BMJ
P-T0-H=3.733E-02 (PH)-T0-C(G.S.)=5.972E-02

DENSITY FUNCTION
CST0RE(2)=-4.578E-02
CST0RE(4)= 2.822E-02
CST0RE(6)=-9.765E-02

CA40+TDA K.K. M0N0P0LE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=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
-.105	.229	-.188	-.126	.303	.106	.701	.437	.309

TYPE=5

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
-.002	.005	-.004	-.003	.014	.002	.061	.013	.006

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

MAJOR COMPONENT P= 7 H= 6 TYPE=3

SINGLE PARTICLE BEJ
P+T0+H=5.791E 01 (PH)+T0+0(G.S.)=6.619E 01

DENSITY FUNCTION
CST0RE(4)= 7.165E-01
CST0RE(6)=-5.597E-01

```
CA40-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-T0-H=3.860E 00      (PH)-T0-0(G.S.)=3.431E 00

DENSITY FUNCTION
CSTORE( 4)= 4.143E-02
CSTORE( 6)= 7.269E-02
```

```
CA40-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   IA=40   IZ=20      HW=10.50
IPU=0
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-TO-H=1.366E 05       (PH)-TO-O(G.S.)=9.937E 04

DENSITY FUNCTION
CSTORE( 6)= 2.603E-01
```

```
CA40-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=0   IA=40   IZ=20     HW=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      -.183
     -.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)-T9-O(G.S.)=3.827E 00

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

CA40-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=10.50
IPU=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-TB-H=5.791E 01 (PH)-TB-O(G.S.)=6.619E 01

DENSITY FUNCTION
CSTORE(4)= 1.902E-01
CSTORE(6)=-8.188E-02

```
CA40-TDA   K.K.  MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITORP=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-O(G.S.)=7.403E 02

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

```
CA40-TDA   K.K.   MONOPOLE 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      (PH)-T0-0(G.S.)=9.937E 04

DENSITY FUNCTION
CSTORE( 6)= 1.617E-01
```

```
CA40-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)-T0-0(G.S.)=4.191E-02

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

CA40-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITDRP=0 IA=40 IZ=20 HW=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 H= 6 TYPE=3

SINGLE PARTICLE BMJ
P-TO-H=1.009E-04 (PH)-TO-O(G.S.)=8.069E-05

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

CA40+TDA K+K+ MONOPOLE SHIFT

ISPIN(G+S+)= 0 ITDRP=0 IA=40 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+TO+H=2+162E 02 (PH)+TO+C(G+S+)=1+236E 02

DENSITY FUNCTION
CSTORE(4)= 9+911E-01
CSTORE(6)=-3+927E-01

```
CA40-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 0   ITDRP=0   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-TO-H=3.143E-02       (PH)-TO-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. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITORP=0 IA=40 IZ=20 HW=10.50
IPU=0
J= 2- E= 9.327 N=20

TYPE=3

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

TYPE=5

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

BMJ(UP)=4.851E-01 BMJ(DOWN)=9.702E-02

MAJOR COMPONENT P= 8 H= 6 TYPE=5

SINGLE PARTICLE BMJ
P-T0-H=9.546E-02 (PH)-T0-0(G.S.)=7.636E-02

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

CA40-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 0 ITORP=0 IA=40 IZ=20 HW=10.50
IPU=0
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 H= 6 TYPE=5

SINGLE PARTICLE BEJ
P-T0-H=2.162E 02 (PH)-T0-0(G.S.)=1.236E 02

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

CA40-TDA K.K. MONOPOLE 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	.103	-.071	-.038	-.513	-.018	-.327	.641	.143

TYPE=5

10/ 4	9/ 6	9/ 5	9/ 4	8/ 6	8/ 4	7/ 6	7/ 5	7/ 4
-.002	-.008	-.008	-.007	-.138	.001	.401	.003	-.014

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

MAJOR COMPONENT P= 7 H= 5 TYPE=3

SINGLE PARTICLE BEJ
P-T0-H=1.930E 02 (PH)-T0-0(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   ITORP=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-TO-H=1.338E 02      (PH)-TO-O(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   ITORP=0   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

BEJ(UP)=1.721E 03      BEJ(DOWN)=2.459E 02


MAJOR COMPONENT  P= 7   H= 5   TYPE=5

SINGLE PARTICLE BEJ
T-T0-H=1.930E 02     (PH)-T0-O(G.S.)=2.206E 02

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

```
CA40-TDA   K.K.   MONOPOLE 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-O(G.S.)=3.404E 03

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

CA48-TDA K.K. MONOPOLE SHIFT

ISPIN(G.S.)= 4 ITDRP=0 IA=48 IZ=20 HW=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	-.009

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

MAJOR COMPONENT P= 7 H= 5 TYPE=1

SINGLE PARTICLE BEJ
P-TO-H=4.150E 02 (PH)-TO-O(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.   M0N0P0LE SHIFT

ISPIN(G.S.)= 4   ITDRP=0   IA=48   IZ=20     HW=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      (PH)-T0-0(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   ITORP=0   IA=48   IZ=20     HW=10.25
IPU=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-TO-H=1.550E 00      (PH)-TO-O(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-TO-H=1.245E 02      (PH)-TO-O(G.S.)=1.423E 02

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

```
CA48-TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 4   ITORP=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-TO-H=5.106E 02     (PH)-TO-O(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   ITORP=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-TO-H=3.083E 05       (PH)-TO-O(G.S.)=2.242E 05

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

```
CA48-TDA   K.K.   MONOPOLE 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-T0-H=3.965E 05      (PH)-T0-O(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   ITORP=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-TO-H= .000E 00     (PH)-TO-O(G.S.)= .000E 00


DENSITY FUNCTION
CSTORE( 5)=  .000E 00
CSTORE( 7)=-1.615E-02
```

```
CA48=TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 4   ITDRP=0   IA=48   IZ=20      HW=10.25
IPU=0
J= 3+      E= 4.443      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+   MONOPOLE SHIFT

ISPIN(G+S+)= 4   ITORP=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-TO-H= +000E 00      (PH)-TO-O(G+S+)= +000E 00

DENSITY FUNCTION
CSTORE( 5)=-1+234E-02
CSTORE( 7)= 1+375E-02
```

```
CA48+TDA   K.K.   MONOPOLE SHIFT

ISPIN(G.S.)= 4   ITORP=0   IA=48   IZ=20     HW=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+T0+H=2.324E 02     (PH)+T0+0(G.S.)=1.328E 02

DENSITY FUNCTION
CSTORE( 4)= 4.200E-01
CSTORE( 6)=-5.339E-02
CSTORE( 8)=  .000E 00
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=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      15/ 9
      .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      15/ 9
     -.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-TO-H=1.471E 03      (PH)-TO-O(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,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=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-TO-H=6.843E 01      (PH)-TO-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,   M0N0P0LE 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(D0WN)=3.689E-02


MAJ0R C0MP0NENT  P=10   H= 9   TYPE=1

SINGLE PARTICLE BEJ
P-T0-H=7.096E 01      (PH)-T0-0(G.S.)=2.839E 01

DENSITY FUNCTI0N
CST0RE( 3)= 1.796E 00
CST0RE( 5)=-9.453E-01
CST0RE( 7)= 9.079E-02
CST0RE( 9)= 1.363E-04
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=0   IA=88   IZ=38     HW= 9.00
IPU=0
J= 5-     E= 3.363     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)-T0-0(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,  MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=0   IA=88   IZ=38     HW= 9.00
IPU=0
J= 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-TO-H=3.700E-02     (PH)-TO-O(G.S.)=2.467E-02


DENSITY FUNCTION
CSTORE( 3)= 1.669E 00
CSTORE( 5)=-1.335E 00
CSTORE( 7)= 2.671E-01
CSTORE( 9)=-3.285E-04
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITDRP=0   IA=88   IZ=38     HW= 9.00
IPU=0
J= 3+     E= 3.559     N= 9

TYPE=1
     10/ 7      10/ 9
     -.001      1.000

TYPE=2
     12/11      13/11      15/11
      .011       .006      -.005

TYPE=3
     16/ 7      16/ 9
     -.010      -.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-TO-H=4.931E-01      (PH)-TO-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,   MONOPOLE 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-TO-H=2.501E 09     (PH)-TO-O(G.S.)=1.667E 09


DENSITY FUNCTION
CSTORE( 8)=-8.829E-02
CSTORE(10)=  .000E 00
```

SR88+TDA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITORP=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
-.032	.939	.339

TYPE=2

13/10	16/11
.002	.034

TYPE=3

12/ 7	12/ 8	12/ 9	13/ 7	13/ 8	13/ 9	14/ 7	15/ 7	15/ 9
-.005	-.009	.006	-.011	-.009	.025	-.004	-.004	.005

TYPE=4

12/ 7	12/ 8	12/ 9	13/ 7	13/ 8	13/ 9	14/ 7	15/ 7	15/ 9
-.012	-.007	.002	-.002	.001	.010	-.006	-.004	.005

BMJ(UP)=2.277E 04 BMJ(DOWN)=2.530E 03

MAJOR COMPONENT P=11 H= 8 TYPE=1

SINGLE PARTICLE BMJ
P-T0-H=5.473E 03 (PH)-T0-0(G.S.)=6.081E 03

DENSITY FUNCTION
CST0RE(4)= 7.307E-02
CST0RE(6)= 5.874E-01
CST0RE(8)=-2.134E-01
CST0RE(10)= 5.679E-04

```
SR88+TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=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-T0-H=3.005E 07      (PH)-T0-O(G.S.)=2.312E 07


DENSITY FUNCTION
CSTORE( 6)=-8.905E-01
CSTORE( 8)= 2.973E-01
CSTORE(10)=-4.859E-04
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=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=TO-H=5.850E 05      (PH)-TO-O(G.S.)=5.319E 05

DENSITY FUNCTION
CSTORE( 6)= 6.390E-02
CSTORE( 8)= 2.250E-02
CSTORE(10)=  .000E 00
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITDRP=0   IA=88   IZ=38     HW= 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      15/ 9
      .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      15/ 9
      .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   H= 9   TYPE=1

SINGLE PARTICLE BEJ
P-T0-H=1.927E 02      (PH)-T0=0(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   ITORP=0   IA=88   IZ=38      HW= 9.00
IPU=0
J= 4+      E= 4.067      N=11

TYPE=1
     10/ 7

     -.342

TYPE=2
     12/11       13/11       14/11       15/11

      .908       -.137        .091       -.058

TYPE=3
     16/ 7       16/ 8       16/ 9

     -.080       -.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-TO-H= .000E 00      (PH)-TO-O(G.S.)= .000E 00

DENSITY FUNCTION
CSTORE( 5)=-2.069E-01
CSTORE( 7)= 6.545E-02
CSTORE( 9)= 9.404E-03
```

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=0   IA=88   IZ=38     HW= 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-TO-H=1.849E 06      (PH)-TO-O(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,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=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-TO-H= .000E 00     (PH)-TO-O(G.S.)= .000E 00

DENSITY FUNCTION
CSTORE( 7)= 2.754E-03
CSTORE( 9)=-2.131E-03
```

SR88-TDA K.K, MONOPOLE SHIFT

ISPIN(G.S.)= 6 ITORP=0 IA=88 IZ=38 HW= 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

```
SR88-TDA   K.K,   MONOPOLE SHIFT

ISPIN(G.S.)= 6   ITORP=0   IA=88   IZ=38      HW= 9.00
IPU=0
J= 2+      E= 4.547      N= 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-TO-H= .000E 00      (PH)-TO-O(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
```