Title

THEORETICAL ALPHA DECAY RATES OF DEFORMED NUCLEI

Author

Poggenburg, John Kenneth

Publication Date

1965-08-01

Thesis/dissertation

UCRL-16187 c.1

University of California

Ernest O. Lawrence Radiation Laboratory

THEORETICAL ALPHA DECAY RATES OF DEFORMED NUCLEI

Berkeley, California

Research and Development

UCRL-16187

UNIVERSITY OF CALIFORNIA

Lawrence Radiation Laboratory
Berkeley, California

AEC Contract No. W-7405-eng-48

THEORETICAL ALPHA DECAY RATES OF DEFORMED NUCLEI

John Kenneth Poggenburg, Jr.

(Ph.D. Thesis)

August 1965

THEORETICAL ALPHA DECAY RATES OF DEFORMED NUCLEI

Contents

THEORETICAL ALPHA DECAY RATES OF DEFORMED NUCLEI

John Kenneth Poggenburg, Jr.

Lawrence Radiation Laboratory and
Chemistry Department
University of California
Berkeley, California

August 1965

ABSTRACT

The shell-model theory of alpha decay developed by Mang is summarized. The calculation of the alpha formation entails use of the pairing-force wave functions of superconductivity theory, and we briefly describe their calculation with a delta-force approximation. The penetration of the alpha particle through the anisotropic potential barrier is considered in detail. We study the approximate treatment of Fröman and the results clearly justify the method.

The particular features of the potential barrier are examined in terms of the WKB expression for barrier transmission. The Woods-Saxon potential $V = -74/(1+ \exp\{(r-1.17A^{1/3}-1.6)/(a)\})$ is chosen after a survey of recent optical model analyses of alpha scattering experiments. The Woods-Saxon potential results in penetrability factors that are ≈45% lower than those calculated with the Igo potential. Modification of the Coulomb potential has little effect on the penetrability.

Extensive numerical calculations are given in an appendix. The theory gives reasonable agreement with experiment, and has provided a clear example of its value in the analysis of the alpha decay of Am^{241}. The calculations predict relative amplitudes and phases of importance in interpretation of angular correlation experiments. They also predict the ℓ-wave mixing in the transition to final states of odd-mass nuclei. Comparisons of theoretical and experimental transition rates indicate the nature of the errors in the calculations. Suggestions are given for future improvement.

I. INTRODUCTION

Alpha radioactivity has in recent years yielded a wealth of experimental data on energy levels in deformed nuclei, particularly in the actinide region. These data interpreted with shell model theory have greatly advanced understanding of nuclear structure. Practical application of the shell model to alpha decay entails solving several problems in the process, and it is one of these which will be examined in detail; namely, the penetration of the alpha particle through the potential field of the residual nucleus.

The earliest successful theoretical interpretation of alpha decay rates was advanced by Gamow,[1] and independently, by Condon and Gurney.[2] Their approach was a one-body model in which an alpha particle is conceived to exist in the nucleus and move in the potential of the remaining nucleons, impinging on the potential wall with a certain frequency and a finite probability of escaping. It seems unreasonable to take seriously the existence of an alpha particle inside the nucleus. Winslow[3] modified the approach by suggesting that the alpha particle does not exist as such in the nuclear interior, but only at the surface, and he proposed a surface-well potential with a repulsive potential in the interior. The decay probability may then be logically separated into the probability of forming an alpha particle in the nucleus (formation factor) and the probability of its escaping the attractive nuclear potential (penetrability factor).

Thomas[4] formulated the first simple many-body approach to alpha decay in terms of scattering theory, but he made no attempt to apply it to a nuclear model. Mang[5] greatly advanced the many-body approach by applying it to the shell model. The success of this theory in explaining α-decay has already been demonstrated by Mang and Rasmussen[6] in extensive studies of even-even spheroidal nuclei.

It is this approach that is taken in the present study. The formation factor is calculated after Mang and Rasmussen,[6] using Nilsson[7] shell-model wave functions for the deformed nuclei of the actinide region. The details of the penetrability factor are examined in comparing the formation factor at the nuclear surface with the experimentally observed alpha rates.

II. THE ALPHA FORMATION FACTOR

A brief outline of the theory and the steps involved in the calculation of the alpha formation factor will be presented before examining the barrier penetration itself.

A. Mang's Alpha Theory

In Mang's formulation of alpha decay, the alpha intrinsic wave function χ_α is expressed as a Gaussian-type function of the relative coordinates of the protons and neutrons. This form is indicated by electron scattering experiments,[8] and the width parameter β was chosen $0.47\ \mathrm{fm}^{-2}$ to agree with the experimental root mean square radius.

Explicitly the wave function is given as

$$\chi_\alpha(\xi_i, s_p s_{p'}, s_N s_{N'}) = \chi_0^0(s_p s_{p'})\ \chi_0^0(s_N s_{N'}) \left(\frac{2\beta^{3/2}}{\frac{1}{2}!\cdot 4\pi}\right)^{3/2} \times \exp\left[-\frac{\beta}{2}\left(\xi_1{}^2 + \xi_2{}^2 + \xi_3{}^2\right)\right]$$

where the ξ_i are the relative coordinates and the χ_0^0 are singlet spin functions of the spin coordinates s_i of the protons and neutrons.

One assumes that the decaying system can be described by a wave function $\Phi_J^M(X_1 \ldots X_A; t)$ which depends on the time, A-space and the spin coordinates X_k; and that one knows the functional form of the time dependence within a defined space-time region. The set of wave functions Ψ_j^m describes the daughter nucleus. By postulating a space-time region with exponential time dependence, one factors out the time-independent probability amplitude

$$g_{j\ell}^J(R) = \left[\binom{N}{2}\binom{Z}{2}\right]^{\frac{1}{2}} \int \sum_m (\ell j m\ M\text{-}m|JM) \times Y_\ell^m(\Omega)\Psi_j^{M-m}(\eta)\chi_\alpha(\xi)\ \Phi_J^{M*}(X_1 \ldots X_A)\ d\xi\ d\eta\ d\Omega$$

where

R = relative distance between α-particle and daughter nucleus

$\Omega = (\theta,\phi)$ = angular coordinates of the alpha particle in center of mass system

ξ,η = internal coordinates of α-particle and daughter, respectively, including the spin coordinates

J, j, and ℓ = angular momenta of parent, daughter, and α-particle relative to daughter, respectively.

Angular momentum of the system has been conserved by including the Clebsh-Gordan coefficient $(\ell jm\ M\text{-}m|JM)$ and summing over the magnetic quantum number m. The binomial coefficient before the integral accounts for the fact that the final state (α + daughter) is not completely antisymmetrized. The $g^J_{j\ell}(R)$ measures the probability that the wave function of the decaying system Φ^M_J contains an α-particle and daughter of the specified quantum numbers at a relative distance R. For sufficiently large R the $g^J_{j\ell}$ should contain only outgoing waves. The validity of these assumptions is discussed in greater detail in Ref. 9.*

A further assumption concerns the existence of a separation distance R_o such that for $R > R_o$ the interaction between α-particle and daughter may be represented by a potential alone, and for $R < R_o$ one may calculate the probability amplitudes $g^J_{j\ell}$ from nuclear-model wave functions. The ratio $|R\ g^J_{j\ell}(R)/R_o\ g^J_{j\ell}(R_o)|^2$ for R larger than the classical turning distance is related simply to the barrier penetrability factor which can be calculated from a one-body Schrödinger equation using the α-daughter potential. The total decay constant may be expressed in the form

---

*Since the purpose here is to present only an outline, the reader should consult Refs. 5, 6, 9, and 10 for a more detailed development of the alpha theory.

$$\lambda = \frac{1}{\hbar} \sum_{j\ell} P_\ell(\epsilon)\, \gamma^2_{Jj\ell}$$

where $P_\ell(\epsilon)$ is the penetrability factor for an α-particle of energy ϵ and relative angular momentum ℓ. The $\gamma^2_{Jj\ell}$ is a reduced width for the transition from parent state J to daughter state j via an α-emission of angular momentum ℓ, and is defined

$$\gamma^2_{Jj\ell} = \frac{\hbar^2}{2M} R_o |g^J_{j\ell}(R_o)|^2$$

where M is the alpha reduced mass. It is more convenient to work with the dimensionless amplitude G defined by

$$G^J_{j\ell}(R) = R^{3/2}\, g^J_{j\ell}(R) ,$$

and it is in this dimensionless form that probability amplitudes will be expressed. The penetrability factor P_ℓ and the reduced width $\gamma^2_{Jj\ell}$ depend on R_o, but their product does not. This point is discussed by Mang and Rasmussen[6] and by Zeh.[10]

It proves convenient for calculations to consider the partial transition probabilities from a parent state $I_iK_iq_i$ to the daughter state $I_fK_fq_f$ by emission of an α-particle of angular momentum ℓ. The q refers to the parity of the state, and the states are described in terms of the strong-coupling model of Bohr and Mottelson[11] applicable to the actinides. One has Mang's[9] Eq. (V.2)

$$\lambda^{I_iK_iq_i}_{I_fK_fq_f\ell} = \frac{1}{\hbar} P_\ell(\epsilon_{I_f}) \frac{\hbar^2}{2MR_o^2} \left| \sum_L \left(B^{LK_i-K_f}_{\ell I_f}\, G_{LK_i-K_f} + (-1)^{I_i-L-K_f} B^{LK_i+K_f}_{\ell I_f}\, G_{LK_i+K_f} \right) \right|^2_{R\,=\,R_o} \quad (1)$$

$$G_{LK_i-K_f} = \mathcal{N} \int \Phi^*_{K_i} \, \chi_\alpha \, \Phi_{K_f} \, Y_L^{K_i-K_f}(\Omega) \, d\xi \, d\eta \, d\Omega$$

$$G_{LK_i+K_f} = \mathcal{N} \int (-1)^{q_f} \, \Phi^*_{K_i} \, \chi_\alpha \, \Phi_{-K_f} \, Y_L^{K_i+K_f}(\Omega) \, d\eta \, d\xi \, d\Omega \qquad (2)$$

and $\mathcal{N}$ is the factor $R^{3/2}\left[\binom{N}{2}\binom{Z}{2}\right]^{\frac{1}{2}}$. The $B^{LM}_{\ell I}$ is a matrix which takes into account the interaction between the daughter and the α-particle as it penetrates the anisotropic potential of the daughter, and its discussion is relegated to a later section where it will be treated in detail.

When the theory is applied to the nuclear-model wave functions of Nilsson[7] it is convenient to define a factor Γ which is the contribution of the wave functions of specific Nilsson orbitals $\Omega_p\Omega_{p'},\Omega_N\Omega_{N'}$ to the alpha particle wave function (Mang and Rasmussen[6] Eq. (II.7))

$$\Gamma_{LM}^{\Omega_p\Omega_{p'},\Omega_N\Omega_{N'}} = R^{3/2} \int A(\psi^*_{\Omega_p}\psi^*_{\Omega_{p'}})A(\psi^*_{\Omega_N}\psi^*_{\Omega_{N'}}) \, \chi_\alpha \, Y_L^M \, d\xi \, d\Omega \qquad (3)$$

where A is an antisymmetrization operator. The amplitude for formation of an α-particle characterized by angular momentum L and projection M with respect to the daughter nucleus is then obtained by summing over the contributions of the occupied orbitals of the nucleus. The formal relationship between G and Γ can be given by noting that Γ is the alpha wave function projected from four nucleon wave functions in four specific Nilsson orbitals. G may therefore be expanded in terms of the Γ as follows

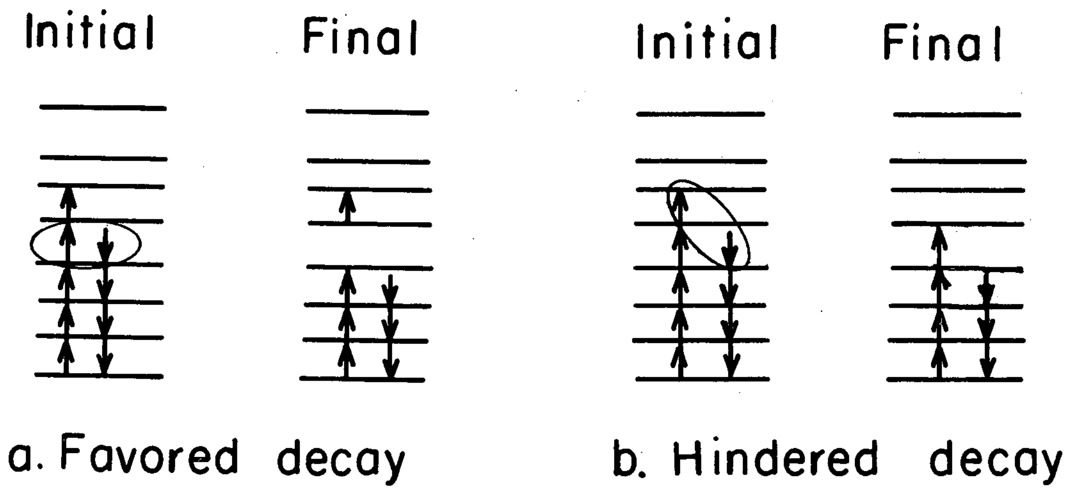
$$G_{LM}(R) = \langle \Phi_f | \sum_{\substack{\Omega_p\Omega_{p'},\\ \Omega_N\Omega_{N'}}} \Gamma_{LM}^{\Omega_p\Omega_{p'},\Omega_N\Omega_{N'}}(R) \, P | \Phi_i \rangle \qquad (4)$$

where P picks out of the initial nucleus the nucleons in the specific Nilsson orbitals specified by Γ.

In the absence of a pairing force, the ground state of an even-even nucleus would be obtained by filling with nucleons the lowest two-fold degenerate orbitals up to the Fermi surface. In this case the summation of Eq. (4) reduces to a single term involving the topmost filled proton p_f and neutron N_f orbitals at the Fermi surface in the parent.

$$G_{LM}(R) = \Gamma_{LM}^{p_f - p_f N_f - N_f}(R)$$

This is the approximation used by Sandulescu[12] in his earlier study of alpha decay. The effect of the pairing force is to introduce into the ground state a mixture of configurations in which a pair has scattered into orbitals above the Fermi surface, and these orbitals therefore contribute to the alpha formation. It is interesting to note that there is intrinsic to the theory a distinction which corresponds to experimental observation in the types of α-decay. In the ground-to-ground decay of even-even nuclei the parent and daughter have a large degree of pairing of angular momenta so that the sum over Γ runs over all proton pairs coupled with all neutron pairs. In an odd-mass nuclide the odd kind of nucleon has an unpaired particle in parent and daughter. It is observed experimentally that if the odd particle is in the same state in parent and daughter the transition rate is comparable to those for even-even decays, thus the term favored decay. If, however, the odd particle in the daughter resides in a different state the transition is greatly hindered. A glance at Fig. 1 which portrays schematically the states of the odd-type nucleon shows how this evolves naturally from the theory. In the favored case (a) the Γ are summed over every pair of the even type of nucleon coupled with every pair of the odd type except the half-filled state. Thus only the contribution of one state coupled with the other type of nucleons is missing from the sum. In the hindered decay (b) there is only one way of pairing two nucleons of the odd type to form an α-particle and yield the daughter configuration, and the summation is drastically reduced, hence the hindrance of the transition.



MU-33608

Fig. 1. Schematic representation of the odd-nucleon system for favored (a) and hindered (b) decay of odd-mass nuclei.

In calculating the α-amplitude from the geometric configuration of the various Nilsson orbitals, the probability that the particular states are occupied by a pair of nucleons must be included. The calculation of these occupation probabilities is discussed in the next section.

B. Occupation Probabilities by the BCS Method

The Bardeen, Cooper, Schrieffer[13] theory of superconductivity can be applied to nuclei to calculate the occupation probabilities of the orbitals. The details of the method as it has been employed in the present work are given in Mang, Poggenburg and Rasmussen,[14] but it is useful to outline the theory here. Further discussion is given in Appendix A.

The BCS method is most easily approached in the formalism of second quantization using creation $b^+_{\Omega\sigma}$ and annihilation $b_{\Omega\sigma}$ operators which create or annihilate a particle in the quantum state $\Omega\sigma$.* Since the Nilsson wave functions are used in this study, the Ω represents all quantum numbers needed to specify a Nilsson state and the σ is the sign of the projection of particle angular momentum on the nuclear symmetry axis which accounts for the two-fold degeneracy of the orbitals. The energy of the state in the prolate potential well is ϵ_Ω. One defines a number operator

$$N = \sum_\Omega \left(b^+_{\Omega+}b_{\Omega+} + b^+_{\Omega-}b_{\Omega-}\right)$$

which counts the nucleons in the system. The Hamiltonian may be expressed

---

*For a lucid explanation of the creation operator formalism see G. E. Brown, Unified Theory of Nuclear Models (North-Holland Publishing Co., Amsterdam, 1964) Ch. 1.

$$H = \sum_{\Omega} \epsilon_{\Omega} (b^{+}_{\Omega+} b_{\Omega+} + b^{+}_{\Omega-} b_{\Omega-})$$

$$- \frac{1}{2} \sum_{\Omega\Omega'} \langle \Omega+\Omega- |G| \Omega'-\Omega'+ \rangle b^{+}_{\Omega+} b^{+}_{\Omega-} b_{\Omega'-} b_{\Omega'+} \tag{5}$$

where the second term arises from the pairing force which scatters pairs from the orbital Ω' into orbital Ω. For simplicity this discussion omits the usual canonical transformation to quasi-particle formalism which allows the separation of the pairing interaction into a residual pairing force and a term arising from the interaction of the nucleons with the self-consistent field of the remaining nucleons.

The probability that orbital Ω is occupied by a pair is given by v^2_{Ω} and the probability of its being empty is u^2_{Ω}. The BCS wave function is of the type

$$\Psi = \prod_{\Omega} (u_{\Omega} + v_{\Omega} b^{+}_{\Omega+} b^{+}_{\Omega-}) |0\rangle \tag{6}$$

where $u^2_{\Omega} + v^2_{\Omega} = 1$. The BCS method seeks a stationary value of $H - \lambda N$ by variation of a trial wave function in which λ is a Langrangian multiplier, equivalent to the chemical potential of the system, adjusted to give the number operator the correct expectation value. The problem has been reduced by Belyaev[15] to solving the set of non-linear simultaneous algebraic equations in Δ_{Ω} and λ

$$\Delta_{\Omega} = \sum_{\Omega'} G_{\Omega\Omega'} u_{\Omega'} v_{\Omega'} \tag{7a}$$

$$N = \sum_{\Omega} 2 v^2_{\Omega} \tag{7b}$$

$$\tilde{\epsilon}_{\Omega} = \epsilon_{\Omega} - \sum_{\Omega} \bar{G}_{\Omega\Omega'} v^2_{\Omega'} \tag{7c}$$

$$\begin{pmatrix} v^2_{\Omega} \\ u^2_{\Omega} \end{pmatrix} = \frac{1}{2} \left(1 \mp \frac{\tilde{\epsilon}_{\Omega} - \lambda}{\sqrt{(\tilde{\epsilon}_{\Omega} - \lambda)^2 + \Delta^2_{\Omega}}} \right) \tag{7d}$$

where $\tilde{\epsilon}_\Omega$ is the energy of the orbital in the self-consistent field; $G_{\Omega\Omega'}$ is the ordinary pairing-force matrix element; and $\bar{G}_{\Omega\Omega'}$ is the matrix element arising from terms in the self-consistent field. As a consequence of the delta force used in this work the $\bar{G}_{\Omega\Omega'}$ equals the $G_{\Omega\Omega'}$. Since the ordinary BCS method is a statistical method the particle number is not strictly conserved.* It can be conserved, however, by performing the variation on a projected wave function as demonstrated by Dietrich, Mang, and Pradal,[16] and the importance in alpha decay of employing this method has been indicated by Mang et al.[14] who refer to it as the FBCS method. It is this FBCS method which is used in the results presented here.

The nuclear wave function is expressed as a product Ψ(protons) $\times\ \Psi$(neutrons) of the independent proton and neutron wave functions of the type given by Eq. (6) for an even system, and by

$$\Psi_k = b_k^+ \prod_{\Omega \neq k} (u_\Omega + v_\Omega b_{\Omega+}^+ b_{\Omega-}^+)|0\rangle \tag{8}$$

for an odd system. The proton-neutron interaction in the nuclear wave functions has thus been neglected in the present work. Although it can be formally treated,[16] the Nilsson wave functions for protons and neutrons already include some of this interaction and it is difficult to isolate the effect.

Using the BCS formalism the occupation probabilities of the orbitals can be calculated and the next section presents an outline of the steps involved in the calculation of the alpha formation factor..

---

*This point is discussed in Appendix A.

C. Numerical Calculations

The results presented in this paper have extended the calculations of Mang and Rasmussen[6] to include 25 proton and 40 neutron orbitals (instead of 10 each) outside an arbitrary core which does not participate in the alpha formation. Thus for even-even calculations, each G_{LO} involves the sum over a thousand Γ coefficients. In addition, the results of calculations for a large number of odd-mass nuclides are presented. Another refinement in the procedure is the use of improved FBCS occupation probabilities described in Appendix A. The sample odd-mass calculations given in Mang's Table III[9] included the same orbitals, but the ordinary BCS calculations were used for the occupation probabilities.

It is clear that if an orbital is to contribute to the alpha formation it must be occupied in the initial state and be vacant in the final state. This leads to a factor $v^i_\Omega u^f_\Omega$ which must enter the sum over the Γ coefficients. As the orbitals get farther away from the Fermi surface this factor tends to zero which justifies neglecting an inner core and limiting the sum. For even-even transitions the probability amplitude is

$$G_{LO} = \sum_{\Omega_p}\sum_{\Omega_N} \prod_{p\neq\Omega_p} (u^i_p u^f_p + v^i_p v^f_p) \prod_{N\neq\Omega_N} (u^i_N u^f_N + v^i_N v^f_N)$$

$$\times\, v^i_{\Omega_p} u^f_{\Omega_p}\, v^i_{\Omega_N} u^f_{\Omega_N}\, \Gamma_{LO}^{\Omega_p -\Omega_p \Omega_N -\Omega_N} \tag{9}$$

The two products over p and N are factors accounting for overlap of parent and daughter states and are usually near unity. These factors, previously taken as unity by Mang and Rasmussen,[6] are explicitly calculated here because of the greater importance they have in the structural details of alpha decay rates of odd-mass nuclei, and especially their importance at the subshell of 152 neutrons. Equation (9) also holds for favored decay of odd-mass nuclei with the restriction that the odd state is excluded from the sum and product. As an example of a hindered decay one has the odd-neutron case

$$G_{LK_i-K_f} = \prod_{N\neq K_i\neq K_f} (u_N^i u_N^f + v_N^i v_N^f)\, v_{K_f}^i u_{K_i}^f \sum_{\Omega_p} \prod_{p\neq\Omega_p} (u_p^i u_p^f + v_p^i v_p^f)$$

$$\times\, v_{\Omega_p}^i u_{\Omega_p}^f\, \Gamma_{LK_i-K_f}^{\Omega_p-\Omega_p\; K_i-K_f} \qquad (10)$$

where the final state K_f must have initially been occupied by a pair and the initial state K_i must be empty in the daughter. The derivation of these equations is given in Appendix B.

The calculations are performed using the $|\ell\Lambda\Omega\rangle$ representation of Nilsson[7] with Ω the total angular momentum projection on the nuclear symmetry axis, and the expansion coefficients $\alpha_{\ell\Lambda}$ of an orbital of negative projection Ω taken with the same sign as for positive Ω. The orbital states are labeled with the usual asymptotic quantum numbers of Nilsson $|N\, n_z\Lambda\rangle$ and Ω; with the projection of the particle angular momentum Σ given by $\Sigma + \Lambda = \Omega$. The Γ_{LM} coefficients depend upon the choice of size parameters α, β, and R_o; but they can be expanded in terms of C_ρ^L coefficients which depend only on the orbital wave functions. β is the α-size parameter which is fixed at $0.47\ \mathrm{fm}^{-2}$ to correspond to the measured rms charge radius of 1.6 fm for an α-particle. The parameter α expresses the nuclear size and is given by $m\omega_o/\hbar$ where Nilsson has given the relation $\hbar\omega_o \approx 41\ A^{-1/3}$ MeV. For A = 238 α has the value $0.1597\ \mathrm{fm}^{-2}$. R_o is fixed somewhat arbitrarily at 8.25 fm for these calculations, so as to be beyond the last radial maximum in the shell-model wave functions. Mang and Rasmussen[6] observed that the G amplitudes are not very sensitive for variations of α and R_o which maintain αR_o^2 constant. Therefore, instead of decreasing α with A and increasing R_o, they have been kept fixed at these values for all the actinides.

The equations used for calculating Γ have been given before in Ref. 6, but they are repeated in Appendix B for convenience. The computer programs are written mostly in FORTRAN IV for the IBM 7094 with some machine-language modifications. The Clebsh-Gordan coefficients are computed by a machine-language subroutine obtained from Los Alamos Laboratory. The steps in the calculation of the alpha formation factor are: (1) calculation of the C_ρ^L coefficients which are stored on tape; (2) calculation of the occupation probabilities which are punched out on cards; and (3) the calculation of the probability amplitudes G_{LM} at the nuclear surface using the output from steps (1) and (2). The G_{LM} are punched on cards which are used as input for the barrier penetration program to be discussed in detail later. One set of C_ρ^L coefficients applies to all even-even transitions and also to all favored transitions of odd-mass nuclei. The C_ρ^L coefficients for hindered decays must be calculated uniquely for the orbitals involved. The L expansion is terminated at L = 8 for even series and L = 9 for odd series. The expressions for $B_\rho^L(n_i\Lambda_i)$ and $D(\ell_i\Lambda_i L)$ given in Appendix B are calculated separately in subroutines. The occupation probabilities require input of pairing matrix elements which are calculated for a δ-force from the relation to the C_ρ^0 coefficients

$$G_{\Omega\Omega'} = \frac{V}{2}\sum_\rho (-1)^\rho \binom{\rho+\frac{1}{2}}{\rho} 2^\rho \; C_\rho^0 \left(\frac{M\omega}{2\hbar}\right)^{3/2}$$

The same matrix elements are used throughout. They are calculated with the Nilsson deformation parameter $\eta = 6$, and the single particle energies used are those appropriate to $\eta = 5$, where the energies have been somewhat adjusted[14] from Nilsson's values.

Attention will now be focused on the barrier penetration.

III. THE BARRIER PENETRATION

The treatment of the barrier penetration has advanced greatly from the "particle-in-a-well" theory. With the discovery of rotational spectra in α-decay of deformed nuclei and the wealth of experimental data which followed, detailed calculations became possible. Rasmussen and Segall[17] treated the α-decay of Cm^{242} and Th^{228} in prolate spheroidal coordinates. They concluded that the variation in relative α-intensities with different nuclei could not be explained by simple nuclear surface boundary conditions and the deformed potential alone, but must also depend on microscopic details of the nuclear structure. Numerical calculations for the anisotropic barrier problem in Cm^{242} α-decay in spherical coordinates were done by Rasmussen and Hansen[18] including partial waves to $\ell = 6$. They used experimental alpha group intensities to set the boundary conditions at infinity and integrated the coupled α-wave equations in to a spherical surface near the nucleus. The results were compared with those of Fröman.[19] In a later paper Chasman and Rasmussen[20] derived approximate analytical methods for calculating from observed intensities the partial α-amplitudes at the nuclear surface. They tabulate for a large number of experimental data the α-wave amplitudes for partial waves to $\ell = 6$, using three different values for the intrinsic quadrupole moments and each possible combination of relative phases. Pennington and Preston[21] also carried out similar careful inward integration studies using experiment to set the boundary conditions and using prolate spheroidal coordinates. In Mang's alpha theory it is possible to calculate from the shell model the partial wave amplitudes and their phases at the nuclear surface. Mang and Rasmussen[6] have applied the matrix method of Fröman in their calculations with even-even nuclei, and because of its convenience it will be used here also.

A. The Fröman Matrix

Fröman[19] studied the alpha penetration problem in deformed nuclei. His treatment involves the approximations that (a) the residual nucleus does not undergo transitions during the α-penetration except through the shape of the electric multipole field by exchange of angular momentum with the outgoing α-particle, (b) the anisotropic part of the potential which couples the different partial waves may be neglected outside a given radius, and (c) the rotational energy spacing in the daughter may be neglected in comparison with the total α-energy. The implication of the last assumption is that the potential barrier is stationary in space during the penetration of the α-particle. Using the WKB approximation Fröman shows how the α-wave on the nuclear surface may be transformed into an equivalent α-wave on a sphere defined by the average nuclear radius, and the penetration problem reduces to a spherical potential barrier. By resolving the α-wave function in terms of spherical harmonics and making suitable approximations, Fröman reduces the penetration to a matrix form.

In the formulation of Eq. (1), where the spherical penetrability factor has been taken out, the penetrability matrix B is given by

$$\begin{aligned} B_{\ell I_f}^{LK_i-K_f} &= (-1)^{\ell+K_i-K_f} (I_i \ell\ K_i\ K_f-K_i | I_f K_f)\ k_{\ell L}^{K_i-K_f}\ (B) \\ B_{\ell I_f}^{LK_i+K_f} &= (-1)^{\ell+K_i+K_f} (I_i \ell\ -K_i\ K_f+K_i | I_f K_f)\ k_{\ell L}^{K_i+K_f}\ (B) \end{aligned} \qquad (11)$$

The matrix k is identical to that of Fröman[19] and the matrix elements are defined by

$$k_{\ell L}^{m} = \int Y_{\ell}^{m*} \exp\{B\ P_2\ (\cos\theta)\}\ Y_L^{m}\ d\Omega \qquad (12)$$

Mang and Rasmussen[6] give the approximate formula for the deformation parameter $B = 6.1\delta - 0.045\ Q_0$, where δ is the deformation parameter defined by Nilsson[7] and the intrinsic quadrupole moment Q_o is given in barns. It is clear from Eq. (12) that the Fröman matrix is real and symmetric. In the numerical work of Rasmussen and Hansen,[18] and Chasman and Rasmussen,[20] and Nosov[22] the matrix was found to be asymmetric and the matrix elements to have small imaginary components. This loss of accuracy is the price one pays for the convenience of the Fröman method, but in the present work the approximations contained in the preceding calculations of the G_{LM} do not justify meticulous accuracy at this point.

At first we explored a Fröman matrix generalized to include the effect of a P_4 deformation term by defining the matrix elements according to

$$k_{\ell L}^{m} = \int Y_{\ell}^{*m} \exp\{B\, P_2\,(\cos\theta) + D\, P_4\,(\cos\theta)\}\, Y_L^{m}\, d\Omega \tag{13}$$

The parameters B and D were to be chosen by fitting the reduced relative α-amplitudes b_2 and b_4 for even-even nuclei to their experimental values. The theoretical values are defined according to Fröman

$$b_{\ell} = \frac{\sum_L k_{\ell L}\, G_{LO}}{\sum_L k_{OL}\, G_{LO}} \tag{14}$$

The experimental values are the square roots of reciprocals of the reduced hindrance factors. The experimental value of b_4 is modified slightly to compensate for the significant Coulomb excitation contribution to the final intensity of the $\ell = 4$ group. This correction is described by Mang and Rasmussen.[6] The procedure used to fit the parameters consisted in starting with the calculated partial α-amplitudes G_{LO} at the nuclear surface and calculating the Fröman matrix according to Eq. (13) for various values of B and D. The isometric lines in b_2 and b_4 were then interpolated in the grid of values obtained. The intersection of the isometric lines corresponding to the experimental values of b_2 and b_4 determines the parameters B and D. In Fig. 2 a sample of this procedure is given for Pu^{238}. The appropriate experimental b_2 line is 1.09 and the b_4 line is 0.24, and their intersection fixes the parameters B = 1.39 and D = -0.15. The fitting procedure is done by a computer program which generates the grid of values, interpolates the isometric lines, and plots the figure by means of the CALCOMP plotter.

The desired results were not attained by this procedure. One immediate objection in the Pu^{238} example is the negative value for the parameter D. Harada[23] has shown that in the actinide region one would expect a positive value for β_4, although Huber[24] has suggested that intensities of α-transitions to the 2+ and 4+ states of even-even nuclei are better explained by assuming small positive values of β_4 below U^{236} and small negative values for the remaining actinides. Nevertheless, after treating some ten nuclei in this manner, the fluctuations in the parameters obtained clearly demonstrated the futility of this approach. Figure 2 illustrates the source of the difficulty. The spacing between isometric lines makes the parameters extremely sensitive to experimental errors in intensities, as well as to defects in the theoretical G_{L0}.

The next approach tried was one in which the matrix was defined by Eq. (12) as in Fröman's work, but the B was varied to achieve the best agreement of theoretical and experimental b_4/b_2 ratios. It was felt better to establish the quadrupole barrier anisotropy B without involving the L = 0 intensities, since G_{00} is more sensitive to the "cut-off", i.e., how many orbitals are included in the pairing-force basis functions. This was done for some two dozen even-even nuclei. The experimental ratios suggest a downward trend with mass, with some structural fluctuations. The values of B determined by this procedure still did not yield a reliable trend. Some values were improbable, and in a few cases the experimental ratio was impossible to match. The conclusion drawn from these calculations was that the value 0.9 for B represents a good average in most cases, and especially in the region of Pu^{238} where the calculations are expected to have most validity. Thus

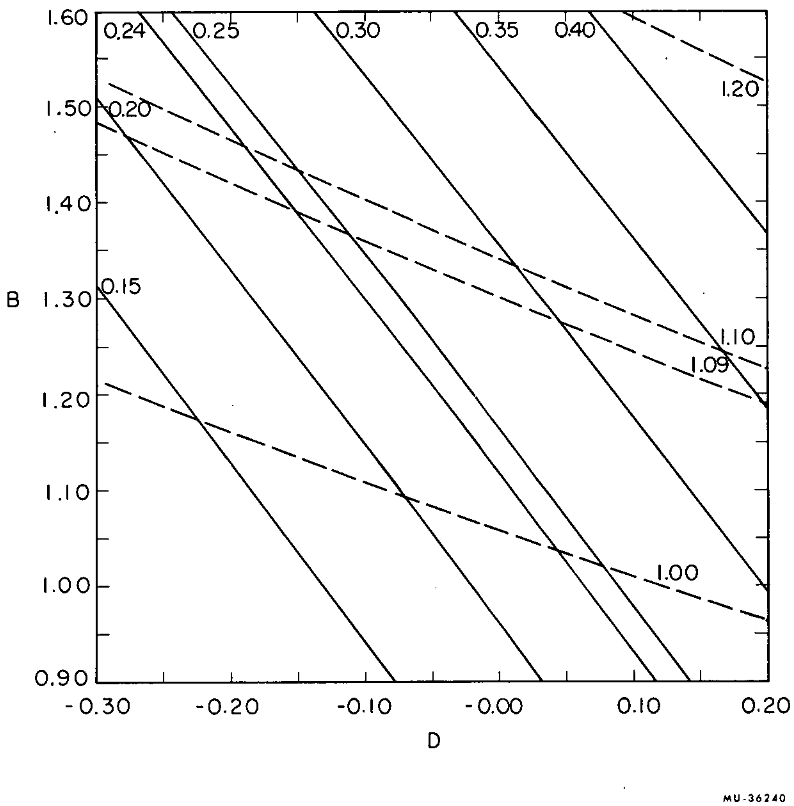


Fig. 2. Plot of isometric lines of theoretical b_2 (solid lines) and b_4 (broken lines) values as a function of the Fröman matrix parameters B and D; the intersection of the lines corresponding to the experimental values of $b_2 = 1.09$ and $b_4 = 0.24$ fixes the parameters B = 1.39 and D = -0.15.

we chose to use the argument B = 0.9 for all Fröman matrices in this study. This choice of a fixed value has the practical advantage of reducing the labor involved in the large number of calculations which follow, and makes it feasible to tabulate the matrices in Appendix C.

The penetrability factors $P_\ell(\epsilon)$ for the various partial waves ℓ and decay energies ϵ also merit discussion.

B. The Penetrability Factor

Barrier penetrabilities including a realistic α-nuclear potential were extensively calculated by Rasmussen.[25] These calculations use the real part of the Igo[26] optical model potential derived from α-elastic scattering. The real part of this potential is expressed by

$$V(r) = -1100 \exp\left\{\frac{r - 1.17\, A^{1/3}}{-0.574}\right\} \text{(MeV)} \tag{15}$$

where r is expressed in femtometers, and the expression is valid for $|V| \leqslant 10$ MeV. Igo showed in his analysis that this potential gave generally good fits to the elastic scattering of α-particles over a large range of nuclei. Rasmussen[25] used the WKB expression for the barrier transmission

$$P_\ell(\epsilon) = \exp\left\{-2 \int_{R_i}^{R_o} q(r)\, dr\right\} \tag{16}$$

where

$$q(r) = \frac{(2m)^{\frac{1}{2}}}{\hbar}\left[V(r) + \frac{2Ze^2}{r} + \frac{\hbar^2}{2mr^2}\,\ell(\ell+1) - \epsilon\right]^{\frac{1}{2}}$$

and the integration runs from inner to outer classical turning points defined by $q(r) = 0$. $V(r)$ is the α-nuclear potential, ϵ is the total α-decay energy, including recoil and electron screening corrections, and m is the reduced mass of the alpha particle. The screening correction is given by the equation*

$$Q_s = 65.3\ Z^{7/5} - 80.0\ Z^{2/5}\ (\mathrm{eV}) \tag{17}$$

and in the actinide region it runs from ≈ 35.3 keV for thorium to ≈ 40.6 keV for fermium. Since the ℓ-wave mixing in α-decay to states in odd-mass nuclei is not usually known from experiment, Rasmussen calculated the penetrability factors in these cases for $\ell = 0$.

Rasmussen's choice of the Igo potential was a practical one. There were not available then the extensive optical model analyses of alpha scattering published today, although the ambiguities in using α-elastic scattering to derive optical model parameters of the Woods-Saxon[27] form had already been recognized.[28] It is appropriate to reconsider the question of the α-nuclear potential.

1. The Alpha-Nuclear Potential

There is reason to question the Igo potential as a representation of the α-nuclear potential. Igo[28] proposed that elastic scattering of alpha particles is sensitive only to the surface of the nucleus and he states that his potential (Eq. (15)), which was fit primarily to elastic scattering, is valid for $|V| \lesssim 10$ MeV. The use of this potential in Eq. (16) is an extrapolation of this range because at the inner turning point the potential has reached a depth of ≈ -30 MeV. Furthermore, the Igo potential is a well of infinite depth which does not connect reasonably with the form of the usual shell-model nuclear potentials. The Woods-Saxon potential[27] having for the real part the usual form

*R. G. Thomas, Prog. Theor. Phys. 12, 253 (1954). In Ref. 23 the screening correction was applied to α-energies before recoil correction in order to make use of an available computer code. While the error is not serious ($\lesssim$ 1 keV) it should be applied after the recoil correction.

$$V(r) = -V_r/\left(1 + \exp\left\{\frac{r-R_o}{a}\right\}\right)\ (\text{MeV}) \tag{18}$$

is intrinsically more reasonable. In Eq. (18) V_r is the real well depth in MeV, R_o is the nuclear radius which is usually parameterized by $R_o = r_oA^{1/3}$, and a is the surface diffuseness parameter. The question to be answered is whether the ambiguities in the parameters can be resolved.

The ambiguities in fitting optical model parameters to scattering data have been the subject of several recent studies.[29-32] Igo's observation that the scattering depends only upon the nuclear surface is expressed by the condition

$$V_r \exp\left\{\frac{R_o}{a}\right\} = \text{constant}$$

Drisko, Satchler, and Bassel[29] showed that this condition, which insures similar coefficients of reflection from the nuclear surface for the partial waves around the critical ℓ-wave ℓ_c, must be modified somewhat so as to restrict the parameter V_r to discrete values within the range of the expression. These discrete values are those which also treat properly the lower partial waves below ℓ_c which are not attenuated by the absorbing potential and are appreciably affected by the volume part of the potential. In this respect the scattering does exhibit sensitivity to the interior of the nucleus. Drisko, et al.[29] also point out that the importance of this effect increases with the wave length of the alpha particle, and hence for the low energies involved in α-decay the volume potential plays a more significant role. At higher energies where surface reflection dominates, the energy dependence of ℓ_c accounts for the observed energy dependence of V_r.

Broek, et al.[30] analyzed scattering of 44 MeV α-particles on Ni^{58} and found several discrete values of V_r from 70-140 MeV which, with slight adjustment of R_o and a, give good fits to the data. Wilson and Sampson[31] studied scattering of 22 MeV α-particles on Fe^{56}, and several zinc isotopes. Their variation of the parameter V_r to obtain best fits confirms the observation that discrete values of this parameter give the best fits to data, and this supports the conclusion that the nuclear interior does indeed play a role in elastic scattering. The values of V_r found to give best fits were 20, 40, and 70 MeV, although it is pointed out that only the 20 MeV potential depth fits well the inelastic scattering to the 2^+ state. El-Nadi and Riad[32] have recently analyzed the scattering data of Gailar, Bleuler, and Tendam[33] for 18.7 MeV α-particles on silver. They too find best fits for discrete values of V_r = 35, 50, 75, and 150 MeV, with slight adjustments for R_o and a. El-Nadi and Riad also make the following observations: (a) the shape and magnitude of the angular distribution of elastic scattering is insensitive to large variations in V_r, (b) increasing R_o results in an increase in the amplitude of the oscillations with an overall downward shift of the curves, (c) keeping $V_r R_o^n$ constant (where n = 10 in the case of silver) preserves the position of maxima and minima, and (d) the shape of the differential scattering is sensitive to changes in the diffuseness parameter a.

In Fig. 3 the real part of the optical model potentials are plotted as a function of r for four sets of parameters given by El-Nadi and Riad. These parameters were fit to the 18.7 MeV α-scattering on silver and they are summarized in Table I, along with the corresponding "measure of fit" χ^2. For comparison the Igo potential is also shown. These plots are analogous to ones given by Igo[26] and illustrate the general feature that potentials which fit scattering data are equivalent in the region near the nuclear surface. This is just the region in which the barrier maximum occurs and it suggests that potentials which fit scattering data must all produce barriers whose maxima correspond in height and position. This is essentially related to the condition discussed previously that the partial waves near ℓ_c must have the proper reflection coefficients.

The preceding observations form the basis for choice of parameters of a Woods-Saxon potential to express the alpha-nuclear potential.

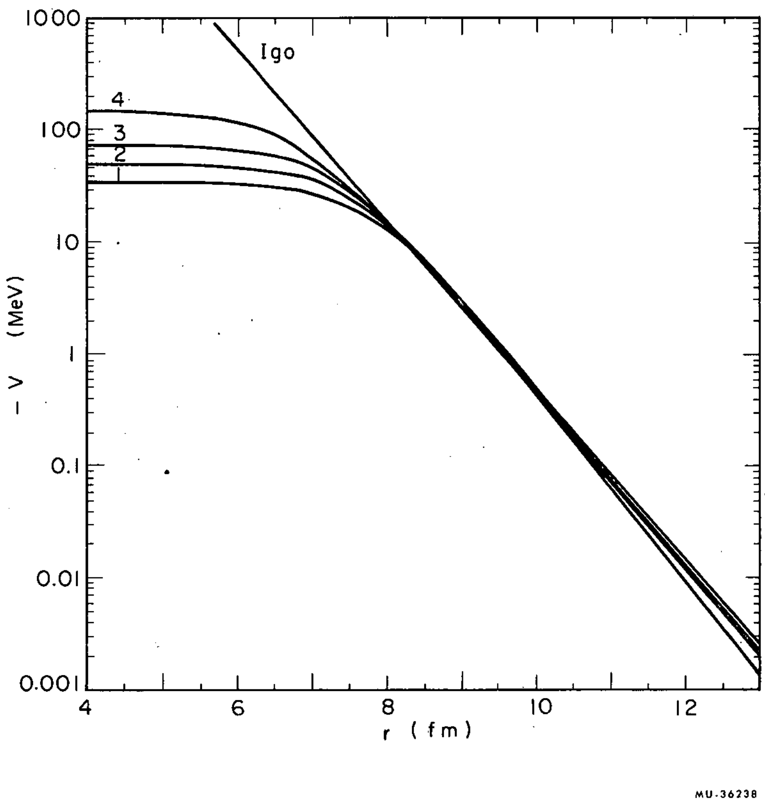


Fig. 3. Plot of the real part of the optical potentials as a function of r for the parameters given in Table I; the Igo potential is also shown.

Table I. Optical model parameters[a] for alpha scattering on silver alpha energy 18.7 MeV.

curve	V_r (MeV)	R_o (fm)	a (fm)	χ^2
1	35	7.709	0.52	0.92
2	50	7.500	0.55	0.83
3	75	7.244	0.55	0.89
4	150	6.683	0.57	1

[a]Taken from Ref. 32.

In the three analyses cited above a good fit was found in the region $70 < V_r < 75$ MeV. The observation of Wilson and Sampson[31] that inelastic scattering could only be fit by $V_r = 20$ MeV presents a practical problem, because such a shallow depth results in the loss of an inner turning point in Eq. (16), even for low partial waves. Practicality therefore limits the choice to a deeper potential which insures that an inner classical turning point exists. Blair and Wegner[34] obtained an excellent fit to scattering data for 26.5 MeV α-particles on Fe^{56} using the parameter $V_r = 74$, and this value was chosen in the present study. Very few optical analyses of scattering are available in the actinide region. Igo[26] showed that his potential did fit total reaction cross-sections for $U^{233,235}$ and Pu^{238}. The procedure we used therefore was to match the Igo potential in the region of the barrier maximum which, for an $\ell = 0$ alpha on U^{234}, occurs at 11.1 fm with a height of 17 MeV. The well depth was fixed at $V_r = 74$ MeV, and R_o and a were varied to obtain the match shown in Fig. 4. The resulting Woods-Saxon parameters are $V_r = 74$ MeV, a = 0.565 fm, and $R_o = 1.17\ A^{1/3} + 1.6$ fm, where 1.6 fm is the alpha size obtained from electron scattering.[8]

The similarity of this potential to the Igo potential was tested on five nuclei from Th^{230} to Cf^{246} for partial waves up to $\ell = 8$. The differences in barrier maxima calculated for the two potentials were generally less than 10 keV in height and 0.005 fm in position. This potential was therefore adopted as the form of the α-nuclear potential. Use of this Woods-Saxon potential gave penetrability factors which were 34 to 48% lower than corresponding calculations made with the Igo potential. This results from a general thickening of the barrier with the inward shift of the inner turning point when the steep slope of the Igo potential is replaced by a realistic gradual slope of the Woods-Saxon form. The effect is largest for higher partial waves, reaching 48% reduction in $P_\ell(\epsilon)$ at $\ell = 8$.

Another part of the penetrability factor which was investigated is the Coulomb potential.

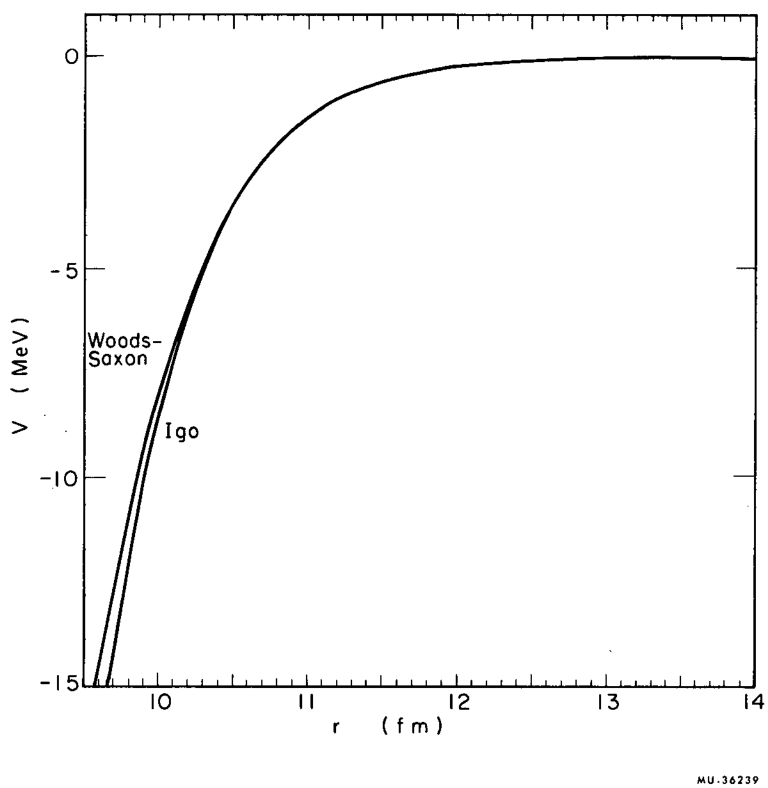


Fig. 4. Comparison of Igo and Woods-Saxon potentials as a function of r for mass 234; the Woods-Saxon parameters are V_r = 74 MeV, a = 0.565 fm, and $R_0 = 1.17\ A^{1/3} + 1.6$ fm.

2. The Coulomb Potential

The effect of modifying the Coulomb term $(2Ze^2/r)$ in $q(r)$ of Eq. (16) was studied. The potential for the Gaussian charge distribution (Family IIb) of Hill and Ford[35] was substituted for the ordinary $1/r$ dependence. This Coulomb potential is expressed in terms of the dimensionless parameter $x = r/r_c$, where r_c is the mean charge radius given by $1.17\ A^{1/3}$. The equations are

$$V_c(r) = \frac{2Ze^2}{r_c}\left[\frac{1}{n^2} + \frac{1}{2} - \frac{x^2}{6} + \frac{e^{-n}}{n^2}\left(\frac{1-e^{nx}}{nx} + \frac{e^{nx}}{2}\right)\right]\Bigg/\left(\frac{1}{3} + \frac{2}{n^2} + \frac{e^{-n}}{n^3}\right) \qquad (x \leq 1) \qquad (19a)$$

$$V_c(r) = \frac{2Ze^2}{r_c}\left[\frac{1}{x} - e^{n-nx}\left(\frac{1}{x} + \frac{n}{2}\right)\Bigg/\left(e^{-n} + 2n + \frac{n^3}{3}\right)\right] \quad (x \geq 1) \qquad (19b)$$

with n a dimensionless shape factor. The shape factor, taken from the values given in Table I of Igo,[26] can be expressed by $n = 1.62\ A^{1/3}$.

Calculations of $P_\ell(\epsilon)$ using the modified Coulomb potential of Eq. (19) show only a slight increase of ½% over equivalent calculations with the ordinary $1/r$ potential. This modification was retained however to provide a basis for comparison of future calculations in which the WKB approximation might be compared with numerical integration of the alpha wave equations. In such cases, the discontinuity in the second derivative at the nuclear surface is avoided by the potential given by Eq. (19). Since the Hill-Ford potential is practically equal to the simple $1/r$ potential at $r > 25$ fm, the calculations use the simple form outside this radius.

Next we consider the centrifugal term in $q(r)$ of Eq. (16).

3. The WKB Approximation and the Centrifugal Barrier

The WKB method is not directly applicable to the radial Schrödinger equation because in this case the singularity occurs at the origin rather than at infinity. Langer[36] showed that for the case of a Coulomb potential one can introduce the transformation $r = \exp(x)$ and the radial equation can be reduced to a form to which the WKB method is applicable.* The result is the so-called Langer modification which consists of replacing the term $\ell(\ell+1)$ in Eq. (16) by $(\ell+\frac{1}{2})^2$. This modification has been introduced into the definition of q(r) in Eq. (16) for the penetrability factors which are presented in the tables given later. The effect of this modification is small and it results in a uniform reduction of $\approx 2\%$ in $P_\ell(\epsilon)$ from the unmodified centrifugal term $\ell(\ell+1)$.

Recently, however, Fröman and Fröman[37] have subjected the WKB approximation to a critical study in what will probably become a classic book on the method. The authors point out that Langer's transformation is restricted to the special case of a Coulomb potential. They emphasize that the replacement of $\ell(\ell+1)$ by the term $(\ell+\frac{1}{2})^2$ only improves the WKB approximation for small values of r when the function $q^2(r)$ has a pole of the first or second order for $r = 0$; for other potentials or for large values of r this modification may be undesirable. They give the mathematical criteria for determining the usefulness of the modification.

With the modified Coulomb potential and the α-nuclear potential, it is not obvious that the Langer modification is to be preferred. Furthermore, the integral in Eq. (16) restrains r to relatively large values. The value of the Langer modification in these calculations should really be tested more carefully, but since it produces a generally uniform reduction of only 2% in $P_\ell(\epsilon)$, no serious errors in the theoretical alpha intensities will arise from including it. We therefore chose to use the Langer modification leaving the question of its validity for future study.

---

*This transformation is also described by P. M. Morse and H. Feshbach in Methods of Theoretical Physics (McGraw-Hill Book Co., Inc., New York, 1953), p. 1101.

4. Summary of the Calculation of Penetrability Factors.

Arguments supporting the choice of the Woods-Saxon potential used in these calculations have been given, and the modified form of the Coulomb potential and the Langer modification to the centrifugal barrier have been discussed. We have shown: (a) that the Woods-Saxon potential results in a 35-48% reduction in the penetrability compared to the Igo potential, (b) the effect of the Hill-Ford Coulomb potential is only of the order of $\frac{1}{2}$% increase in penetrability; and (c) the usefulness of the Langer modification is questionable but nonetheless results in only a 2% reduction in the penetrability.

The numerical integration used in the solution of Eq. (16) is done by means of the IBM SHARE subroutine RW INT, using the fourth-order Adams-Moulton predictor-corrector method. The step size was automatically altered by the program to meet the requirement that the upper bound on the local truncation error estimate be less than 10^{-8}. Comparison of the calculations with this integration method for data identical to those of Rasmussen[25] gave values about 10% lower than his results. In these comparisons the Igo potential and unmodified form of Eq. (16) were used. It is not clear what is the source of the difference, but some trial calculations suggest that the Simpson's integration used earlier was less accurate than estimated. Sandulescu and Voeroes[38] calculated values for the same data which were a factor of four less than those of Rasmussen. They were unable to explain the discrepancy. Our present work indicates Rasmussen's values are not that much in error.

The last word has not yet been heard regarding the alpha-nuclear potential. Chaudhury[39] has shown that a non-local potential can enhance the penetrability up to 50%. Nevertheless we shall see that the potential and approximations used here yield reasonable results in the calculation of theoretical alpha transition probabilities from the nuclear shell-model.

IV. RESULTS

The justification of any theory or model rests ultimately on its ability to systematize experimental knowledge and permit the deduction (calculation) of physical phenomena in a quantitative way. This is the Correspondence Principle *par excellence*. It is this test which we now apply to the alpha decay theory presented in this thesis, with the hope that the reader will feel his patience has been rewarded. In order not to present an overwhelming amount of results here, we give only a summary and defer the full tables to Appendix D.

At this point, the steps comprising these calculations should be recalled. Using Mang's theory of alpha decay, the various partial amplitudes for alpha emission are calculated in the region of the nuclear surface from the Nilsson single-particle wave functions, taking into account the diffuse Fermi surface produced by pair-correlation of the nucleons. The penetration of the partial α-waves through the anisotropic potential is treated in an approximate way to calculate the final transition probabilities. All transition probabilities are normalized by a factor which brings the theoretical rate for the Pu^{238} ground transition into agreement with the experimental value.

In predicting the amplitudes, the calculations also give the relative phases of the α-partial waves. The α-amplitudes near the nuclear surface for even-even and odd-mass nuclei are given in tables in Appendix D. The inclusion of more orbitals and use of better basis wave functions have resulted in a factor of two increase in the G_{00} values over the previous results of Mang and Rasmussen.[6] The G_{L0} for other L values are less affected with the result that ratios G_{L0}/G_{00} given in table D.I are less than those of Mang and Rasmussen. Sandulescu and Stancu[40] made similar calculations including 24 proton and 24 neutron orbitals. Instead of exact calculations of the Γ coefficients they used an approximate method based on the assumption $\alpha = \beta$, and applied a parameterized correction factor. They find G_{20}/G_{00} ratios which are almost a factor of two greater than Mang and Rasmussen.

They do not give the absolute values of their G_{00}, so no comparison can be made. The differences may well lie in the basis wave functions.

Also tabulated in Appendix D are the reduced relative amplitudes b_ℓ for even-even transitions as defined by Eq. (14), and the transformed $\ell = 0$ amplitudes $\hat{G}_{00}$ defined as the denominator of Eq. (14). Table D.III gives experimental data for even-even alpha decay, and tabulates the penetrability factors and the deduced experimental b_ℓ values. Finally, there is an extensive table for odd-mass alpha decay. This table lists phases and amplitudes for the allowed partial waves in transitions to the final states of the intrinsic rotational bands in the daughter. Included are the appropriate penetrability factors, a prediction of the relative ℓ-wave contributions to the final state, and the normalized transition probability.

In Table II we summarize some of the results in Appendix D for the even-even nucleu. The theoretical and experimental transition probabilities and their ratios are given for various nuclei. The data are taken mostly from Hyde, Perlman, and Seaborg[41] with some more recent data culled from the Table of Isotopes now in preparation by Lederer, Hollander, and Perlman.[42] For comparison, in column 7 we give from the pairing-force calculations the product of the proton and neutron "diffuseness parameters" shown in Fig. 6 of Ref. 14; and, in column 6, the experimental to theoretical ratio of the product of odd-even mass differences ΔE_{oe} for protons and neutrons taken from Figs. 8 and 9 of Ref. 14. As Eq. (9) shows G_{00} is proportional to

$$\sum_p \sum_n u'_p v_p u'_n v_n \, \Gamma_{00}^{p-pn-n} .$$

The Γ_{00} are known to all be positive and their magnitude fluctuates, but if we replace them by an average value $\Gamma_{00}(av)$ and make the additional approximation that the chemical potentials for protons and neutrons are unchanged in alpha decay, then

$$G_{00} \propto \Gamma_{00}(av) \sum_p \sum_n u_p v_p u_n v_n = \Gamma_{00}(av) \frac{\Delta_p}{G_p} \frac{\Delta_n}{G_n} .$$

Table II. Comparison of theory and experiment for ground transitions of even-even nuclei.

Nucleus	N	λ (exp) $(sec)^{-1}$	λ (theo) $(sec)^{-1}$	$\frac{\lambda\ (exp)}{\lambda\ (theo)}$	$R_{\Delta E_{oe}}$	D_pD_n
Th^{226}	136	3.40 (-4)	3.74 (-4)	0.910	0.853	47.4
Th^{228}	138	8.08 (-9)	1.09 (-8)	0.742	0.925	45.5
Th^{230}	140	2.09 (-13)	2.30 (-13)	0.870	0.865	42.4
Th^{232}	142	1.21 (-18)	9.05 (-19)	1.338	0.915	37.4
Th^{234}	144				0.905	37.1
U^{228}	136	8.44 (-4)	1.41 (-3)	0.598	0.899	43.7
U^{230}	138	2.59 (-7)	3.09 (-7)	0.838	0.977	42.0
U^{232}	140	2.03 (-10)	2.33 (-10)	0.870	0.915	39.0
U^{234}	142	6.33 (-14)	5.99 (-14)	1.058	0.965	34.5
U^{236}	144	6.80 (-16)	6.18 (-16)	1.100	0.955	34.2
U^{238}	146	3.75 (-18)	2.22 (-18)	1.690	0.969	32.1
U^{240}	148				0.956	27.6
Pu^{232}	138	≈5.45 (-6)	6.00 (-5)	≈0.091	0.968	39.9
Pu^{234}	140	8.15 (-7)	1.03 (-6)	0.790	0.906	37.2
Pu^{236}	142	5.31 (-9)	6.02 (-9)	0.822	0.957	32.9
Pu^{238}	144	1.81 (-10)	1.81 (-10)	1.000[a]	0.947	32.6
Pu^{240}	146	2.54 (-12)	1.83 (-12)	1.389	0.960	30.6
Pu^{242}	148	4.32 (-14)	2.65 (-14)	1.632	0.950	26.3
Pu^{244}	150				0.860	26.0
Cm^{238}	142	≈5.77 (-6)	2.47 (-6)	≈2.32	0.995	26.7
Cm^{240}	144	2.16 (-7)	2.47 (-7)	0.874	0.985	26.4
Cm^{242}	146	3.64 (-8)	3.53 (-8)	1.030	0.998	24.8
Cm^{244}	148	9.40 (-10)	7.15 (-10)	1.315	0.986	21.4
Cm^{246}	150	3.24 (-12)	2.28 (-12)	1.422	0.895	21.1
Cm^{248}	152	3.84 (-14)	2.01 (-14)	1.912		16.9

Table II. Continued.

Nucleus	N	λ (exp) $(\mathrm{sec})^{-1}$	λ (theo) $(\mathrm{sec})^{-1}$	$\frac{\lambda\ (\mathrm{exp})}{\lambda\ (\mathrm{theo})}$	$R_{\Delta E_{oe}}$	$D_p D_n$
Cf^{244}	146	3.46 (-4)	2.40 (-4)	1.441	1.179	26.4
Cf^{246}	148	4.20 (-6)	3.61 (-6)	1.162	1.163	22.7
Cf^{248}	150	1.88 (-8)	1.43 (-8)	1.315	1.057	22.4
Cf^{250}	152	1.38 (-9)[b]	7.30 (-10)	1.890		18.0
Cf^{252}	154	6.75 (-9)[b]	3.13 (-9)	2.15		24.4
Fm^{252}	152	≈7.2 (-6)	6.09 (-6)	≈1.183		17.2
Fm^{254}	154	5.05 (-5)	3.22 (-5)	1.570		23.9

[a]Normalization.

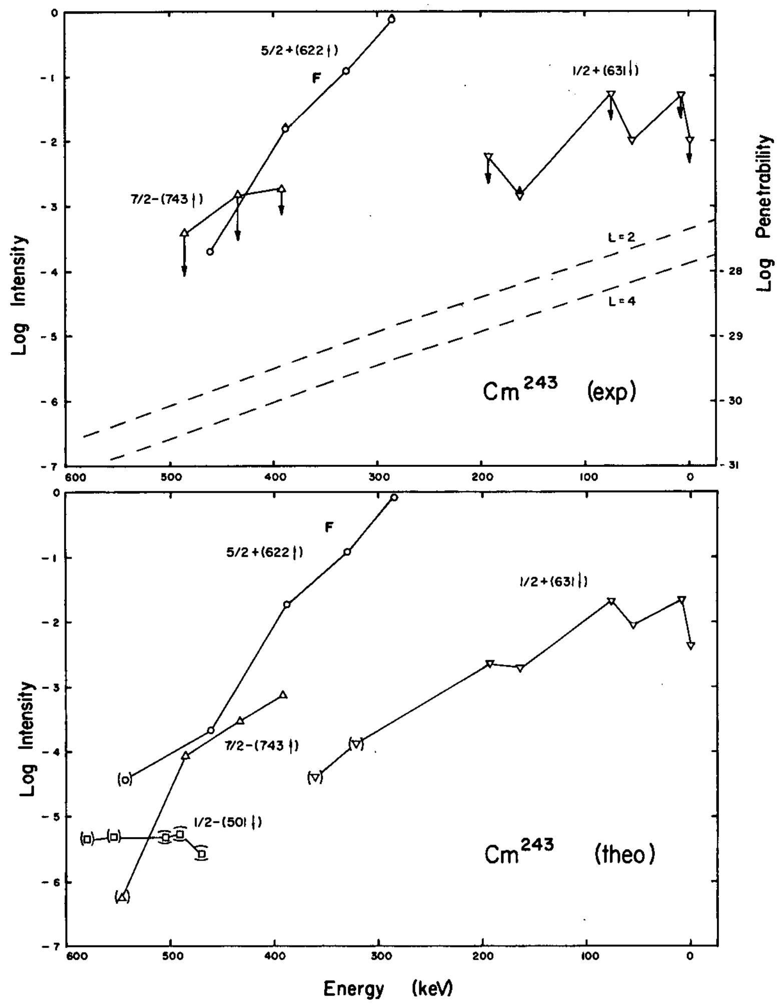
[b]D. Metta, H. Diamond, R. F. Barnes, J. Milsted, J. Gray, Jr., D. J. Henderon, and C. M. Stevens, J. Inorg. Nucl. Chem. 27, 33 (1965).

This leads to the approximation that the G_{00} are proportional to the odd-even mass difference ΔE_{oe} for the protons and neutrons. The failure of the calculations to match the experimental ΔE_{oe} would therefore be reflected quadratically in the theoretical ground decay rate comparisons. For the fixed particle wave functions the Δ/G values go over to the diffuseness values D. The diffuseness product is therefore a measure of the enhancement in the alpha amplitude brought about by the pairing correlation.

Figure 6 of Mang et al. shows the BCS and FBCS methods give substantially the same D values while the PBCS systematically is lower. Thus we may conclude that the particle fluctuation in the ordinary BCS wave functions of the original Mang and Rasmussen calculation is not the source of significant error in the G_{00} compared to FBCS fixed particle wave functions. The factor of ≈ 2 increase in the G_{00} must therefore come from the larger (25×40) set of orbitals considered. The table shows that inclusion of more orbitals increased the enhancement of intensity from the factor 320 reported earlier by Mang and Rasmussen[6] for 10 proton and 10 neutron orbitals to values near the 1700 reported by Soloviev.[43]

Eichler and Mang[44] recently pointed out that a factor of 8 is required to take into account the relation between the volume element in internal coordinates in which the alpha formation is calculated and the laboratory system. This relation was also given by Mang in his review article[9] but the G_{LM} in the tables of Appendix D do not contain this factor. When this factor is included and our value of 8.25 fm for R_0 is inserted in the theoretical expression for λ given by Eq. (1), the theoretical ground transition rate of Pu^{238} is found to be lower than experiment by a factor of about 60. The fact that this factor is uniform in the theory is clearly evident from Table II which shows that the ratio of experiment to theory remains close to unity after the normalization to Pu^{238}. The greatest deviation occurs near neutron number 152 where the basis wave functions are probably in greatest error as a result of the gap in level density in deformed nuclei at this number. The large error in Cm^{238} is probably due to error in the experimental alpha branching ratio. The experimental half-life of Pu^{232} also appears to be in error. The odd-even mass difference ratio in column 6 exhibits the same trend as the ratio of experimental to theoretical transition probabilities, indicating that the basis wave functions are responsible for part of the deviation.

The success of Mang's theory is probably best illustrated in Figs. 5 through 8. These figures summarize some of the results for odd-mass calculations found in Table D.VI. We have plotted the log of the relative alpha intensities of the decays to various states in the daughter. The intensities are plotted as a function of excitation energy of the final state with the transition of highest α-energy at the right. The plots are thus like alpha spectra. The rotational members of an intrinsic single-particle band are connected and the band is labeled by the usual Nilsson[7] asymptotic quantum numbers $K\pi(N\ n_z\Lambda)$. The relative theoretical intensities are obtained from the tables by totaling all the normalized transition probabilities for a given nucleus and taking the ratio with respect to this total. This constitutes an additional normalization for odd-mass nuclei, but makes comparisons convenient. The theoretical transition rates may be obtained directly from Table D.VI in the appendix. The experimental graphs (top) also show an arrow whose head indicates the position of the corresponding theoretical point in the graph below, when the difference is large enough to be portrayed thus. A few dashed curves are plotted as a function of energy for penetrability factors of representative ℓ-waves. The circles represent the members of the favored band, also labeled by F. The inverted triangles signify the transition involves spin flip (where the odd particle spin projection Σ changes sign relative to the projection of orbital angular momentum Λ), while the the other transitions do not. The theoretical graph gives predicted α-intensities to states for which no data was available, plotted in parentheses.



MU-36153

Fig. 5. Plot of relative alpha intensities of Cm^{243} as a function of excitation energy of the final state; the intrinsic bands are labeled by asymptotic quantum numbers and the rotational members are connected by a line; the arrows on the experimental plot (top) indicate the position of the corresponding theoretical point of the graph below; the broken lines give the value of the penetrability factor for some representative ℓ-waves as a function of the excitation energy.

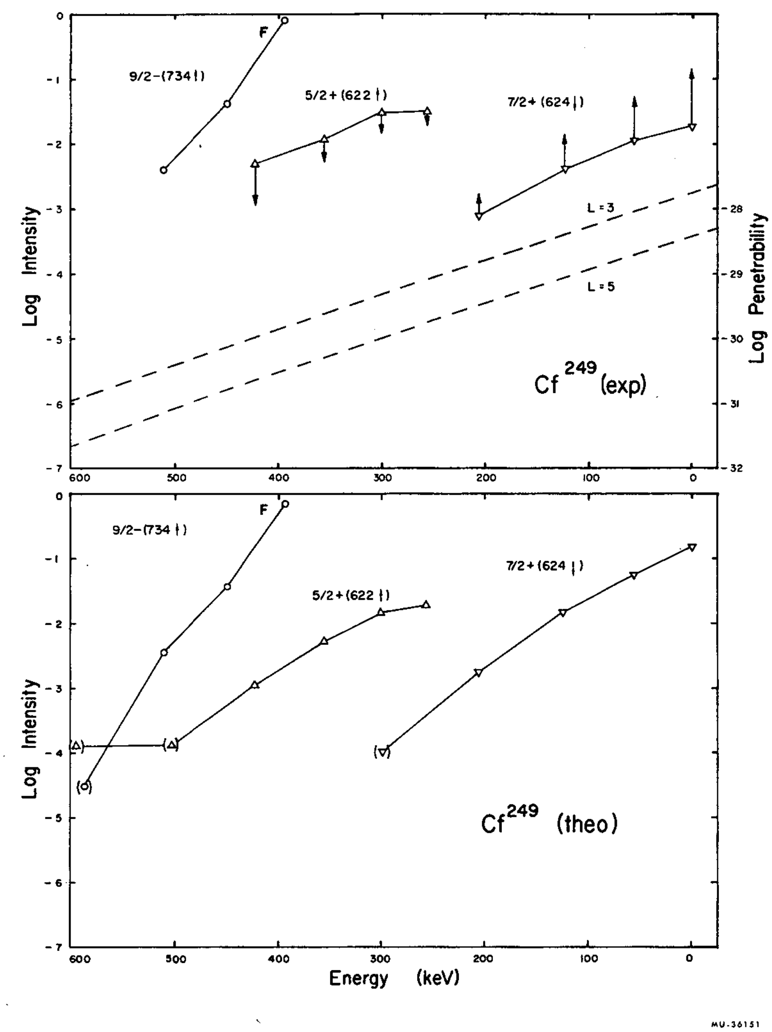


Fig. 6. Plot of relative alpha intensities of Cf^{249} as a function of excitation energy of the final state; the notation is similar to that for Fig. 5.

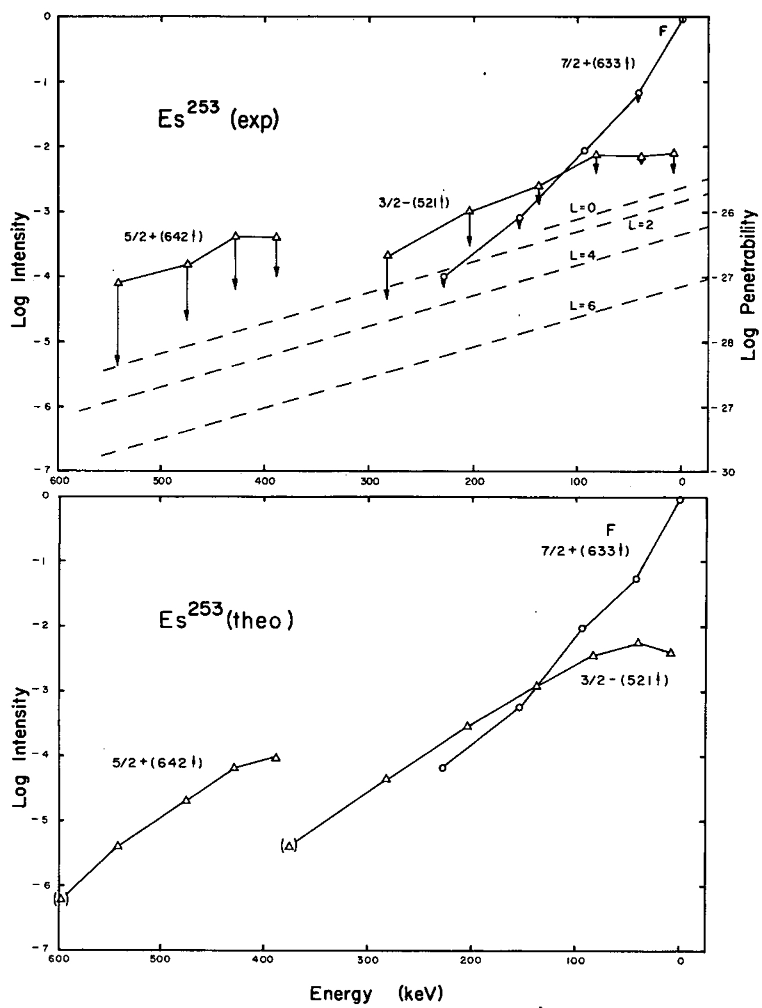


Fig. 7. Plot of relative alpha intensities of Es^{253} as a function of excitation energy of the final state; the notation is similar to that for Fig. 5.

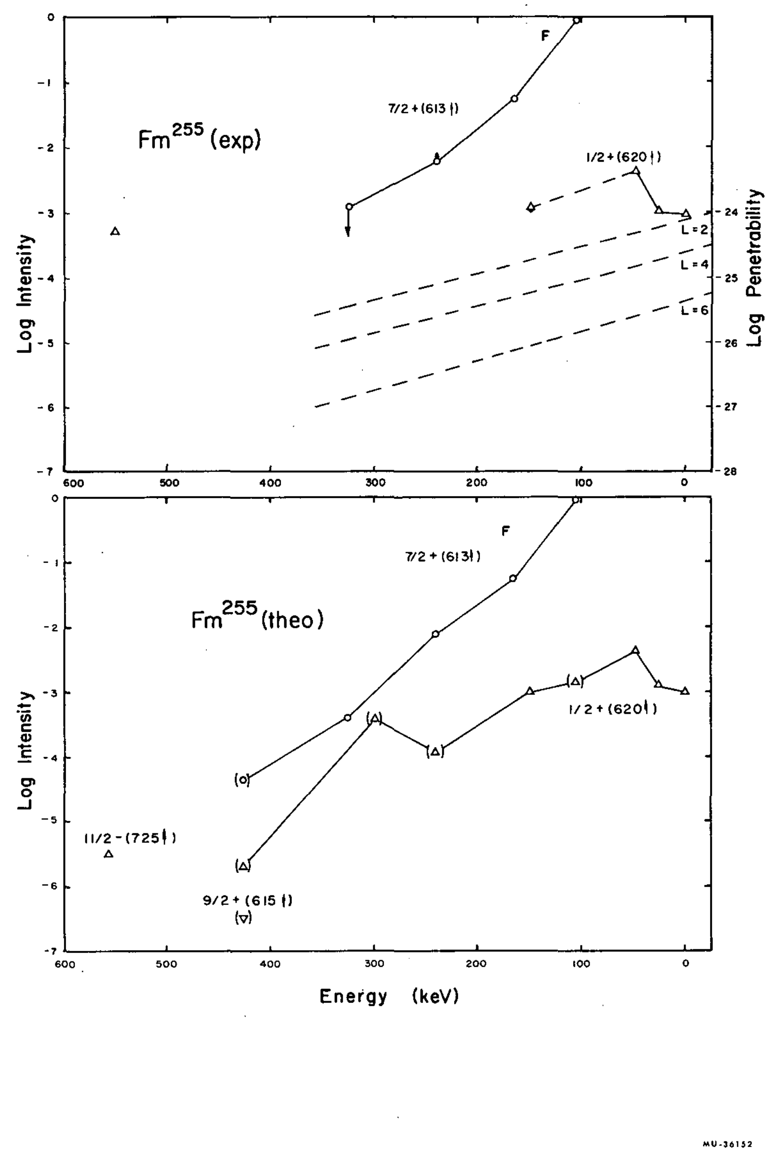
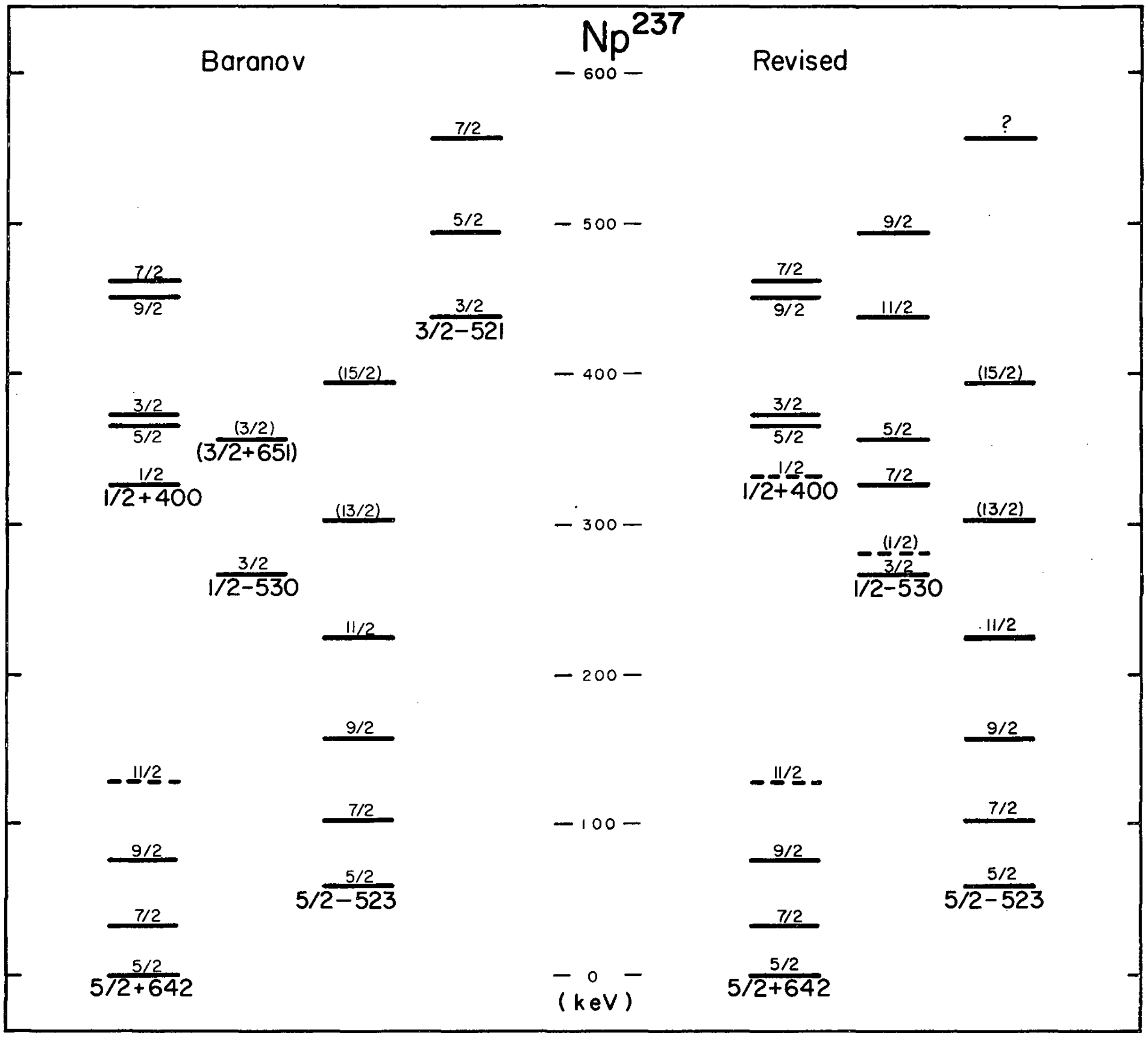


Fig. 8. Plot of relative alpha intensities of Fm^{255} as a function of excitation energy of the final state; the notation is similar to that for Fig. 5.

Figure 5 shows results for Cm^{243} decay. We note that the theory correctly predicts the alternating intensities to members of the $\frac{1}{2}+$ ground band. This is indication that the theory correctly predicts the relative amplitudes of the $G_{LK_i-K_f}$ and $G_{LK_i+K_f}$ waves, which are alternately constructive and destructive. The three states of the $\frac{1}{2}-$ band which have horizontal parentheses are levels in Pu^{239} which were observed by Davies and Hollander[45] in beta decay of Np^{239}, but have not been seen in α-decay. The favored band is predicted well by the theory. The 7/2- band has larger errors, but the intensity pattern is in agreement.

In Fig. 6 results are plotted for Cf^{249}. The favored band is again well predicted, with larger error in the hindered decays. Figure 7 shows that the theoretical intensities for decay of Es^{253} to the 5/2+ band are an order of magnitude too low, but the pattern of intensities is correct. Figure 8 displays the decay of Fm^{255} and the theory here nicely reproduces the hindered decay to the $\frac{1}{2}+$ ground band. The 7/2+ member of this band is masked experimentally by the favored transition. We note that the theory predicts an intensity more than two orders of magnitude too low for an assignment of 11/2-(725) to the state at 546 keV. It is therefore doubtful that this state could be a pure single-particle state of that designation. The theory usually predicts the hindered intensities within an order of magnitude, and much larger discrepancies have not been observed. Even when the hindered predictions disagree by an order of magnitude, the error is generally uniform throughout the band so that the intensity pattern is correctly given by the theory. We also mention that the theory does not take into account any Coriolis interaction between states.

It is the reliability of the calculations in giving the correct intensity patterns that led Lederer et al.[46] to the reassignment of the levels of Np^{237} given by Baranov, Kulakov, and Shatinsky[47] in the report of their excellent alpha decay data in Am^{241}. Baranov's suggested scheme is portrayed in Fig. 9 alongside the assignments as revised



MUB-6590

Fig. 9. Levels of Np^{237}; the proposed assignments of Baranov et al.[47] are compared with the assignments of Lederer et al.[46]

by Lederer et al. It was noted that while the theory undershot the intensities of the $\frac{1}{2}+$ band by an order of magnitude, the intensity of the state reported as the $\frac{1}{2}+$ state by Baranov did not fit the pattern. Furthermore, the $\frac{1}{2}+$ level was accurately known to be at 332 keV from β-decay and the 5 keV energy discrepancy in Baranov's reported level seemed too large. Another guide given by the calculation is the indication that the $\frac{1}{2}-$ rotational member of the $\frac{1}{2}-(530)$ band should be populated with an intensity two orders of magnitude less than the other members, and thus would not be observed in alpha decay, but the other members should be seen if the 3/2- member is seen. The calculations also show that if the 3/2+ state of the 3/2+(651) band is seen, some higher rotational members should be seen. Lederer had observed a weak gamma transition which suggested the $\frac{1}{2}-$ level might be $\approx$ 13 keV above the 3/2- state. Taking the 327 keV state of Baranov to be the 7/2- member one can calculate a rotational constant of 6.72 keV and a decoupling parameter of -1.64 for the band. This results in a rotational band which places Baranov's 357, 438, and 485 keV levels as the 5/2-, 11/2, and 9/2 members of the band. The theoretical and calculated intensities are compared in Table III, and the agreement is convincing, especially since five observed levels are fit to the rotational band.

We have also observed a selection rule which is a guide to determining the onset of strong ℓ-waves in hindered alpha transitions. It is related to the first electric multipole allowed for electromagnetic transitions between two intrinsic states specified by the asymptotic quantum numbers $(N\ n_z \Lambda)$. The larger reduced transitions probabilities near the nuclear surface are usually those for which $\ell \geq \Delta n_z + \Delta\Lambda$. The reduced transition probabilities are the square of the intrinsic alpha amplitudes near the nuclear surface after the barrier anisotropy is taken into account (by means of the Fröman matrix) but excluding the energy and centrifugal dependence of the penetrability factors $P_\ell(\epsilon)$. This corresponds to the squared quantity in the brackets Eq. (1), and is given in column 7 in Table D.VI. The reduced penetrability for partial waves of higher angular momenta leads qualitatively

Table III. Comparison of theory and experiment in alpha decay of Am^{241} to the $\frac{1}{2}$-(530) rotational band.

J	Ex. Energy[a] (keV)	Percent Intensity exp.	Percent Intensity theory
3/2-	267.5[b]	5×10^{-4}	1.5×10^{-3}
1/2-	(280)[c]	---	3.5×10^{-5}
7/2-	327	1.3×10^{-3}	1.6×10^{-3}
5/2-	357	6×10^{-4}	4.7×10^{-4}
11/2-	438	4×10^{-4}	2.8×10^{-4}
9/2-	485	1.4×10^{-4}	4.8×10^{-5}

[a]Energies and intensities are taken from Baranov et al.[47]

[b]Energy taken from T. Yamazaki and J. M. Hollander (to be published).

[c]Calculated.

to a high hindrance factor for these transitions. The high hindrance associated with transitions involving spin flip is taken into account by the fact that for such cases the $\Delta\Lambda$ is computed by taking the Λ values to be of opposite sign. This results in higher partial waves for the strong transitions, with concomitant higher hindrance. This rule is shown graphically for Cm^{243} in Fig. 10 where the contributions of particular ℓ-waves to all final states in a given band are totaled from column 7 of Table D.VI and plotted in arbitrary relative units within each band. The different bands are not plotted to scale relative to one another. The rule is illustrated nicely in the transition to the $\frac{1}{2}+(631)$ band but the figure indicates that there are other effects superimposed. One such effect appears to be the greater probability amplitude for forming alpha particles of low relative angular momentum from the overlap of proton and neutron single-particle wave functions. Chang[48] has also made this observation in his calculations of alpha clusters from the overlap integrals of orbital wave functions.

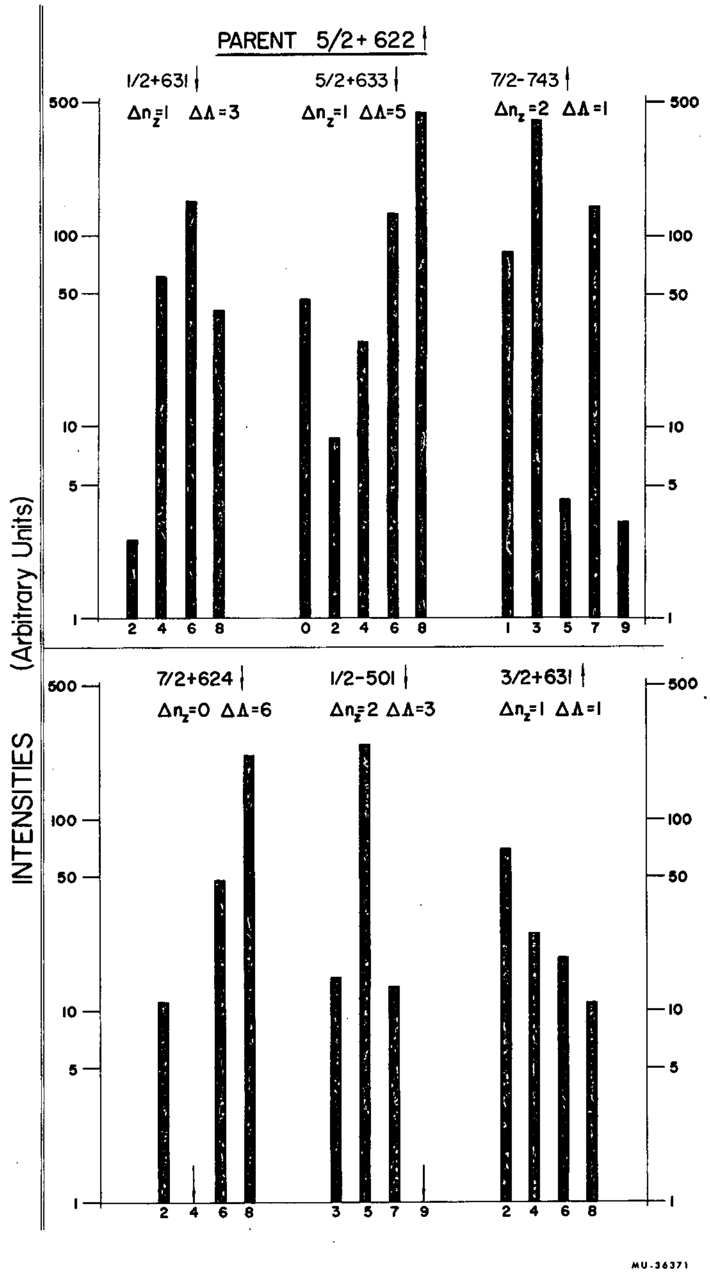


Fig. 10. Comparison of L-wave probabilities within the hindered bands of Cm^{243} calculated at the spherical surface given by R_0; the total L-wave contributions are plotted in relative units for each band.

V. CONCLUSIONS

The calculations show that Mang's theory is capable of describing alpha decay in a quantitative way. The uniformly lower theoretical absolute transition rates appear to stem from defects in the basis wave functions. One likely defect is the failure to take into account specifically the proton-neutron force. The large binding energy of the alpha particle indicates a strong proton-neutron force and suggests that the α-formation probability should be greater than that indicated by the orbital overlap of independent proton and neutron pairs. Inclusion of such a force should result in a fairly uniform enhancement.

The calculations have demonstrated their usefulness in making level assignments in odd-mass nuclei. The theory can aid in the search for new rotational states. Even though theoretical relative intensities to hindered bands may be off an order of magnitude, the intensity pattern of the band is correctly described. Disagreement in intensity much larger than an order of magnitude, and especially disagreement in the intensity pattern, are serious grounds to question the intrinsic assignment of the band. The predicted phases are useful to the interpretation of angular correlation experiments. The phases and relative ℓ-wave contributions to final states provide needed data for calculation of Coriolis admixture in odd-mass alpha decay. It is for these reasons that we have included in the tables calculations for unobserved transitions when the pairing-force calculations show the bands may be present.

The study of the barrier penetration clearly shows that more information is needed about this process, and especially about the alpha-nuclear potential. There is need for more careful inward numerical solutions to the coupled decay equations to check the Fröman method, which is nevertheless a useful expedience, and also to point out the detailed defects in the calculated alpha amplitudes near the nuclear surface.

Tables D.II and D.III show that using a constant argument B in the Fröman matrix results in the calculated reduced relative amplitudes b_ℓ varying too slowly to follow the experimental trend. The effect of this is less noticeable in odd-mass decay where the transitions are mixed ℓ-waves. It does affect absolute transition rates, however. The use of constant R_o and α parameters, and use of basis functions appropriate near the deformation $\eta = 5$ will naturally result in greater error as the calculations are extended to protactinium and fermium isotopes where the deformation differs. Coriolis interaction is known to be important in several cases and it has not been taken into account here.

With all the known shortcomings and approximations it must be admitted that the theory does explain alpha decay in principle, and in practice is useful in the interpretation of experiment and in furthering knowledge of detailed nuclear structure.

ACKNOWLEDGMENTS

I wish to express my thanks to Professor John O. Rasmussen for his inspiration and direction in the conduct of this research.

I also thank Professor H.-J. Mang, whose friendship I have been privileged to enjoy, for his guidance and many lucid discussions.

My wife, Sheila, deserves recognition for her patience and encouragement which were indispensable to me.

Appreciation is due to Dr. Frank Asaro, whose desk was the source of untold treasure, for his many helpful discussions and unpublished data.

I have also enjoyed the help of the Mathematics and Computing Group, especially that of Dr. Paul Concus.

Dr. Jack M. Hollander deserves thanks for the direction he gave me in my earlier research.

My thanks are due to Professors Street and Crowe for their time and interest in serving as my thesis committee, and especially for their effort to accommodate my pressing demands.

I would like to mention my appreciation to the Chemistry Division Office Staff whose friendly assistance has made my work here so much a pleasure. In particular, I thank Mrs. Eileen Eiland who was responsible for the typing of this thesis.

I also thank Miss Judy Yee for her help with drawings when deadlines advanced relentlessly.

Messrs. Judd Haverfield, Rand Watson, James Lamb, and James Harris have contributed a measure of levity which dispelled the natural gloom of our offices.

Above all I thank God for the blessings of an education and especially the friends I am privileged to acknowledge above.

This research was supported by the United States Atomic Energy Commission.

APPENDIX A

Discussion of the BCS Method

The Bardeen, Cooper, Schrieffer[13] wave functions are used widely in nuclear many-body problems. This is true despite the fact that it represents a statistical approximation strictly valid only for very large ensembles, a condition not fulfilled in nuclei. Bohr, Mottelson and Pines[49] were first to point out the similarity between nuclei and superconductors. Here we consider why the BCS method is used and the nature of the approximation, and also, how it can be improved by seeking a wave function which is an eigenstate of the number operator.

Consider a very simple case of configuration mixing. Suppose there are three Nilsson proton orbitals (1,2,3) outside a closed core $|P\rangle$ of protons, and the proton wave function represents the distribution of two pairs in these levels, as follows:

$$\Psi_p = (c_{12}a^+_1a^+_{1-}a^+_2a^+_{2-} + c_{13}a^+_1a^+_{1-}a^+_3a^+_{3-} + c_{23}a^+_2a^+_{2-}a^+_3a^+_{3-})|P\rangle \tag{A.1}$$

This will be multiplied by a similar wave function for neutrons. The number of terms in a wave function which contains p pairs distributed in Ω orbitals is given by the binomial coefficient $\binom{\Omega}{p}$. Clearly for realistic problems of 40 orbitals, such as we use for our neutron wave functions, the number of terms is too large to handle exactly even in large high-speed computers. One is thus forced to seek an approximate method.

One can see the statistical nature of the BCS wave function by expanding the wave function for the example above.

$$\begin{aligned}\Psi &= \prod_{i=1}^{3} (u_i + v_i a^+_i a^+_{i-})|P\rangle \\ &= ([u_1u_2u_3]_0 + [u_1u_2v_3a^+_3a^+_{3-} + u_1u_3v_2a^+_2a^+_{2-} + u_2u_3v_1a^+_1a^+_{1-}]_1 \\ &\quad + [u_1v_2v_3a^+_2a^+_{2-}a^+_3a^+_{3-} + u_2v_1v_3a^+_1a^+_{1-}a^+_3a^+_{3-} + u_3v_1v_2a^+_1a^+_{1-}a^+_2a^+_{2-}]_2 \\ &\quad + [v_1v_2v_3a^+_1a^+_{1-}a^+_2a^+_{2-}a^+_3a^+_{3-}]_3)|P\rangle\end{aligned} \tag{A.2}$$

The brackets contain terms proper to different pair numbers indicated by the subscripts. Obviously there are spurious components in the wave function, and it is not an eigenstate of the number operator. All we have required is that the expectation value $\langle N \rangle$ be the proper number of nucleons. The structure of a few typical BCS wave functions for our 25 proton orbitals is shown in Fig. A.1 where we plot the probability $\mathcal{P}(n,p)$ of components with p pairs in a BCS wave function with average pair number n. $\mathcal{P}$ corresponds to the square of the sum of the uv factors connected with creation operators for a given number of pairs (i.e., the square of the sum of the bracketed coefficients in Eq. (A.2)). As the size of the system increases the Gaussian-like distributions have a narrower width and the BCS wave functions become a better approximation.

Since the expansion in Eq. (A.2) contains terms of the same type as Eq. (A.1), one is led to ask if we cannot extract from the BCS wave function, just the terms with the proper number of pairs. Bayman[50] first indicated how this might formally be done based on the property

$$\oint \zeta^{n-p-1} \, d\zeta = 2\pi i \, \delta_{np}$$

with the contour taken around the origin. The wave function containing only terms with p pairs may be written

$$\Psi_p = \frac{\mathcal{N}}{2\pi i} \oint \zeta^{-p-1} \prod_\nu \left(u_\nu + \zeta v_\nu a^+_{\nu+} a^+_{\nu-}\right) |0\rangle \, d\zeta \qquad (A.3)$$

where $\mathcal{N}$ is a normalization constant determined by the condition $\langle \Psi_p | \Psi_p \rangle = 1$. Bayman showed that the u and v parameters of such a wave function are the same as determined by the usual BCS variational method. Kerman, Lawson, and Macfarlane[51] have demonstrated with numerical calculations that, despite the fact one discards some 40% of the BCS wave function in projecting out eigenfunctions of the number operator, nevertheless, after renormalization they have over 98% overlap with exact solutions. The discarding of such a significant part of the BCS wave

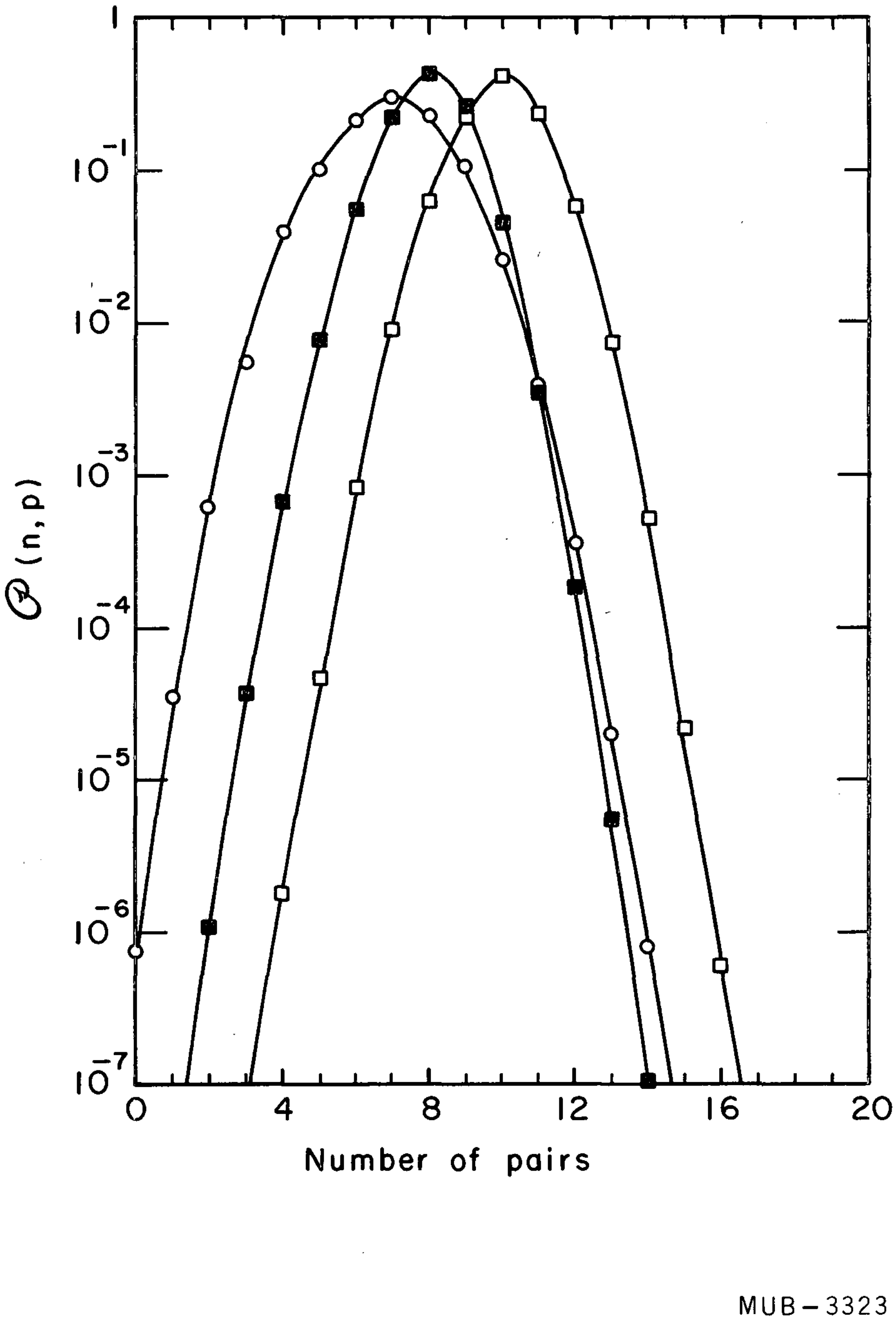


Fig. A.1. Probability of components with p pairs in a BCS ground state wave function with average pair number n; ○ n = 7, wave function for Z = 90; □ n = 10, wave function for Z = 96; ■ n = 8, wave function for Z = 93 with 5/2 + (642) orbital blocked.

function does have adverse properties however—significantly, there is a decrease in overall pairing correlation. Mang et al.[14] have demonstrated this effect, which has serious consequences in alpha decay, and have shown that ordinary BCS wave functions are in fact superior.

The defects in the projected wave function arise from the fact that the variational problem is solved first, after which projection discards part of the wave function. It is clear that the proper procedure is to perform the variation on the projected wave function itself. This results in an eigenfunction of the number operator without any loss of pairing correlation. The practical formulae for such a variational procedure are given by Dietrich et al.,[16] and Mang et al.[14] have compared this method, termed FBCS, with the preceding methods for the nuclear wave functions used in our alpha decay calculations.

By the procedure of conserving particle number in the variational calculations, one can achieve the best approximation to an exact calculation possible within the BCS framework. The method is still limited by the neglect of configurations of seniority two and higher, which are probably less important because of the high expense of energy in breaking pairs. Another limitation is the restriction to $J = 0$ pairs. This is probably valid for like nucleons, but in the presence of a proton-neutron interaction this is not entirely justified.* Of course we have entirely neglected any proton-neutron interaction in the present calculations except insofar as the average value in the Nilsson potential.

---

*See M. Baranger, Theory of Finite Nuclei, in 1962 Cargese Lectures in Theoretical Physics, (Benjamin, Inc., New York, 1963) p. V-16.

APPENDIX B

Derivation of Equations

The creation a_Ω^+ and annihilation a_Ω operators have the following properties:

$$a_\Omega^+|0\rangle = |\Omega\rangle \qquad \langle 0|a_\Omega^+ = 0$$

$$a_\Omega|0\rangle = 0 \qquad \langle 0|a_\Omega = \langle\Omega|$$

where the vacuum state $|0\rangle$ has the normalization $\langle 0|0\rangle = 1$. The operators obey anticommutation relations given by:

$$[a_\Omega, a_\nu]_+ \equiv a_\Omega a_\nu + a_\nu a_\Omega = 0$$

$$[a_\Omega^+, a_\nu^+]_+ = 0 \qquad [a_\Omega, a_\nu^+]_+ = \delta_{\Omega\nu}$$

The value of any matrix element may be derived by commuting the operators to eliminate all terms in which their operation on the vacuum state yields zero.

Consider the definition of G given in Eq. (4). The projection operator P can be expressed in terms of second quantization

$$G_{LM}(R) = \langle\Phi_K| \sum_{\substack{\Omega_1\Omega_2 \\ \Omega_3\Omega_4}} \Gamma_{LM}^{\Omega_1\Omega_2\Omega_3\Omega_4}(R)\; a_{\Omega_1}^+ a_{\Omega_2}^+ b_{\Omega_3}^+ b_{\Omega_4}^+ |\Phi_K'\rangle \tag{B.1}$$

where the a_i^+ (b_i^+) are the usual proton (neutron) operators. The primes represent the final system. In the approximation of independent wave functions for protons and neutrons $\Phi = \Psi_p\Psi_N$.

We consider first the equations for even systems. The Γ coefficients will be composed of the conjugate pairs of protons and neutrons because the breaking of pairs to scatter a single nucleon is a higher order excitation than the scattering of a pair. Indeed the usual BCS formalism does not treat such excitation processes of seniority two and higher.* For the even systems

$$\Phi = \prod_p (u_p + v_p a^+_{p+} a^+_{p-}) \prod_N (u_N + v_N b^+_{N+} b^+_{N-}) |0\rangle$$

$$\equiv (u_{\Omega_p} + v_{\Omega_p} a^+_{\Omega+_p} a^+_{\Omega-_p}) (u_{\Omega_N} + v_{\Omega_N} b^+_{\Omega+_N} b^+_{\Omega-_N}) |P\rangle$$

where we have defined the function $|P\rangle$ to be a product wave function of all states except Ω_p and Ω_N, with the peoperties $a_{\Omega_p}|P\rangle = 0$ and $b_{\Omega_N}|P\rangle = 0$. Thus the matrix element of any operator containing annihilation and creation operators which do not balance in number for each state, or which do not occur with creation operators on the right, will vanish.

The G can now be written

$$G_{LO} = \langle P| (u_{\Omega_p} + v_{\Omega_p} a_{\Omega-_p} a_{\Omega+_p}) (u_{\Omega_N} + v_{\Omega_N} b_{\Omega-_N} b_{\Omega+_N}) \tag{B.2}$$

$$\times \sum_{\Omega_p \Omega_N} \Gamma_{LO}^{\Omega_p - \Omega_p \Omega_N - \Omega_N} a^+_{\Omega_{\bar{p}}^+} a^+_{\Omega_{\bar{p}}^-} b^+_{\Omega_N^+} b^+_{\Omega_{\bar{N}}^-} (u'_{\Omega_p} + v'_{\Omega_p} a^+_{\Omega_p^+} a^+_{\Omega_{\bar{p}}^-})$$

$$\times (u'_{\Omega_N} + v'_{\Omega_N} b^+_{\Omega_N^+} b^+_{\Omega_N^-}) |P'\rangle$$

The surviving terms are those with balanced operators. This leads to

$$G_{LO} = \sum_{\Omega_p \Omega_N} \Gamma_{LO}^{\Omega_p - \Omega_p \Omega_N - \Omega_N} v_{\Omega_p} u'_{\Omega_p} v_{\Omega_N} u'_{\Omega_N} \langle P|P'\rangle$$

---

*See A. Sandulescu, Nucl. Phys. 48, 345 (1963) for formal equations for decay to two-quasi-particle states in the daughter.

From the definition of $|P\rangle$ above we have

$$\langle P|P'\rangle = \prod_{p\neq\Omega_p} (u_p u'_p + v_p v'_p) \prod_{N\neq\Omega_N} (u_N u'_N + v_N v'_N)$$

which leads immediately to Eq. (9).

The system with one odd particle is represented by

$$\Phi_k = b_k^+ (u_{\Omega_p} + v_{\Omega_p} a^+_{\Omega^+_p} a^+_{\Omega^-_p})(u_{\Omega_N} + v_{\Omega_N} b^+_{\Omega^+_N} b^+_{\Omega^-_N})|P_k\rangle$$

where we have defined $|P_k\rangle$ as before except that k is also excluded from the product function and therefore $b_k|P_k\rangle = 0$. In the favored decay with $k = k'$ the operators b_k and b_k^+ cancel and the term in the summation with $\Omega_N = k$ is zero and hence the sum over Γ must exclude this state. With the exclusion of the state k from the product and summation, Eq. (9) holds for favored decay. In the hindered decay with the odd particle in different initial and final states

$$G_{LM} = \langle P_k|(u_{\Omega_p} + v_{\Omega_p} a_{\Omega^-_p} a_{\Omega^+_p})(u_{\Omega_N} + v_{\Omega_N} b_{\Omega^-_N} b_{\Omega^+_N}) b_k$$

$$\times \sum_{\Omega_p \Omega_N \Omega_{N'}} \Gamma_{LM}^{\Omega_p - \Omega_p \Omega_N \Omega_{N'}} (a^+_{\Omega^+_p} a^+_{\Omega^-_p} b^+_{\Omega_N} b^+_{\Omega_{N'}}) b^+_{k'}$$

$$\times (u'_{\Omega_p} + v'_{\Omega_p} a^+_{\Omega^+_p} a^+_{\Omega^-_p})(u'_{\Omega_{N'}} + v'_{\Omega_{N'}} b^+_{\Omega^+_{N'}} b^+_{\Omega^-_{N'}})|P'_k\rangle \qquad (B.3)$$

The only terms which survive are those with $\Omega_N = k'$ and $\Omega_{N'} = k$ and this reduces to Eq. (10).

Consider now projected wave functions of the type given by equation (A.3). We shall let $n_p(n_N)$ designate the number of proton (neutron) pairs in the parent nucleus and shall demonstrate the derivation of equations for the even systems with one kind of particle. The normalization constant $\mathcal{N}_{n_p}$ is determined from

$$1 = \langle \Psi_{n_p} | \Psi_{n_p} \rangle = \frac{\mathcal{N}_{n_p}^2}{2\pi i} \oint \frac{d\zeta}{\zeta^{n_p+1}} \prod_p (u_p^2 + \zeta v_p^2)$$

which gives

$$\mathcal{N}_{n_p} = \left[\frac{1}{2\pi i} \oint \frac{d\zeta}{\zeta^{n_p+1}} \prod_p (u_p^2 + \zeta v_p^2) \right]^{-\frac{1}{2}}$$

We write the parent wave function and factor out the state Ω_p which will contribute a pair to the alpha wave function leaving n_p-1 pairs in the remaining wave function $|P\rangle$

$$\Psi_{n_p} = \frac{\mathcal{N}_{n_p}}{2\pi i} (u_{\Omega_p} + v_{\Omega_p} a^+_{\Omega_p} a^+_{\Omega_{\bar{p}}}) \oint \frac{d\zeta}{\zeta^{n_p}} \prod_{p \neq \Omega_p} (u_p + \zeta v_p a^+_p a^+_{p-}) |0\rangle$$

$$= \frac{\mathcal{N}_{n_p}}{2\pi i} (u_{\Omega_p} + v_{\Omega_p} a^+_{\Omega_p} a^+_{\Omega_{\bar{p}}}) |P\rangle$$

The same state is factored out of the final wave function, but since the pair of nucleons lost to the alpha wave function came from the state Ω_p, the remaining part $|P'\rangle$ still contains n_p-1 pairs.

$$\Psi'_{n_p-1} = \frac{\mathcal{N}_{n_p-1}}{2\pi i} (u'_{\Omega_p} + v'_{\Omega_p} a^+_{\Omega_p} a^+_{\Omega_{\bar{p}}}) \oint \frac{d\zeta}{\zeta^{n_p}} \prod_{p \neq \Omega_p} (u'_p + \zeta v'_p a^+_p a^+_{p-}) |0\rangle$$

$$= \frac{\mathcal{N}_{n_p-1}}{2\pi i} (u'_{\Omega_p} + v'_{\Omega_p} a^+_{\Omega_p} a^+_{\Omega_{\bar{p}}}) |P'\rangle$$

$\langle P|P'\rangle$ now reduces to

$$\frac{1}{2\pi i} \oint \frac{d\zeta}{\zeta^{n_p}} \prod_{p \neq \Omega_p} (u_p u'_p + \zeta v_p v'_p)$$

Generalizing to include both kinds of nucleons, the G_{LO} is then expressed

$$G_{LO} = \langle \Psi_{n_p} \Psi_{n_N} | \sum_{\Omega_p \Omega_N} \Gamma_{LO}^{\Omega_p - \Omega_p \Omega_N - \Omega_N} \; a^+_{\Omega_p} a^+_{\Omega_{\bar{p}}} b^+_{\Omega_N} b^+_{\Omega_{\bar{N}}} | \Psi'_{n_p - 1} \Psi'_{n_N - 1} \rangle$$

$$= \frac{\mathcal{N}_{n_p} \mathcal{N}_{n_N} \mathcal{N}_{n_p - 1} \mathcal{N}_{n_N - 1}}{(2\pi i)^2} \sum_{\Omega_p} \sum_{\Omega_N} \oint \frac{d\zeta}{\zeta^{n_p}} \prod_{p \neq \Omega_p} (u_p u'_p + \zeta v_p v'_p)$$

$$\times \oint \frac{d\xi}{\xi^{n_N}} \prod_{N \neq \Omega_N} (u_N u'_N + \xi v_N v'_N) \; v_{\Omega_p} u'_{\Omega_p} v_{\Omega_N} u'_{\Omega_N} \; \Gamma_{LO}^{\Omega_p - \Omega_p \Omega_N - \Omega_N} \qquad (B.4)$$

Again this equation is valid for favored decay of an odd-mass system with the restriction that the summation and all products must exclude the state with the odd nucleon. The projected wave function for an odd system of n_N pairs plus an odd particle in state k is written

$$\Psi_{k, n_N} = \frac{\mathcal{N}_{n_N}}{2\pi i} \, b^+_k \oint \frac{d\xi}{\xi^{n_N + 1}} \prod_{N \neq k} (u_N + \xi v_N b^+_N b^+_{N-}) |0\rangle$$

Using this type of wave function, the equation analogous to Eq. (10) is derived.

$$G_{LM} = \frac{\mathcal{N}_{n_p} \mathcal{N}_{n_N} \mathcal{N}_{n_p - 1} \mathcal{N}_{n_N - 1}}{(2\pi i)^2} \oint \frac{d\xi}{\xi^{n_N}} \prod_{N \neq K_i \neq K_f} (u_N u'_N + \xi v_N v'_N) v_{K_f} u'_{K_i}$$

$$\times \sum_{\Omega_p} \oint \frac{d\zeta}{\zeta^{n_p}} \prod_{p \neq \Omega_p} (u_p u'_p + \zeta v_p v'_p) \; v_{\Omega_p} u'_{\Omega_p} \; \Gamma_{LM}^{\Omega_p - \Omega_p K_i K_f} \qquad (B.5)$$

The $\mathcal{N}_{n_N}$ must exclude the odd-particle state K_i from the product, and the $\mathcal{N}_{n_N - 1}$ excludes the state K_f.

Comparison shows that Eqs. (B.4) and (B.5) are similar to Eqs. (9) and (10), with only the addition of the contour integration to project out the correct particle number, and the necessary renormalization factors $\mathcal{N}$. These normalization factors are equivalent to reciprocal square roots of the "residuum integrals" of Dietrich et al.[16] If the u and v parameters are of the FBCS variational calculation described in Appendix A, one has the best results possible within the BCS method. If the u and v parameters result from the ordinary BCS variation, the use of projected wave functions represented by Eqs. (B.4) and (B.5) is less desirable than the unprojected functions given by Eqs. (9) and (10).

The equations used for the calculation of the Γ coefficients have been given before as Eqs. (II.8-II.11) in Ref. 6. They are repeated here without derivation for convenience, with the shorthand notation for angular momentum $[L] = \sqrt{2L+1}$, and the labels 1 and 2 refer to protons and 3 and 4 to neutrons.

$$\Gamma_{LM}^{\Omega_1\Omega_2\Omega_3\Omega_4}(\alpha,\beta,R) = (-1)^f\left(\frac{2}{\alpha+\beta}\right)^{9/2}(\alpha\beta)^{9/4}\left(\frac{2\alpha}{\alpha+\beta}\right)^{(\rho_{max}+L/2)}\sqrt{2}$$

$$\times\left(\tfrac{1}{2}!\right)^{-\frac{1}{2}}(\alpha R^2)^{3/4}\exp(-2\alpha R^2)[2(\alpha+\beta)R^2]^{L/2}$$

$$\times\sum_\rho\left(\frac{\beta-\alpha}{2\alpha}\right)^{\rho_{max}-\rho} C_\rho^L\, L_\rho^{L+\frac{1}{2}}(2(\alpha+\beta)R^2)$$

where $\rho_{max} = \frac{1}{2}(N_1+N_2+N_3+N_4-L)$ and f is a phase factor determined by the sum $\sum_i(|\Omega_i|-\frac{1}{2})$ for orbitals with Ω negative. $L_\rho^{L+\frac{1}{2}}$ is the associated Laguerre polynomial.

$$C_\rho^L = \frac{\rho!\left(\frac{1}{2}!\right)^2}{[L]\,2^{(2\rho+L)}}\sum_{\ell_1\ell_2\ell_3\ell_4}$$

$$\times\frac{[\ell_1][\ell_2][\ell_3][\ell_4]\,B_\rho^L(n_i\ell_i)}{[n_1!n_2!n_3!n_4!(n_1+\ell_1+\frac{1}{2})!(n_2+\ell_2+\frac{1}{2})!(n_3+\ell_3+\frac{1}{2})!(n_4+\ell_4+\frac{1}{2})!]^{\frac{1}{2}}}$$

$$\times\sum_{\Sigma_1\Sigma_2\Sigma_3\Sigma_4}(-1)^{1-\Sigma_1-\Sigma_3+n_1+n_2+n_3+n_4}\,\delta_{\Sigma_1,-\Sigma_2}\,\delta_{\Sigma_3,-\Sigma_4}$$

$$\times\alpha_{\ell_1\Lambda_1}\alpha_{\ell_2\Lambda_2}\alpha_{\ell_3\Lambda_3}\alpha_{\ell_4\Lambda_4}D(\ell_i\Lambda_i L)$$

$$D(\ell_i \Lambda_i L) = \sum_{\ell_p \ell_N} (\ell_1 \ell_2 \Lambda_1 \Lambda_2 | \ell_p \Lambda_1 + \Lambda_2)(\ell_1 \ell_2 00 | \ell_p 0)$$

$$\times (\ell_3 \ell_4 \Lambda_3 \Lambda_4 | \ell_N \Lambda_3 + \Lambda_4)(\ell_3 \ell_4 00 | \ell_N 0)$$

$$\times (\ell_p \ell_N \; \Lambda_1 + \Lambda_2 \Lambda_3 + \Lambda_4 | LM)(\ell_p \ell_N 00 | L0)$$

$$B^L_\rho(n_i \ell_i) = (-1)^\rho n_1! n_2! n_3! n_4! \sum_{\nu_1 \nu_2 \nu_3 \nu_4} \frac{(-1)^{\nu_1+\nu_2+\nu_3+\nu_4}}{\nu_1! \nu_2! \nu_3! \nu_4!} \binom{n_1+\ell_1+\frac{1}{2}}{n_1-\nu_1}$$

$$\times \binom{n_2+\ell_2+\frac{1}{2}}{n_2-\nu_2} \binom{n_3+\ell_3+\frac{1}{2}}{n_3-\nu_3} \binom{n_4+\ell_4+\frac{1}{2}}{n_4-\nu_4}$$

where the summation is restricted by

$$2\rho + L = 2(\nu_1+\nu_2+\nu_3+\nu_4) + \ell_1+\ell_2+\ell_3+\ell_4$$

The $D(\ell_i \Lambda_i L)$ is just the integral

$$\int Y_L^{*\Lambda_1+\Lambda_2+\Lambda_3+\Lambda_4} \, Y_{\ell_1}^{\Lambda_1} \, Y_{\ell_2}^{\Lambda_2} \, Y_{\ell_3}^{\Lambda_3} \, Y_{\ell_4}^{\Lambda_4} \, d\Omega$$

APPENDIX C

Frőman Matrices

The elements of the Frőman matrices were calculated from Eq. (12) with the parameter B = 0.9 as explained earlier. Numerical integration was performed on an IBM 7094 computer using Gaussian quadrature with 100 equal intervals in θ, taking two points in each interval. The values for the spherical harmonics were calculated using an adaptation of the IBM SHARE routine JP ASLF which calculates the associated Legendre polynomials from recursion relations. All matrices in the table require a total of about a minute to calculate.

The accuracy of the program was checked in two ways. First the parameter B was set to zero and, when rounded to five decimal places, the calculations gave the unit matrix as required by the orthonormality property of the spherical harmonics. Secondly, the calculations were repeated with B = 0.9, but using 200 intervals instead of 100. The differences in the matrix elements were never larger than two units in the sixth decimal place. We may thus state that accumulated round-off errors will not affect the four decimal places given in the table below.

Table C.I. Frőman matrices.

m = 0, even L

	L				
ℓ	0	2	4	6	8
0	1.0906	0.4814	0.0847	0.0097	0.0008
2	0.4814	1.4707	0.4700	0.0778	0.0087
4	0.0847	0.4700	1.4168	0.4546	0.0755
6	0.0097	0.0778	0.4546	1.4069	0.4509
8	0.0008	0.0087	0.0755	0.4509	1.4035

Table C.I. Continued.

m = 0, odd L

ℓ	L = 1	3	5	7	9
1	1.5211	0.4967	0.0821	0.0091	0.0008
3	0.4967	1.4319	0.4591	0.0762	0.0085
5	0.0821	0.4591	1.4103	0.4523	0.0751
7	0.0091	0.0762	0.4523	1.4049	0.4501
9	0.0008	0.0085	0.0751	0.4501	1.4026

m = 1, even L

ℓ	L = 2	4	6	8
2	1.1960	0.3841	0.0637	0.0071
4	0.3841	1.3480	0.4256	0.0700
6	0.0637	0.4256	1.3760	0.4361
8	0.0071	0.0700	0.4361	1.3858

m = 1, odd L

ℓ	L = 1	3	5	7	9
1	0.8753	0.2999	0.0517	0.0059	0.0005
3	0.2999	1.3074	0.4132	0.0680	0.0075
5	0.0517	0.4132	1.3662	0.4322	0.0711
7	0.0059	0.0680	0.4322	1.3819	0.4386
9	0.0005	0.0075	0.0711	0.4386	1.3885

Table C.I. Continued.

m = 2, even L

ℓ	L = 2	4	6	8
2	0.7951	0.2113	0.0336	0.0037
4	0.2113	1.1722	0.3477	0.0552
6	0.0336	0.3477	1.2887	0.3937
8	0.0037	0.0552	0.3937	1.3344

m = 2, odd L

ℓ	L = 3	5	7	9
3	1.0391	0.2995	0.0474	0.0051
5	0.2995	1.2455	0.3759	0.0601
7	0.0474	0.3759	1.3161	0.4056
9	0.0051	0.0601	0.4056	1.3473

m = 3, even L

ℓ	L = 4	6	8
4	0.9488	0.2417	0.0358
6	0.2417	1.1597	0.3299
8	0.0358	0.3299	1.2543

m = 3, odd L

ℓ	L = 3	5	7	9
3	0.7545	0.1611	0.0233	0.0024
5	0.1611	1.0764	0.2944	0.0445
7	0.0233	0.2944	1.2155	0.3546
9	0.0024	0.0445	0.3546	1.2821

Table C.I. Continued.

m = 4, even L

ℓ	L = 4	6	8
4	0.7302	0.1295	0.0170
6	0.1295	1.0076	0.2529
8	0.0170	0.2529	1.1525

m = 4, odd L

ℓ	L = 5	7	9
5	0.8908	0.2011	0.0278
7	0.2011	1.0915	0.2909
9	0.0278	0.2909	1.1977

m = 5, even L

ℓ	L = 6	8
6	0.8506	0.1714
8	0.1714	1.0374

m = 5, odd L

ℓ	L = 5	7	9
5	0.7141	0.1079	0.0129
7	0.1079	0.9564	0.2205
9	0.0129	0.2205	1.0996

Table C.I. Continued.

m = 6, even L

ℓ \ L	6	8
6	0.7028	0.0923
8	0.0923	0.9172

m = 6, odd L

ℓ \ L	7	9
7	0.8212	0.1490
9	0.1490	0.9940

m = 7, even L

$k^7_{88} = 0.7988$

m = 7, odd L

ℓ \ L	7	9
7	0.6943	0.0805
9	0.0805	0.8862

m = 8, even L

$k^8_{88} = 0.6878$

m = 8, odd L

$k^8_{99} = 0.7812$

m = 9, odd L

$k^9_{99} = 0.6826$

APPENDIX D

Numerical Results

In this appendix we compile the tables of numerical results of the alpha calculations. The organization of the Appendix is as follows:

Table D.I. The partial alpha amplitudes G_{00} on the surface defined by the radius R_0 are tabulated for even-even nuclei in section (a). In sections (b) through (e) the ratio G_{L0}/G_{00} is given.

Table D.II. Section (a) tabulates for even-even nuclei the $\hat{G}_{00}$ defined by $\sum_L k_{\ell L} G_{L0}$. Sections (b) through (e) present the reduced relative amplitudes b_ℓ defined by Fröman[19] (our Eq. (14)).

Table D.III. Penetrability factors and experimental data for even-even alpha decay are presented.

Table D.IV. The partial alpha amplitudes G_{LM} are given for odd-proton transitions.

Table D.V. The partial alpha amplitudes G_{LM} are given for odd-neutron transitions.

Table D.VI. The penetrability factors and theoretical transition rates are given for odd-mass alpha decay.

Table D.I.a. The amplitudes G_{00} for alpha decay of even-even nuclei to ground.

Neutron no.				$G_{00} \times 10^2$					
	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	2.495	2.369							
138	2.432	2.312	2.136						
140	2.315	2.204	2.040						
142	2.129	2.030	1.885	1.687					
144	2.007	1.918	1.789	1.606					
146		1.890	1.767	1.588	1.575				
148		1.674	1.571	1.416	1.416	1.367	1.393		
150			1.358	1.227	1.235	1.195	1.224	1.275	1.200
152			1.183	1.069	1.077	1.043	1.069	1.113	1.049
154				1.286	1.303	1.265	1.309	1.361	1.305
156					1.505	1.463	1.516	1.575	1.516
158						1.504	1.558	1.619	1.555
160							1.536	1.596	1.530

Table D.I.b. The ratio of the partial amplitudes G_{20}/G_{00} for alpha decay of even-even nuclei.

Neutron No.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	0.497	0.496							
138	0.492	0.491	0.475						
140	0.497	0.497	0.482						
142	0.520	0.520	0.504	0.484					
144	0.559	0.558	0.541	0.521					
146		0.568	0.551	0.530	0.468				
148		0.523	0.507	0.487	0.430	0.394	0.328		
150			0.454	0.435	0.381	0.347	0.283	0.297	0.133
152			0.444	0.426	0.374	0.339	0.275	0.290	0.127
154				0.358	0.309	0.275	0.212	0.227	0.071
156					0.299	0.264	0.200	0.215	0.057
158						0.276	0.211	0.226	0.065
160							0.223	0.238	0.072

Table D.I.c. The ratio of the partial amplitudes G_{40}/G_{00} for alpha decay of even-even nuclei.

Neutron no.	G_{40}/G_{00} Th	U	Pu	Cm	Cf	Fm	No	104	106
136	0.329	0.281							
138	0.301	0.253	0.157						
140	0.270	0.222	0.126						
142	0.234	0.186	0.089	0.029					
144	0.176	0.127	0.029	-0.033					
146		0.095	-0.004	-0.066	-0.221				
148		0.043	-0.056	-0.118	-0.272	-0.287	-0.297		
150			-0.093	-0.154	-0.307	-0.321	-0.331	-0.334	-0.362
152			-0.096	-0.158	-0.311	-0.324	-0.333	-0.336	-0.363
154				-0.192	-0.343	-0.355	-0.366	-0.370	-0.396
156					-0.320	-0.332	-0.344	-0.348	-0.376
158						-0.304	-0.317	-0.320	-0.354
160							-0.283	-0.286	-0.326

Table D.I.d. The ratio of the partial amplitudes G_{60}/G_{00} for alpha decay of even-even nuclei.

	G_{60}/G_{00}								
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	-0.148	-0.176							
138	-0.164	-0.191	-0.238						
140	-0.178	-0.206	-0.251						
142	-0.193	-0.220	-0.266	-0.285					
144	-0.203	-0.231	-0.276	-0.295					
146		-0.224	-0.269	-0.287	-0.310				
148		-0.192	-0.233	-0.249	-0.267	-0.246	-0.176		
150			-0.185	-0.199	-0.214	-0.192	-0.123	-0.133	-0.022
152			-0.181	-0.195	-0.210	-0.189	-0.120	-0.131	-0.021
154				-0.097	-0.109	-0.087	-0.016	-0.027	0.083
156					-0.081	-0.059	0.011	0.001	0.109
158						-0.048	0.021	0.010	0.114
160							0.032	0.022	0.121

Table D.I.e. The ratio of the partial amplitudes G_{80}/G_{00} for alpha decay of even-even nuclei.

	G_{80}/G_{00}								
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	-0.093	-0.097							
138	-0.093	-0.095	-0.087						
140	-0.092	-0.093	-0.082						
142	-0.089	-0.089	-0.076	-0.055					
144	-0.080	-0.078	-0.061	-0.037					
146		-0.062	-0.042	-0.018	0.067				
148		-0.013	0.009	0.034	0.119	0.123	0.117		
150			0.052	0.077	0.161	0.162	0.151	0.159	0.159
152			0.063	0.088	0.171	0.171	0.160	0.168	0.165
154				0.107	0.185	0.181	0.162	0.172	0.153
156					0.164	0.159	0.139	0.149	0.126
158						0.157	0.137	0.147	0.125
160							0.127	0.137	0.115

Table D.II.a. The transformed amplitudes $\hat{G}_{00}$ for decay of even-even nuclei to ground.

					$\hat{G}_{00} \times 10^2$				
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	3.383	3.201							
138	3.285	3.113	2.841						
140	3.128	2.967	2.716						
142	2.893	2.749	2.522	2.233					
144	2.755	2.623	2.417	2.145					
146		2.589	2.390	2.124	2.038				
148		2.250	2.085	1.859	1.801	1.714	1.703		
150			1.764	1.576	1.539	1.468	1.466	1.536	1.349
152			1.532	1.369	1.338	1.277	1.276	1.336	1.176
154				1.602	1.576	1.509	1.520	1.590	1.425
156					1.816	1.739	1.755	1.835	1.648
158						1.801	1.816	1.899	1.700
160							1.804	1.886	1.681

Table D.II.b. The reduced relative amplitudes for $\ell = 2$ alpha decay of even-even nuclei.

	b_2								
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	0.999	0.983							
138	0.986	0.971	0.928						
140	0.981	0.966	0.924						
142	0.986	0.971	0.929	0.895					
144	0.998	0.982	0.939	0.905					
146		0.981	0.938	0.903	0.805				
148		0.934	0.891	0.856	0.759	0.724	0.665		
150			0.840	0.805	0.708	0.673	0.612	0.625	0.451
152			0.831	0.796	0.701	0.665	0.605	0.618	0.444
154				0.731	0.635	0.599	0.535	0.548	0.374
156					0.635	0.597	0.532	0.545	0.366
158						0.620	0.554	0.568	0.385
160							0.579	0.593	0.404

Table D.II.c. The reduced relative amplitudes for $\ell = 4$ alpha decay of even-even nuclei.

	b_4								
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	0.524	0.466							
138	0.489	0.430	0.312						
140	0.454	0.396	0.278						
142	0.417	0.359	0.240	0.165					
144	0.363	0.304	0.185	0.109					
146		0.278	0.157	0.081	-0.112				
148		0.225	0.104	0.027	-0.166	-0.191	-0.207		
150			0.066	-0.011	-0.206	-0.230	-0.247	-0.247	-0.324
152			0.062	-0.016	-0.211	-0.235	-0.251	-0.252	-0.327
154				-0.045	-0.241	-0.265	-0.284	-0.284	-0.360
156					-0.209	-0.233	-0.253	-0.254	-0.333
158						-0.188	-0.210	-0.210	-0.298
160							-0.159	-0.159	-0.254

Table D.II.d. The reduced relative amplitudes for ℓ=6 alpha decay of even-even nuclei.

				b_6					
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	-0.038	-0.085							
138	-0.065	-0.111	-0.192						
140	-0.090	-0.135	-0.215						
142	-0.114	-0.159	-0.238	-0.276					
144	-0.137	-0.182	-0.260	-0.297					
146		-0.179	-0.256	-0.292	-0.356				
148		-0.154	-0.226	-0.260	-0.316	-0.303	-0.241		
150			-0.180	-0.212	-0.264	-0.250	-0.186	-0.195	-0.092
152			-0.174	-0.206	-0.259	-0.245	-0.182	-0.191	-0.089
154				-0.111	-0.159	-0.144	-0.077	-0.086	0.020
156					-0.126	-0.111	-0.046	-0.055	0.049
158						-0.087	-0.023	-0.032	0.064
160							0.001	-0.007	0.082

Table D.II.e. The reduced relative amplitudes for $\ell = 8$ alpha decay of even-even nuclei.

	b_8								
Neutron no.	Th	U	Pu	Cm	Cf	Fm	No	104	106
136	-0.124	-0.140							
138	-0.131	-0.146	-0.159						
140	-0.136	-0.149	-0.160						
142	-0.139	-0.152	-0.160	-0.150					
144	-0.135	-0.145	-0.149	-0.136					
146		-0.127	-0.130	-0.115	-0.045				
148		-0.072	-0.069	-0.052	0.025	0.036	0.054		
150			-0.010	0.009	0.088	0.098	0.113	0.117	0.168
152			0.004	0.022	0.101	0.110	0.124	0.129	0.176
154				0.077	0.156	0.160	0.168	0.175	0.205
156					0.144	0.147	0.152	0.159	0.183
158						0.149	0.154	0.161	0.184
160							0.149	0.155	0.176

Table D.III lists experimental data for even-even nuclei and the quantities calculated from them. The data are taken mostly from Hyde, Perlman, and Seaborg[41] with some recent changes from the Table of Isotopes[42] now in preparation. The experimental data are given primarily to define the numerical values used in the calculations. Nuclei are arranged in ascending atomic number and mass. The partial alpha half-life and the total alpha transition probability are given. The table is arranged as follows:

col.

1. the observed alpha particle energy in MeV
2. the relative percent alpha intensity of the group.
3. the total energy Q_α for the alpha transition, including recoil and screening corrections.

4. and 5. the inner and outer classical turning points defined by Eq. (16) given in fm.

6. and 7. the height of the barrier maximum above the Q_α and the radius at which it occurs.

8. the assigned partial wave of the transition. A minus indicates a negative parity state.
9. the calculated penetrability factor $P_\ell(\epsilon)$
10. the reduced width γ_ℓ^2 in MeV calculated from the relation $\gamma_\ell^2 = \lambda_\ell h/P_\ell(\epsilon)$ where h is Planck's constant.
11. the reduced hindrance factor defined as the ratio γ_0^2/γ_ℓ^2.
12. the experimental reduced relative amplitude b_ℓ calculated as the reciprocal square root of the reduced hindrance factor.

Table D.III. Experimental data and penetrability factors for alpha decay of even-even nuclei.

Z = 90 A = 224 ALPHA HALF-LIFE = 1.0500E 00 SEC ALPHA RATE = 6.6014E-01/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
7.170	79.000000	7.336	9.218	34.552	14.548	10.980	0	1.195E-20	1.805E-01	1.00E 00	1.000
7.000	19.000000	7.162	9.195	35.513	14.986	10.965	2	1.644E-21	3.155E-01	5.72E-01	1.322
6.767	1.500000	6.925	9.148	37.014	15.844	10.931	4	5.910E-23	6.928E-01	2.61E-01	1.959
6.705	0.500000	6.862	9.193	36.978	15.109	10.975	-1	1.634E-22	8.355E-02	2.16E 00	0.680

Z = 90 A = 226 ALPHA HALF-LIFE = 1.8540E 03 SEC ALPHA RATE = 3.7387E-04/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.330	79.000000	6.479	9.206	39.118	15.359	11.003	0	5.424E-24	2.251E-01	1.00E 00	1.000
6.221	19.000000	6.368	9.186	39.925	15.734	10.989	2	1.024E-24	2.868E-01	7.85E-01	1.129
6.095	1.700000	6.240	9.191	40.660	15.686	10.998	-1	3.827E-25	6.868E-02	3.28E 00	0.552
6.029	0.600000	6.173	9.141	41.475	16.547	10.955	4	3.690E-26	2.514E-01	8.96E-01	1.057

Z = 90 A = 228 ALPHA HALF-LIFE = 6.0200E 07 SEC ALPHA RATE = 1.1514E-08/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.421	71.000000	5.553	9.192	45.643	16.241	11.027	0	1.672E-28	2.022E-01	1.00E 00	1.000
5.338	28.000000	5.468	9.173	46.473	16.588	11.012	2	3.241E-29	4.113E-01	4.92E-01	1.426
5.208	0.400000	5.336	9.177	47.539	16.545	11.022	-1	8.016E-30	2.376E-02	8.51E 00	0.343
5.173	0.200000	5.301	9.130	48.232	17.371	10.979	4	9.477E-31	1.005E-01	2.01E 00	0.705
5.137	0.030000	5.264	9.149	48.399	17.056	10.998	-3	1.187E-30	1.204E-02	1.68E 01	0.244

Z = 90 A = 230 ALPHA HALF-LIFE = 2.5240E 12 SEC ALPHA RATE = 2.7462E-13/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.682	76.000000	4.800	9.184	52.801	16.950	11.051	0	3.906E-33	2.210E-01	1.00E 00	1.000
4.615	24.000000	4.732	9.167	53.688	17.280	11.036	2	7.423E-34	3.671E-01	6.02E-01	1.289
4.476	0.120000	4.590	9.126	55.629	18.034	11.003	4	1.892E-35	7.202E-02	3.07E 00	0.571
4.433	0.030000	4.547	9.169	55.786	17.291	11.046	-1	4.736E-35	7.193E-03	3.07E 01	0.180
4.368	0.001000	4.480	9.142	56.817	17.793	11.022	-3	5.818E-36	1.952E-03	1.13E 02	0.094
4.273	0.000008	4.384	9.064	58.682	19.210	10.953	6	6.246E-38	1.455E-03	1.52E 02	0.081
4.245	0.000008	4.355	9.092	58.815	18.709	10.980	-5	1.116E-37	8.137E-04	2.72E 02	0.061

Z = 90 A = 232 ALPHA HALF-LIFE = 4.4200E 17 SEC ALPHA RATE = 1.5682E-18/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.007	77.000000	4.112	9.181	61.629	17.594	11.074	0	1.797E-38	2.779E-01	1.00E 00	1.000
3.949	23.000000	4.053	9.163	62.651	17.914	11.059	2	3.042E-39	4.903E-01	5.67E-01	1.328
3.825	0.200000	3.927	9.124	64.951	18.650	11.026	4	5.572E-41	2.328E-01	1.19E 00	0.915

Z = 92 A = 228 ALPHA HALF-LIFE = 5.7600E 02 SEC ALPHA RATE = 1.2034E-03/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.680	70.000000	6.836	9.218	37.922	15.481	11.012	0	2.284E-23	1.525E-01	1.00E 00	1.000
6.590	29.000000	6.744	9.199	38.559	15.836	10.998	2	5.608E-24	2.573E-01	5.93E-01	1.299
6.440	0.700000	6.591	9.203	39.368	15.813	11.008	-1	1.781E-24	1.956E-02	7.80E 00	0.358
6.400	0.500000	6.551	9.155	39.977	16.646	10.965	4	2.409E-25	1.033E-01	1.48E 00	0.823

Z = 92 A = 230 ALPHA HALF-LIFE = 1.7980E 06 SEC ALPHA RATE = 3.8551E-07/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.884	67.200000	6.024	9.209	43.027	16.247	11.036	0	5.301E-27	2.021E-01	1.00E 00	1.000
5.813	32.100000	5.952	9.191	43.672	16.582	11.022	2	1.335E-27	3.832E-01	5.27E-01	1.377
5.662	0.400000	5.798	9.149	45.110	17.349	10.989	4	6.027E-29	1.058E-01	1.91E 00	0.724
5.658	0.300000	5.794	9.194	44.776	16.565	11.031	-1	2.888E-28	1.656E-02	1.22E 01	0.286

Z = 92 A = 232 ALPHA HALF-LIFE = 2.3230E 09 SEC ALPHA RATE = 2.9839E-10/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.318	68.000000	5.448	9.209	47.583	16.780	11.060	0	4.406E-30	1.904E-01	1.00E 00	1.000
5.261	32.000000	5.390	9.192	48.217	17.099	11.045	2	1.163E-30	3.396E-01	5.61E-01	1.335
5.135	0.320000	5.261	9.152	49.673	17.838	11.013	4	5.455E-32	7.238E-02	2.63E 00	0.617
5.000	0.006000	5.124	9.191	50.628	17.190	11.055	-1	3.809E-32	1.943E-03	9.80E 01	0.101
4.508	0.000024	4.623	9.176	56.065	17.604	11.060	0	1.503E-35	1.970E-02	9.67E 00	0.322

Z = 92 A = 234 ALPHA HALF-LIFE = 7.8900E 12 SEC ALPHA RATE = 8.7852E-14/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.768	72.000000	4.887	9.210	53.038	17.296	11.083	0	1.317E-33	1.986E-01	1.00E 00	1.000
4.717	28.000000	4.835	9.193	53.730	17.608	11.068	2	3.300E-34	3.083E-01	6.44E-01	1.246
4.601	0.350000	4.717	9.154	55.355	18.334	11.036	4	1.303E-35	9.760E-02	2.04E 00	0.701
4.270	0.000030	4.381	9.185	59.213	17.889	11.078	-1	1.690E-37	6.447E-04	3.08E 02	0.057
4.145	0.000032	4.253	9.185	60.941	17.930	11.083	0	1.753E-38	6.630E-03	3.00E 01	0.183

Z = 92 A = 236 ALPHA HALF-LIFE = 7.5400E 14 SEC ALPHA RATE = 9.1930E-16/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.499	74.000000	4.613	9.222	56.192	17.527	11.106	0	1.492E-35	1.885E-01	1.00E 00	1.000
4.451	26.000000	4.564	9.206	56.916	17.834	11.092	2	3.643E-36	2.713E-01	6.95E-01	1.200
4.339	0.260000	4.450	9.167	58.654	18.554	11.059	4	1.284E-37	7.698E-02	2.45E 00	0.639

Z = 92 A = 238 ALPHA HALF-LIFE = 1.4230E 17 SEC ALPHA RATE = 4.8710E-18/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.195	77.000000	4.303	9.233	60.239	17.793	11.129	0	5.507E-38	2.816E-01	1.00E 00	1.000
4.148	23.000000	4.255	9.217	61.038	18.099	11.115	2	1.241E-38	3.732E-01	7.55E-01	1.151
4.038	0.230000	4.143	9.178	62.967	18.814	11.082	4	3.578E-40	1.295E-01	2.18E 00	0.678

Z = 94 A = 232 ALPHA HALF-LIFE = 8.6400E 04 SEC ALPHA RATE = 8.0226E-06/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.580	68.000000	6.733	9.236	39.356	16.015	11.045	0	1.235E-24	1.826E-02	1.00E 00	1.000
6.530	32.000000	6.682	9.218	39.775	16.328	11.031	2	4.398E-25	2.414E-02	7.57E-01	1.150

Z = 94 A = 234 ALPHA HALF-LIFE = 5.7000E 05 SEC ALPHA RATE = 1.2161E-06/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.196	68.000000	6.341	9.244	41.786	16.362	11.068	0	2.313E-26	1.478E-01	1.00E 00	1.000
6.145	32.000000	6.289	9.227	42.251	16.674	11.054	2	7.718E-27	2.085E-01	7.09E-01	1.188
6.025	0.400000	6.167	9.187	43.362	17.407	11.023	4	5.726E-28	3.513E-02	4.21E 00	0.488

Z = 94 A = 236 ALPHA HALF-LIFE = 8.9900E 07 SEC ALPHA RATE = 7.7102E-09/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.763	68.900000	5.900	9.249	44.912	16.759	11.092	0	1.572E-28	1.397E-01	1.00E 00	1.000
5.716	30.900000	5.852	9.232	45.399	17.066	11.078	2	5.130E-29	1.920E-01	7.28E-01	1.172
5.610	0.180000	5.744	9.193	46.526	17.781	11.046	4	3.835E-30	1.496E-02	9.34E 00	0.327
5.448	0.002000	5.579	9.133	48.319	18.908	10.998	6	6.401E-32	9.961E-03	1.40E 01	0.267
5.205	0.000270	5.332	9.221	49.733	17.413	11.087	-1	7.461E-32	1.154E-03	1.21E 02	0.091
5.082	0.000600	5.207	9.221	50.887	17.451	11.092	0	1.455E-32	1.315E-02	1.06E 01	0.307

Z = 94 A = 238 ALPHA HALF-LIFE = 2.7220E 09 SEC ALPHA RATE = 2.5465E-10/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.491	71.000000	5.622	9.261	47.129	16.992	11.115	0	5.143E-30	1.454E-01	1.00E 00	1.000
5.448	29.000000	5.579	9.244	47.618	17.294	11.101	2	1.689E-30	1.808E-01	8.04E-01	1.115
5.350	0.090000	5.479	9.206	48.760	17.998	11.069	4	1.264E-31	7.496E-03	1.94E 01	0.227
5.200	0.005000	5.326	9.147	50.575	19.108	11.021	6	2.115E-33	2.489E-02	5.84E 00	0.414
5.000	0.000007	5.123	9.067	53.127	20.630	10.961	8	7.359E-36	1.002E-02	1.45E 01	0.263
4.710	0.000015	4.828	9.224	54.922	17.872	11.110	-1	3.494E-35	4.521E-03	3.22E 01	0.176
4.695	0.000110	4.813	9.229	55.056	17.801	11.115	0	3.251E-35	3.563E-02	4.08E 00	0.495

Z = 94 A = 240 ALPHA HALF-LIFE = 2.0780E 11 SEC ALPHA RATE = 3.3357E-12/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.159	76.000000	5.284	9.270	50.147	17.286	11.137	0	5.320E-32	1.970E-01	1.00E 00	1.000
5.115	24.000000	5.239	9.254	50.695	17.588	11.124	2	1.618E-32	2.045E-01	9.63E-01	1.019
5.014	0.090000	5.136	9.216	51.984	18.293	11.092	4	1.000E-33	1.241E-02	1.59E 01	0.251
4.854	0.003000	4.974	9.157	54.103	19.409	11.045	6	1.121E-35	3.691E-02	5.34E 00	0.433
4.484	0.000021	4.597	9.214	57.873	18.488	11.110	-3	2.882E-37	1.005E-02	1.96E 01	0.226

Z = 94 A = 242 ALPHA HALF-LIFE = 1.1860E 13 SEC ALPHA RATE = 5.8444E-14/SEC

OBS. EN.	PCT. INT.	Q	R INR	OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
4.895	74.000000	5.015	9.282	52.839	17.512	11.160	0	1.013E-33	1.766E-01	1.00E 00	1.000
4.851	[illegible].000000	4.970	9.266	53.434	17.813	11.146	2	2.910E-34	2.159E-01	8.18E-01	1.106

Z = 96 A = 238 ALPHA HALF-LIFE = 8.6400E 04 SEC ALPHA RATE = 8.0226E-06/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.500	72.000000	6.650	9.277	40.714	16.483	11.101	0	8.222E-26	2.905E-01	1.00E 00	1.000
6.460	[illegible]000000	6.609	9.260	41.082	16.782	11.087	2	3.201E-26	2.901E-01	1.00E 00	0.999

Z = 96 A = 240 ALPHA HALF-LIFE = 2.3150E 06 SEC ALPHA RATE = 2.9942E-07/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.287	72.000000	6.432	9.292	42.091	16.656	11.124	0	[illegible].928E-27	9.984E-02	1.00E 00	1.000
6.243	28.000000	6.387	9.275	42.503	16.958	11.110	2	3.245E-27	1.068E-01	9.34E-01	1.034
6.143	0.040000	6.286	9.236	43.460	17.664	11.079	4	3.091E-28	1.602E-03	6.23E 01	0.127

Z = 96 A = 242 ALPHA HALF-LIFE = 1.4040E 07 SEC ALPHA RATE = 4.9370E-08/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.110	73.700000	6.251	9.307	43.309	16.792	11.146	0	1.301E-27	1.157E-01	1.00E 00	1.000
6.067	26.300000	6.207	9.291	43.731	17.092	11.133	2	4.672E-28	1.149E-01	1.01E 00	0.997
5.967	0.030000	6.106	9.252	44.729	17.795	11.102	4	4.214E-29	1.453E-03	7.96E 01	0.112
5.812	0.005000	5.948	9.193	46.324	18.904	11.055	6	9.295E-31	1.098E-02	1.05E 01	0.308
5.606	0.000030	5.739	9.114	48.547	20.424	10.996	8	4.845E-33	1.264E-02	9.15E 00	0.331
5.515	0.000260	5.646	9.278	47.988	17.482	11.142	-1	6.338E-31	8.374E-04	1.38E 02	0.085
5.183	0.000060	5.309	9.270	50.998	17.735	11.146	0	6.744E-33	1.816E-02	6.37E 00	0.396
5.120	0.000004	5.245	9.252	51.738	18.055	11.133	2	1.530E-33	5.338E-03	2.17E 01	0.215

Z = 96 A = 244 ALPHA HALF-LIFE = 5.6500E 08 SEC ALPHA RATE = 1.2268E-09/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.802	76.700000	5.937	9.317	45.599	17.062	11.169	0	3.440E-29	1.131E-01	1.00E 00	1.000
5.760	23.300000	5.895	9.301	46.046	17.360	11.155	2	1.197E-29	9.877E-02	1.15E 00	0.934
5.663	0.023000	5.796	9.263	47.099	18.058	11.124	4	1.009E-30	1.156E-03	9.78E 01	0.101
5.507	0.003600	5.637	9.205	48.834	19.164	11.078	6	1.848E-32	9.881E-03	1.14E 01	0.296
5.213	0.000110	5.338	9.289	50.753	17.746	11.164	-1	9.512E-33	5.867E-04	1.93E 02	0.072
4.953	0.000170	5.074	9.283	53.355	17.925	11.169	0	2.088E-34	4.131E-02	2.74E 00	0.604
4.914	0.000050	5.034	9.267	53.893	18.220	11.155	2	6.518E-35	3.891E-02	2.91E 00	0.587

Z = 96 A = 246 ALPHA HALF-LIFE = 1.7300E 11 SEC ALPHA RATE = 4.0066E-12/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.388	81.000000	5.516	9.323	49.084	17.440	11.191	0	1.527E-31	8.791E-02	1.00E 00	1.000
5.344	19.000000	5.471	9.307	49.603	17.739	11.178	2	4.821E-32	6.530E-02	1.35E 00	0.862

Z = 96 A = 248 ALPHA HALF-LIFE = 1.4800E 13 SEC ALPHA RATE = 4.6834E-14/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
5.080	82.000000	5.202	9.333	52.045	17.710	11.214	0	1.779E-33	8.924E-02	1.00E 00	1.000
5.036	18.000000	5.157	9.317	52.614	18.009	11.200	2	5.282E-34	6.599E-02	1.35E 00	0.860

Z = 98 A = 244 ALPHA HALF-LIFE = 1.5000E 03 SEC ALPHA RATE = 4.6210E-04/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
7.170	75.000000	7.329	9.349	37.725	16.186	11.155	0	9.615E-24	1.490E-01	1.00E 00	1.000
7.130	25.000000	7.289	9.332	38.051	16.483	11.142	2	3.998E-24	1.195E-01	1.25E 00	0.895

Z = 98 A = 246 ALPHA HALF-LIFE = 1.2860E 05 SEC ALPHA RATE = 5.3900E-06/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.753	77.900000	6.904	9.354	40.047	16.566	11.178	0	1.848E-25	9.393E-02	1.00E 00	1.000
6.711	21.900000	6.862	9.337	40.411	16.864	11.164	2	7.230E-26	6.751E-02	1.39E 00	0.848
6.615	0.180000	6.764	9.300	41.257	17.559	11.134	4	8.138E-27	4.929E-03	1.91E 01	0.229
6.468	0.020000	6.615	9.241	42.592	18.654	11.089	6	2.626E-28	1.697E-02	5.53E 00	0.425

Z = 98 A = 248 ALPHA HALF-LIFE = 3.0200E 07 SEC ALPHA RATE = 2.2952E-08/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.260	82.000000	6.402	9.356	43.186	17.024	11.200	0	1.002E-27	7.767E-02	1.00E 00	1.000
6.220	18.000000	6.362	9.340	43.577	17.319	11.187	2	3.782E-28	4.517E-02	1.72E 00	0.763

Z = 98 A = 250 ALPHA HALF-LIFE = 3.4720E 08 SEC ALPHA RATE = 1.9964E-09/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.024	83.000000	6.162	9.369	44.873	17.221	11.222	0	6.776E-29	1.011E-01	1.00E 00	1.000
5.980	17.000000	6.117	9.353	45.316	17.518	11.209	2	2.364E-29	5.938E-02	1.70E 00	0.766
5.882	0.320000	6.017	9.316	46.330	18.211	11.179	4	2.098E-30	1.259E-02	8.03E 00	0.353

Z = 98 A = 252 ALPHA HALF-LIFE = 7.1640E 07 SEC ALPHA RATE = 9.6755E-09/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
6.112	84.000000	6.250	9.395	44.237	17.089	11.244	0	2.093E-28	1.606E-01	1.00E 00	1.000
6.069	15.500000	6.207	9.379	44.663	17.384	11.231	2	7.490E-29	8.279E-02	1.94E 00	0.718
5.968	0.280000	6.104	9.342	45.678	18.077	11.201	4	6.619E-30	1.693E-02	9.49E 00	0.325
5.814	0.006600	5.947	9.284	47.281	19.168	11.156	6	1.457E-31	1.812E-02	8.86E 00	0.336

Z = 100 A = 252 ALPHA HALF-LIFE = 8.1700E 04 SEC ALPHA RATE = 8.4841E-06/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
7.060	85.000000	7.215	9.410	39.122	16.637	11.231	0	6.211E-25	4.801E-02	1.00E 00	1.000
7.020	15.000000	7.174	9.393	39.456	16.930	11.218	2	2.550E-25	2.064E-02	2.33E 00	0.656

Z = 100 A = 254 ALPHA HALF-LIFE = 1.1660E 04 SEC ALPHA RATE = 5.9447E-05/SEC

OBS. EN.	PCT. INT.	Q	R INR	R OUT	MAX (MEV)	AT R	L	P	RED. WDTH.	RED. HF	B
7.192	85.000000	7.348	9.437	38.413	16.459	11.253	0	2.351E-24	8.886E-02	1.00E 00	1.000
7.150	14.000000	7.305	9.421	38.750	16.754	11.240	2	9.602E-25	3.584E-02	2.48E 00	0.635
7.053	0.900000	7.207	9.383	39.538	17.442	11.210	4	1.184E-25	1.869E-02	4.75E 00	0.459
6.907	0.004000	7.058	9.326	40.763	18.522	11.166	6	4.531E-27	2.170E-03	4.09E 01	0.156

Table D.IV lists the G_{LM} amplitudes for α-decay of odd-proton nuclei to the intrinsic bands in the daughter, and Table D.V is a similar table for odd-neutron nuclei. All the values have been scaled by a factor of 100 for convenience.

We should point out an important point regarding the phases in the tables. The phase conventions for the single particle wave functions are:

$$\phi_K = \sum_{\ell,\Lambda} a_{\ell\Lambda} f_{n\ell}(r)\ Y_\ell^\Lambda\ (\underset{\sim}{r}/r)\ \chi_{\frac{1}{2}}^{K-\Lambda}$$

$$\phi_{-K} = \sum_{\ell,\Lambda} a_{\ell\Lambda} f_{n\ell}(r)\ Y_\ell^{-\Lambda}(\underset{\sim}{r}/r)\ \chi_{\frac{1}{2}}^{-K+\Lambda}$$

The C_ρ^L coefficients do not however contain the factor $(-1)^{K-\frac{1}{2}}$ and there is therefore a difference between the phase of the G_{LM} as calculated and the formal definitions of Eq. (10). This is done because of the simplification which results. The explicit factor $(-1)^{K_f-\frac{1}{2}}$ must multiply the $G_{L\ K_i-K_f}$, and the explicit factor $(-1)^{p+1}$ must multiply the $G_{L\ K_i+K_f}$ (where $(-1)^p$ is the parity of the final state). Inserting these explicit factors in the brackets of Eq. (1) and using Eq. (11) Mang derives for the transformed amplitudes $\hat{G}_{\ell m}$ (obtained by performing the summation on L):

$$\Big| (-1)^{\ell+K_i-K_f}\ (-1)^{K_f-\frac{1}{2}}\ (I_i \ell K_i K_f - K_i | I_f K_f)\ \hat{G}_{\ell\ K_i-K_f}$$

$$+\ (-1)^{I_i-L-K_f}\ (-1)^{\ell+K_i+K_f}\ (-1)^{p+1}\ (I_i \ell -K_i K_f + K_i | I_f K_f)\ \hat{G}_{\ell\ K_i+K_f} \Big|$$

Using the condition that the sum ℓ+L is even and the relation $(-1)^{q+\ell} = (-1)^p$ one can factor out $(-1)^{\ell+K_i-\frac{1}{2}}$ which results in a relative phase between the $\hat{G}_{\ell\ K_i-K_f}$ and $\hat{G}_{\ell\ K_i+K_f}$ given simply by $(-1)^{I_i-\frac{1}{2}+q}$ with $(-1)^q$ the parity of the final state.

We note that the Clebsh-Gordan coefficient modifying the $\hat{G}_{\ell\ K_i-K_f}$ is always positive while the other coefficient may take on negative values.

Table D.IV. The partial alpha amplitudes G_{LM} for odd-proton transitions.

$G_{LM} \times 10^2$

DAUGHTER	PARENT 1/2- (530)	PARENT 5/2+ (642)	PARENT 5/2- (523)
1/2- (530)	PA 231 L M 0 0 1.697 2 0 0.550 4 0 0.364 6 0 -0.308 8 0 -0.080	NP 235 NP 237 L M 3 2 -0.280 -0.275 5 2 -0.442 -0.433 7 2 -0.371 -0.350 9 2 -0.112 -0.090 3 3 0.026 0.022 5 3 -0.033 -0.030 7 3 -0.068 -0.066 9 3 -0.072 -0.069	AM 241 L M 2 2 -0.020 4 2 0.005 6 2 0.076 8 2 0.088 4 3 0.113 6 3 0.228 8 3 0.183
5/2+ (642)	PA 231 L M 3 2 -0.109 5 2 -0.173 7 2 -0.149 9 2 -0.050 3 3 -0.011 5 3 0.013 7 3 0.026 9 3 0.028	NP 233 NP 235 NP 237 L M 0 0 1.824 1.676 1.578 2 0 0.814 0.787 0.806 4 0 0.472 0.373 0.256 6 0 -0.289 -0.287 -0.283 8 0 -0.104 -0.091 -0.069	AM 239 AM 241 AM 243 L M 1 0 -0.034 -0.031 -0.021 3 0 -0.065 -0.065 -0.057 5 0 0.001 -0.001 -0.003 7 0 0.083 0.083 0.074 9 0 0.052 0.051 0.042 5 5 0.000 -0.001 0.000 7 5 -0.110 -0.111 -0.097 9 5 -0.246 -0.248 -0.218
5/2- (523)	PA 231 L M 2 2 -0.010 4 2 0.006 6 2 0.038 8 2 0.046 4 3 -0.053 6 3 -0.108 8 3 -0.095	NP 235 NP 237 L M 1 0 -0.018 -0.016 3 0 -0.032 -0.031 5 0 0.001 0.000 7 0 0.040 0.040 9 0 0.027 0.025 5 5 -0.001 -0.000 7 5 0.053 0.053 9 5 0.118 0.119	AM 239 AM 241 AM 243 L M 0 0 1.259 1.240 1.097 2 0 0.720 0.721 0.590 4 0 0.087 0.049 -0.011 6 0 -0.392 -0.379 -0.296 8 0 -0.175 -0.152 -0.078
1/2+ (400)	PA 231 L M 1 0 -0.047 3 0 -0.075 5 0 0.117 7 0 -0.028 9 0 0.009 1 1 0.002 3 1 0.037 5 1 -0.060 7 1 0.017 9 1 -0.005	NP 233 NP 235 NP 237 L M 2 2 0.017 0.016 0.014 4 2 0.041 0.043 0.047 6 2 0.132 0.122 0.114 8 2 -0.087 -0.079 -0.074 4 3 -0.003 -0.005 -0.009 6 3 -0.048 -0.043 -0.039 8 3 0.075 0.068 0.063	AM 241 L M 3 2 -0.002 5 2 -0.019 7 2 0.006 9 2 0.002 3 3 -0.012 5 3 -0.140 7 3 0.017 9 3 0.007
3/2+ (651)	PA 231 L M 1 1 -0.092 3 1 -0.326 5 1 -0.366 7 1 -0.232 9 1 -0.031 3 2 -0.084 5 2 -0.078 7 2 -0.024 9 2 0.034	NP 233 NP 235 NP 237 L M 2 1 -0.201 -0.188 -0.181 4 1 -0.299 -0.277 -0.264 6 1 -0.214 -0.195 -0.181 8 1 -0.012 -0.005 0.002 4 4 0.051 0.047 0.044 6 4 0.099 0.095 0.097 8 4 0.142 0.136 0.135	AM 241 L M 1 1 -0.014 3 1 -0.025 5 1 0.041 7 1 0.077 9 1 0.010 5 4 0.015 7 4 -0.047 9 4 -0.149
3/2- (532)	PA 231 L M 2 1 0.045 4 1 0.114 6 1 0.153 8 1 0.098 2 2 -0.096 4 2 -0.246 6 2 -0.307 8 2 -0.180	7/2+ (633)	AM 241 L M 1 1 -0.004 3 1 -0.014 5 1 -0.009 7 1 0.008 9 1 0.012 7 6 -0.020 9 6 -0.047
1/2+ (660)	PA 231 L M 1 0 -0.147 3 0 -0.293 5 0 -0.283 7 0 -0.149 9 0 0.009 1 1 -0.061 3 1 -0.210 5 1 -0.197 7 1 -0.088 9 1 0.024	3/2- (521)	AM 241 L M 2 1 -0.018 4 1 -0.024 6 1 -0.002 8 1 0.019 4 4 0.031 6 4 0.076 8 4 0.075

$G_{LM} \times 10^2$

<table>
<tr><th rowspan="2">DAUGHTER</th><th colspan="3">PARENT</th></tr>
<tr><th>3/2- (521)</th><th>7/2+ (633)</th><th>7/2- (514)</th></tr>
<tr><td>3/2- (521)</td>
<td>L M | BK 243 | BK 245 | BK 247
0 0 | 1.220 | 1.085 | 0.938
2 0 | 0.640 | 0.522 | 0.401
4 0 | 0.003 | -0.053 | -0.080
6 0 | -0.323 | -0.248 | -0.169
8 0 | -0.070 | -0.008 | 0.032</td>
<td>L M | ES 253
3 2 | -0.286
5 2 | -0.233
7 2 | 0.064
9 2 | 0.138
5 5 | -0.041
7 5 | -0.021
9 5 | 0.018</td>
<td>L M | MD 255 | MD 257
2 2 | -0.012 | -0.016
4 2 | 0.040 | 0.045
6 2 | 0.043 | 0.050
8 2 | -0.043 | -0.050
6 5 | -0.180 | -0.208
8 5 | -0.244 | -0.276</td></tr>
<tr><td>7/2+ (633)</td>
<td></td>
<td>L M | BK 249 | ES 249 | ES 251 | ES 253
0 0 | 0.922 | 0.979 | 0.854 | 1.035
2 0 | 0.387 | 0.362 | 0.310 | 0.309
4 0 | -0.114 | -0.320 | -0.282 | -0.376
6 0 | -0.167 | -0.210 | -0.180 | -0.113
8 0 | 0.063 | 0.173 | 0.160 | 0.208</td>
<td>L M | MD 255 | MD 257
1 0 | -0.008 | -0.008
3 0 | -0.028 | -0.033
5 0 | 0.034 | 0.040
7 0 | 0.025 | 0.029
9 0 | -0.046 | -0.053
7 7 | -0.004 | -0.007
9 7 | 0.131 | 0.147</td></tr>
<tr><td>7/2- (514)</td>
<td></td>
<td></td>
<td>L M | MD 253 | MD 255 | MD 257
0 0 | 0.818 | 0.986 | 1.138
2 0 | 0.307 | 0.307 | 0.342
4 0 | -0.267 | -0.351 | -0.378
6 0 | -0.199 | -0.142 | -0.132
8 0 | 0.155 | 0.201 | 0.208</td></tr>
<tr><td>5/2+ (642)</td>
<td>L M | BK 243 | BK 245
1 1 | -0.140 | -0.119
3 1 | -0.393 | -0.336
5 1 | -0.190 | -0.154
7 1 | 0.152 | 0.141
9 1 | 0.194 | 0.158
5 4 | 0.102 | 0.098
7 4 | 0.107 | 0.100
9 4 | 0.025 | 0.016</td>
<td>L M | BK 249 | ES 253
2 1 | -0.142 | -0.147
4 1 | -0.125 | -0.126
6 1 | 0.028 | 0.032
8 1 | 0.107 | 0.108
6 6 | -0.033 | -0.040
8 6 | -0.062 | -0.074</td>
<td></td></tr>
<tr><td>5/2- (523)</td>
<td>L M | BK 243 | BK 245
2 1 | 0.081 | 0.068
4 1 | 0.106 | 0.090
6 1 | 0.011 | 0.006
8 1 | -0.085 | -0.075
4 4 | 0.140 | 0.132
6 4 | 0.336 | 0.316
8 4 | 0.334 | 0.292</td>
<td>L M | BK 249
1 1 | 0.009
3 1 | 0.049
5 1 | 0.033
7 1 | -0.032
9 1 | -0.043
7 6 | -0.088
9 6 | -0.198</td>
<td></td></tr>
<tr><td>3/2+ (651)</td>
<td></td>
<td>L M | ES 253
2 2 | -0.029
4 2 | 0.022
6 2 | 0.108
8 2 | 0.087
6 5 | -0.050
8 5 | -0.100</td>
<td></td></tr>
</table>

Table D.V. The partial alpha amplitudes G_{LM} for odd-neutron transitions.

$G_{LM} \times 10^2$

DAUGHTER	PARENT 3/2+ (631)	5/2+ (633)	7/2− (743)	1/2+ (631)	5/2+ (622)	7/2+ (624)
3/2+ (631)	U 229 L M 0 0 1.916 2 0 0.750 4 0 0.618 6 0 −0.208 8 0 −0.088	TH 229 U 233 L M 2 1 0.034 0.031 4 1 0.018 0.017 6 1 −0.018 −0.017 8 1 −0.020 −0.018 4 4 −0.072 −0.064 6 4 −0.182 −0.168 8 4 −0.270 −0.245		PU 239 L M 2 1 0.020 4 1 0.005 6 1 −0.019 8 1 −0.017 2 2 0.153 4 2 0.351 6 2 0.314 8 2 0.046	CM 243 L M 2 1 −0.196 4 1 −0.102 6 1 0.111 8 1 0.091 4 4 0.024 6 4 0.029 8 4 0.022	
5/2+ (633)		TH 229 U 233 L M 0 0 1.950 1.566 2 0 0.810 0.654 4 0 0.768 0.511 6 0 −0.157 −0.185 8 0 −0.167 −0.142	U 235 L M 1 1 −0.036 3 1 −0.129 5 1 −0.077 7 1 0.037 9 1 0.081 7 6 0.069 9 6 0.158	PU 239 L M 2 2 −0.132 4 2 −0.302 6 2 −0.271 8 2 −0.045 4 3 −0.013 6 3 −0.026 8 3 −0.015	CM 243 L M 0 0 −0.060 2 0 −0.015 4 0 0.043 6 0 0.014 8 0 −0.025 6 5 0.091 8 5 0.201	
7/2− (743)		U 233 L M 1 1 0.010 3 1 0.037 5 1 0.022 7 1 −0.011 9 1 −0.023 7 6 0.020 9 6 0.045	U 235 L M 0 0 1.523 2 0 0.695 4 0 0.404 6 0 −0.222 8 0 −0.113	PU 239 CM 241 L M 3 3 −0.007 −0.007 5 3 −0.107 −0.096 7 3 −0.180 −0.161 9 3 −0.157 −0.135 5 4 −0.122 −0.114 7 4 −0.249 −0.231 9 4 −0.279 −0.252	CM 243 L M 1 1 −0.055 3 1 −0.146 5 1 −0.006 7 1 0.114 9 1 0.030 7 6 −0.032 9 6 −0.007	
1/2+ (631)		U 233 L M 2 2 −0.040 4 2 −0.089 6 2 −0.085 8 2 −0.021 4 3 0.004 6 3 0.008 8 3 0.005		PU 239 CM 241 L M 0 0 1.108 0.996 2 0 0.497 0.429 4 0 0.016 −0.044 6 0 −0.269 −0.257 8 0 −0.038 −0.012	CM 243 PU 241 L M 2 2 0.049 0.053 4 2 0.055 0.058 6 2 0.011 0.014 8 2 −0.023 −0.023 4 3 −0.172 −0.183 6 3 −0.281 −0.302 8 3 −0.125 −0.145	
5/2+ (622)		U 233 L M 0 0 −0.014 2 0 −0.003 4 0 0.009 6 0 0.004 8 0 −0.005 6 5 −0.021 8 5 −0.046		PU 239 L M 2 2 0.018 4 2 0.020 6 2 0.005 8 2 −0.008 4 3 0.061 6 3 0.101 8 3 0.048	CM 243 PU 241 L M 0 0 1.136 1.271 2 0 0.690 0.803 4 0 0.050 0.137 6 0 −0.349 −0.360 8 0 −0.108 −0.148	CM 245 L M 2 1 0.037 4 1 0.003 6 1 −0.023 8 1 0.002 6 6 0.095 8 6 0.209
7/2+ (624)				PU 239 L M 4 3 −0.035 6 3 −0.057 8 3 −0.028 4 4 0.007 6 4 0.004 8 4 −0.001	CM 243 L M 2 1 −0.009 4 1 −0.001 6 1 0.006 8 1 −0.000 6 6 0.023 8 6 0.051	CM 245 L M 0 0 0.933 2 0 0.503 4 0 0.035 6 0 −0.255 8 0 −0.069
1/2− (501)		TH 229 U 233 L M 3 2 0.011 0.014 5 2 0.095 0.092 7 2 −0.063 −0.060 9 2 0.019 0.015 3 3 0.002 0.000 5 3 −0.044 −0.043 7 3 0.023 0.021 9 3 −0.008 −0.006	U 235 L M 4 3 −0.002 6 3 0.012 8 3 −0.060 4 4 0.005 6 4 0.003 8 4 0.121	PU 239 L M 1 0 −0.053 3 0 −0.044 5 0 0.119 7 0 −0.055 9 0 0.009 1 1 0.006 3 1 0.026 5 1 −0.029 7 1 0.011 9 1 −0.003	CM 243 L M 3 2 0.017 5 2 −0.020 7 2 0.011 9 2 −0.003 3 3 0.016 5 3 0.164 7 3 −0.075 9 3 0.011	
5/2− (752)		TH 229 U 233 L M 1 0 0.053 0.048 3 0 0.081 0.074 5 0 0.004 0.004 7 0 −0.075 −0.071 9 0 −0.073 −0.067 5 5 −0.006 −0.005 7 5 0.060 0.057 9 5 0.146 0.139	U 235 L M 2 1 −0.135 4 1 −0.168 6 1 −0.065 8 1 0.075 6 6 −0.026 8 6 −0.044			

$G_{LM} \times 10^2$

	PARENT			
DAUGHTER	9/2− (734)	1/2+ (620)	7/2+ (613)	9/2+ (615)
9/2− (734)	CF 249 FM 251 L M 0 0 0.716 0.692 2 0 0.273 0.237 4 0 −0.127 −0.134 6 0 −0.145 −0.126 8 0 0.052 0.051			
1/2+ (620)		CF 251 FM 253 L M 0 0 0.828 0.803 2 0 0.281 0.245 4 0 −0.260 −0.261 6 0 −0.194 −0.170 8 0 0.120 0.116	FM 255 L M 4 3 0.234 6 3 0.138 8 3 −0.135 4 4 0.046 6 4 0.043 8 4 0.008	
5/2+ (622)	CF 249 L M 3 2 −0.182 5 2 −0.113 7 2 0.094 9 2 0.083 7 7 0.019 9 7 −0.021	7/2+ (613)	FM 255 L M 0 0 1.008 2 0 0.361 4 0 −0.387 6 0 −0.183 8 0 0.251	FM 257 L M 2 1 0.022 4 1 −0.011 6 1 −0.006 8 1 0.007 8 8 −0.123
7/2+ (624)	CF 249 L M 1 1 −0.024 3 1 −0.068 5 1 0.008 7 1 0.053 9 1 0.000 9 8 −0.084	9/2+ (615)	FM 255 L M 2 1 −0.006 4 1 0.003 6 1 0.002 8 1 −0.002 8 8 −0.034	FM 257 L M 0 0 1.135 2 0 0.406 4 0 −0.352 6 0 −0.178 8 0 0.246

Table D.VI contains examples of calculations for odd-mass nuclei. It should be emphasized that the tables are not intended as a source of experimental data. Many of the assignments to experimentally observed levels are purely speculative; and they should not be interpreted to mean there is experimental evidence to support them. Some of the assignments are well established, but we have made no effort in the tables to distinguish. Some of the assignments to levels are judicious guesses, aided by the results of the pairing-force calculations. Figure D.1 and Fig. D.2 summarize the pairing-force calculations for odd systems, and give the theoretical band head positions.

The calculations in Table D.VI are arranged in order of increasing atomic number and mass. The favored transition is given first for each nucleus, followed usually by the well established hindered bands. The heading of each page also lists the parent and daughter intrinsic bands, the parent ground state spin I_i, K_i, the M value determined by K_f-K_i, and the total alpha transition energy Q_α for the ground transition.

The information that follows is by column:

1. the excitation energy of the final state in keV. This information is normally supplied by a set of input data which assigns asymptotic quantum numbers to the observed levels. The absence of an asterisk indicates that input data was given for the level. Data is stored in a table in the computer and is searched for the assignments. If the state is unassigned, a subroutine is called to attempt an estimate for the level from available data. The estimate is made by taking data for the first two rotational members to calculate a rotational constant from the formula $\Delta E = A(I(I+1) - I(I-1))$. In the case of a $K=\frac{1}{2}$ band, the 1/2, 3/2, and 5/2 states are necessary to calculate in addition to the rotational constant A, the decoupling parameter a for use in the formula.

$$\Delta E = E_I - E_{I-1} = A\ (2I)[1 + \delta_{K,\frac{1}{2}}\ (-1)^{I+\frac{1}{2}}a]$$

2. the spin of the final state I_i.

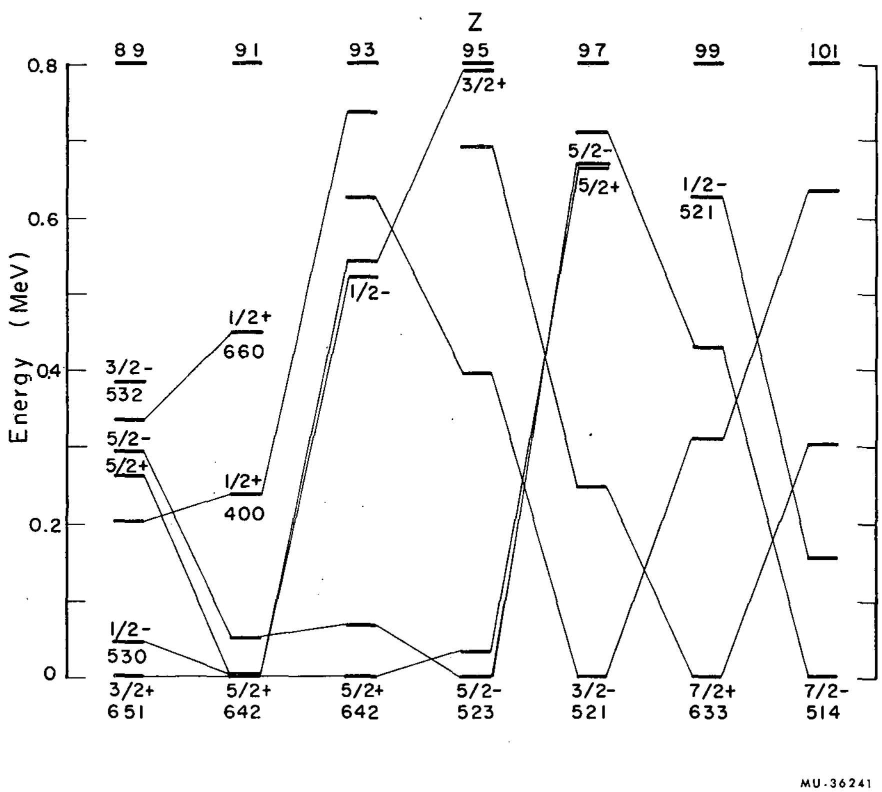


Fig. D.1. Theoretical energies of various bands in odd-proton nuclei.

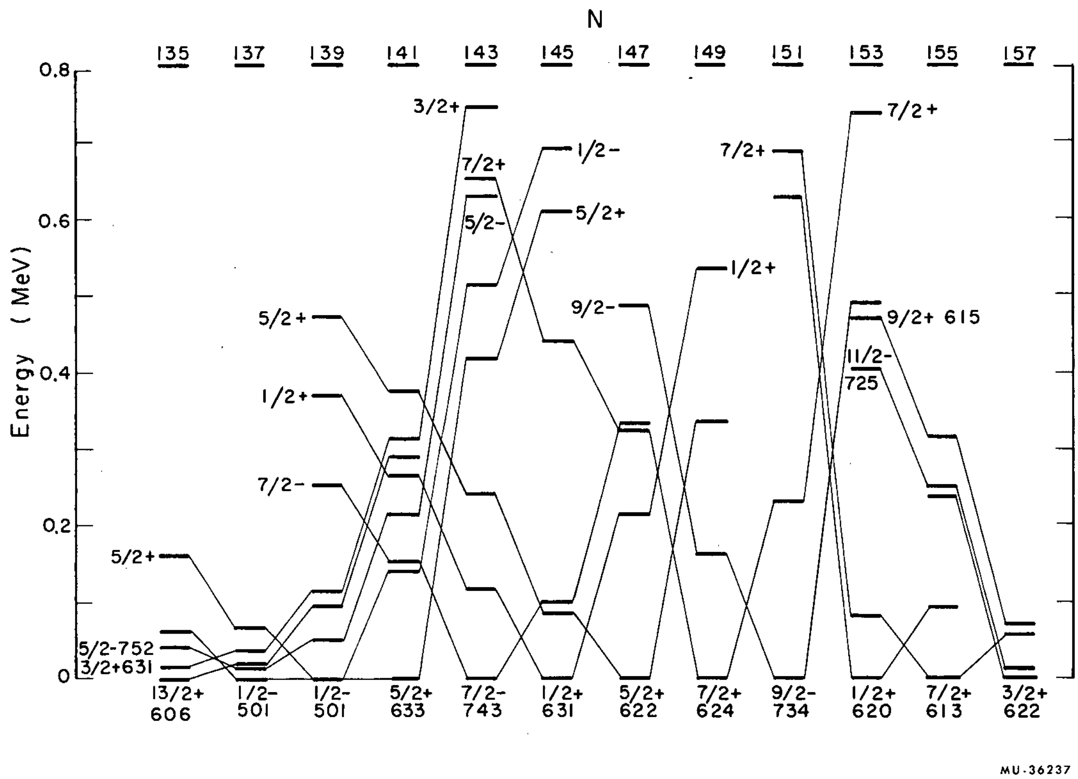


Fig. D.2. Theoretical energies of various bands in odd-neutron nuclei.

3. the various allowed ℓ-waves in the transition to the final state $|K_f - K_i| \leq \ell \leq K_f + K_i$

4. $H(\ell,\ K_i - K_f)$ corresponds to the product of the Clebsh-Gordan coefficient $(I_i\ \ell\ K_i\ K_f - K_i | I_f K_f)$ and the transformed amplitude $\hat{G}_{\ell\ K_i - K_f}$ described in the discussion preceding Table D.IV.

5. $H(\ell,\ K_i + K_f)$ corresponds to the product $(I_i\ \ell - K_i\ K_f + K_i | I_f K_f)$ $\hat{G}_{\ell\ K_i + K_f}$.

6. the sum of columns 4 and 5 with the relative phase factor for column 5 determined by $(-1)^{I_i - \frac{1}{2} + q}$. The phase factor for the resultant sum is then given by $(-1)^{\ell + K_i - \frac{1}{2}}$. This is the column which gives the correct theoretical relative phases of the ℓ-waves in the final state and corresponds to results measured by angular correlation experiments.

7. the square of column 6, representing a theoretical reduced transition probability exclusive of energy and centrifugal effects. This factor is sensitive to the detailed nuclear structure.

8. the penetrability factor $P_\ell(\epsilon)$ for the ℓ-wave of column 3 and an energy ϵ calculated from Q_α—col. 1. If no estimate was possible in col. 1, the comment NO STATE appears, or NO DATA, which indicates that no information at all was supplied for that nucleus. In either of these cases the next two columns are blank.

9. a normalized transition probability in reciprocal seconds. This includes the same factor which normalized the Pu^{238} ground transition as described previously. These values are theoretical predictions of the relative ℓ-wave mixing in the final state I_f.

10. the sum of the ℓ-wave transition probabilities, representing the total theoretical transition probability of decay to the final state. At the bottom of the page is the total to all members of this rotational band. These numbers are in reciprocal seconds and comparable directly with experimental values. The

sum of decay to all observed bands provides the total α-decay rate, and this is the number used to calculate relative α-intensities to final states in Figs. 5 through 8.

11. the reciprocal formation factor which is analogous to the experimental reduced hindrance factor having centrifugal and energy dependence removed. We avoid using the latter term because instead of making a comparison with favored transitions to ground of the nearest even-even nuclei, the theoretical comparison is made with the ground transition of Pu^{238}. This leads to numbers less than unity in some cases, but it has the same significance as the experimental hindrance factors. It is calculated for each final state by dividing the $|\hat{G}_{00}|^2$ of Pu^{238} (5.84×10^{-4}) by the contribution of all ℓ-waves of the state I_f to the total in column 6.

Table D.VI. Penetrability factors and theoretical alpha transition rates for odd-mass nuclei.

TH 229 FAVORED 5/2+633 FGAP V I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.195 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
236.	5/2	0	2.579E-02	0.	2.579E-02	6.653E-04	4.481E-32	1.793E-12		
		2	1.480E-02	0.	1.480E-02	2.190E-04	2.571E-32	3.387E-13		
		4	2.391E-03	0.	2.391E-03	5.718E-06	7.076E-33	2.433E-15	2.134E-12	6.56E-01

						8.900E-04				
267.	7/2	2	1.709E-02	0.	1.709E-02	2.920E-04	1.600E-32	2.811E-13		
		4	6.449E-03	0.	6.449E-03	4.159E-05	4.400E-33	1.101E-14		
		6	9.193E-05	0.	9.193E-05	8.451E-09	5.874E-34	2.986E-19	2.921E-13	1.75E 00

						3.336E-04				
307.*	9/2	2	1.011E-02	0.	1.011E-02	1.022E-04	8.641E-33	5.312E-14		
		4	9.538E-03	0.	9.538E-03	9.097E-05	2.373E-33	1.298E-14		
		6	3.250E-04	0.	3.250E-04	1.056E-07	3.162E-34	2.009E-18	6.610E-14	3.02E 00

						1.933E-04				
356.*	11/2	4	8.853E-03	0.	8.853E-03	7.837E-05	1.104E-33	5.203E-15		
		6	6.369E-04	0.	6.369E-04	4.056E-07	1.467E-34	3.580E-18		
		8	-2.266E-04	0.	-2.266E-04	5.136E-08	9.629E-36	2.975E-20	5.206E-15	7.41E 00

						7.883E-05				
413.*	13/2	4	4.849E-03	0.	4.849E-03	2.351E-05	4.398E-34	6.220E-16		
		6	8.158E-04	0.	8.158E-04	6.655E-07	5.831E-35	2.334E-18		
		8	-6.704E-04	0.	-6.704E-04	4.494E-07	3.812E-36	1.030E-19	6.244E-16	2.37E 01

						2.463E-05				
480.*	15/2	6	7.015E-04	0.	7.015E-04	4.921E-07	1.968E-35	5.825E-19		
		8	-1.186E-03	0.	-1.186E-03	1.406E-06	1.281E-36	1.083E-19	6.908E-19	3.08E 02

						1.898E-06				

									2.498E-12	

* ESTIMATED WITH ROT. CONST.= 4.43 KEV

TH 229 5/2+633 - 3/2+631 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 5.195 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	3/2	2	2.465E-04	0.	2.465E-04	6.078E-08	NO STATE	0.		
		4	2.537E-05	5.386E-04	5.640E-04	3.181E-07	NO STATE	0.	0.	1.54E 03
						3.789E-07				
0.*	5/2	2	3.019E-04	0.	3.019E-04	9.116E-08	NO STATE	0.		
		4	8.788E-05	-4.665E-04	-3.786E-04	1.433E-07	NO STATE	0.	0.	2.49E 03
						2.345E-07				
0.*	7/2	2	2.250E-04	0.	2.250E-04	5.065E-08	NO STATE	0.		
		4	1.530E-04	3.248E-04	4.778E-04	2.283E-07	NO STATE	0.		
		6	-3.071E-05	1.157E-03	1.126E-03	1.268E-06	NO STATE	0.	0.	3.78E 02
						1.547E-06				
0.*	9/2	2	1.006E-04	0.	1.006E-04	1.013E-08	NO STATE	0.		
		4	1.710E-04	-1.816E-04	-1.053E-05	1.109E-10	NO STATE	0.		
		6	-8.208E-05	-1.546E-03	-1.628E-03	2.651E-06	NO STATE	0.	0.	2.20E 02
						2.661E-06				
0.*	11/2	4	1.286E-04	7.802E-05	2.066E-04	4.269E-08	NO STATE	0.		
		6	-1.303E-04	1.402E-03	1.272E-03	1.618E-06	NO STATE	0.		
		8	-4.854E-05	1.282E-03	1.234E-03	1.522E-06	NO STATE	0.	0.	1.84E 02
						3.183E-06				
0.*	13/2	4	5.940E-05	-2.252E-05	3.688E-05	1.360E-09	NO STATE	0.		
		6	-1.407E-04	-9.468E-04	-1.088E-03	1.183E-06	NO STATE	0.		
		8	-1.211E-04	-1.999E-03	-2.120E-03	4.495E-06	NO STATE	0.	0.	1.03E 02
						5.679E-06				
0.*	15/2	6	-1.048E-04	4.701E-04	3.652E-04	1.334E-07	NO STATE	0.		
		8	-1.854E-04	2.041E-03	1.856E-03	3.444E-06	NO STATE	0.	0.	1.63E 02
						3.578E-06				
									0.	

* ESTIMATE NOT POSSIBLE

TH 229 5/2+633 - 1/2-501 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 5.195 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	3	8.053E-05	2.853E-05	-1.091E-04	1.190E-08	NO STATE	0.	0.	4.91E 04

						1.190E-08				
0.	3/2	3	1.801E-04	-3.190E-05	-1.482E-04	2.196E-08	4.739E-31	6.258E-16	6.258E-16	2.66E 04

						2.196E-08				
0.	5/2	3	2.206E-04	2.605E-05	-2.466E-04	6.081E-08	4.739E-31	1.733E-15		
		5	2.117E-04	1.423E-04	-3.540E-04	1.253E-07	9.155E-32	6.902E-16	2.423E-15	3.14E 03

						1.862E-07				
0.*	7/2	3	1.860E-04	-1.647E-05	-1.695E-04	2.873E-08	NO STATE	0.		
		5	4.464E-04	-2.250E-04	-2.213E-04	4.899E-08	NO STATE	0.	0.	7.52E 03

						7.772E-08				
0.*	9/2	3	1.108E-04	7.853E-06	-1.187E-04	1.409E-08	NO STATE	0.		
		5	5.790E-04	2.335E-04	-8.125E-04	6.602E-07	NO STATE	0.		
		7	-7.956E-05	-3.502E-05	1.146E-04	1.313E-08	NO STATE	0.	0.	8.50E 02

						6.874E-07				
0.*	11/2	3	4.206E-05	-2.483E-06	-3.957E-05	1.566E-09	NO STATE	0.		
		5	5.252E-04	-1.765E-04	-3.487E-04	1.216E-07	NO STATE	0.		
		7	-1.688E-04	6.190E-05	1.069E-04	1.142E-08	NO STATE	0.	0.	4.34E 03

						1.346E-07				
0.*	13/2	5	3.356E-04	9.669E-05	-4.323E-04	1.869E-07	NO STATE	0.		
		7	-2.240E-04	-7.042E-05	2.944E-04	8.667E-08	NO STATE	0.		
		9	1.108E-05	1.027E-05	-2.135E-05	4.559E-10	NO STATE	0.	0.	2.13E 03

						2.740E-07				
0.*	15/2	5	1.356E-04	-3.418E-05	-1.014E-04	1.029E-08	NO STATE	0.		
		7	-2.090E-04	5.750E-05	1.515E-04	2.295E-08	NO STATE	0.		
		9	2.369E-05	-1.922E-05	-4.469E-06	1.997E-11	NO STATE	0.	0.	1.76E 04

						3.326E-08				

									3.049E-15	

* ESTIMATE NOT POSSIBLE

TH 229 5/2+633 - 5/2-752 FGAP I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.195 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	1	1.025E-03	0.	-1.025E-03	1.050E-06	NO STATE	0.		
		3	4.780E-04	0.	-4.780E-04	2.285E-07	NO STATE	0.		
		5	3.906E-06	-3.001E-05	2.610E-05	6.813E-10	NO STATE	0.	0.	4.57E 02
						1.279E-06				
0.*	7/2	1	6.481E-04	0.	-6.481E-04	4.200E-07	NO STATE	0.		
		3	8.551E-04	0.	-8.551E-04	7.312E-07	NO STATE	0.		
		5	1.747E-05	2.237E-05	-3.983E-05	1.587E-09	NO STATE	0.	0.	5.07E 02
						1.153E-06				
0.*	9/2	3	8.527E-04	0.	-8.527E-04	7.270E-07	NO STATE	0.		
		5	3.791E-05	-1.387E-05	-2.404E-05	5.780E-10	NO STATE	0.		
		7	-1.088E-04	-4.558E-04	5.646E-04	3.187E-07	NO STATE	0.	0.	5.58E 02
						1.046E-06				
0.*	11/2	3	4.823E-04	0.	-4.823E-04	2.326E-07	NO STATE	0.		
		5	5.127E-05	7.034E-06	-5.830E-05	3.399E-09	NO STATE	0.		
		7	-3.440E-04	5.405E-04	-1.965E-04	3.862E-08	NO STATE	0.	0.	2.13E 03
						2.747E-07				
0.*	13/2	5	4.550E-05	-2.774E-06	-4.272E-05	1.825E-09	NO STATE	0.		
		7	-6.340E-04	-4.428E-04	1.077E-03	1.159E-06	NO STATE	0.		
		9	-1.404E-04	-7.221E-04	8.626E-04	7.440E-07	NO STATE	0.	0.	3.07E 02
						1.905E-06				
0.*	15/2	5	2.432E-05	7.414E-07	-2.506E-05	6.280E-10	NO STATE	0.		
		7	-7.826E-04	2.733E-04	5.093E-04	2.594E-07	NO STATE	0.		
		9	-3.972E-04	1.021E-03	-6.241E-04	3.895E-07	NO STATE	0.	0.	8.99E 02
						6.496E-07				
									0.	

* ESTIMATE NOT POSSIBLE

TH 229 5/2+633 - 13/2+606 FGAP I = 5/2 KI = 5/2 M = 4 KF = 13/2 Q ALPHA 5.195 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	13/2	4	-3.687E-05	0.	-3.687E-05	1.360E-09	NO STATE	0.		
		6	8.208E-05	0.	8.208E-05	6.736E-09	NO STATE	0.		
		8	5.680E-07	0.	5.680E-07	3.226E-13	NO STATE	0.	0.	7.22E 04
						8.097E-09				
0.*	15/2	6	1.867E-04	0.	1.867E-04	3.487E-08	NO STATE	0.		
		8	2.658E-06	0.	2.658E-06	7.063E-12	NO STATE	0.	0.	1.67E 04
						3.488E-08				
									0.	

* ESTIMATE NOT POSSIBLE

PA 231 1/2-530 FAVORED FGAP I = 3/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
351.	1/2	0	0.	0.	0.	0.	1.451E-33	0.		
		2	-7.924E-03	0.	-7.924E-03	6.279E-05	8.337E-34	3.148E-15	3.148E-15	9.30E 00
						6.279E-05				
327.	3/2	0	2.143E-02	0.	2.143E-02	4.594E-04	2.132E-33	5.892E-14		
		2	-7.924E-03	0.	-7.924E-03	6.279E-05	1.225E-33	4.627E-15	6.354E-14	1.12E 00
						5.222E-04				
423.	5/2	2	5.187E-03	0.	5.187E-03	2.691E-05	2.602E-34	4.211E-16		
		4	-4.123E-03	0.	-4.123E-03	1.700E-05	7.162E-35	7.321E-17	4.943E-16	1.33E 01
						4.390E-05				
385.	7/2	2	1.271E-02	0.	1.271E-02	1.615E-04	4.848E-34	4.707E-15		
		4	-3.073E-03	0.	-3.073E-03	9.442E-06	1.336E-34	7.586E-17	4.783E-15	3.42E 00
						1.709E-04				
556.*	9/2	4	2.451E-03	0.	2.451E-03	6.008E-06	7.482E-36	2.704E-18		
		6	1.372E-03	0.	1.372E-03	1.883E-06	9.938E-37	1.126E-19	2.816E-18	7.40E 01
						7.892E-06				
468.*	11/2	4	5.200E-03	0.	5.200E-03	2.704E-05	3.339E-35	5.430E-17		
		6	9.375E-04	0.	9.375E-04	8.789E-07	4.454E-36	2.354E-19	5.453E-17	2.09E 01
						2.792E-05				
717.*	13/2	6	-8.028E-04	0.	-8.028E-04	6.446E-07	5.760E-38	2.233E-21		
		8	1.245E-03	0.	1.245E-03	1.549E-06	3.733E-39	3.479E-22	2.581E-21	2.66E 02
						2.194E-06				
597.*	15/2	6	-1.606E-03	0.	-1.606E-03	2.578E-06	4.928E-37	7.641E-20		
		8	8.149E-04	0.	8.149E-04	6.641E-07	3.218E-38	1.285E-21	7.770E-20	1.80E 02
						3.242E-06				
									7.203E-14	

* ESTIMATED WITH ROT. CONST.= 5.55 KEV, AND DEC. PARAM.= -2.441

PA 231 1/2-530 - 3/2-532 FGAP I = 3/2 KI = 1/2 M = 1 KF = 3/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	3/2	2	-6.839E-04	-8.810E-04	-1.565E-03	2.449E-06	1.759E-31	2.591E-14	2.591E-14	2.39E 02

						2.449E-06				
29.	5/2	2	-1.828E-04	9.418E-04	7.591E-04	5.762E-07	1.148E-31	3.979E-15		
		4	-1.026E-03	-2.543E-03	-3.569E-03	1.274E-05	3.197E-32	2.450E-14	2.848E-14	4.39E 01

						1.332E-05				
71.*	7/2	2	8.174E-04	-5.265E-04	2.909E-04	8.462E-08	6.279E-32	3.196E-16		
		4	-1.341E-03	-4.152E-04	-1.756E-03	3.084E-06	1.747E-32	3.240E-15	3.559E-15	1.84E 02

						3.169E-06				
123.*	9/2	4	2.114E-04	2.619E-03	2.830E-03	8.010E-06	7.937E-33	3.824E-15		
		6	-1.506E-03	-3.475E-03	-4.981E-03	2.481E-05	1.076E-33	1.606E-15	5.430E-15	1.78E 01

						3.282E-05				
188.*	11/2	4	1.733E-03	-2.147E-03	-4.137E-04	1.711E-07	2.975E-33	3.062E-17		
		6	-1.521E-03	3.511E-04	-1.170E-03	1.369E-06	4.021E-34	3.310E-17	6.372E-17	3.79E 02

						1.540E-06				
265.*	13/2	6	5.338E-04	3.081E-03	3.615E-03	1.306E-05	1.224E-34	9.622E-17		
		8	-1.114E-03	-2.366E-03	-3.480E-03	1.211E-05	8.176E-36	5.954E-18	1.022E-16	2.32E 01

						2.517E-05				
353.*	15/2	6	2.097E-03	-3.025E-03	-9.283E-04	8.617E-07	2.996E-35	1.553E-18		
		8	-9.901E-04	5.257E-04	-4.644E-04	2.156E-07	1.989E-36	2.580E-20	1.579E-18	5.42E 02

						1.077E-06				

									6.354E-14	

* ESTIMATED WITH ROT. CONST.= 5.88 KEV

PA 231 1/2-530 - 3/2+651 FGAP I = 3/2 KI = 1/2 M = 1 KF = 3/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	3/2	1	1.254E-03	0.	-1.254E-03	1.572E-06	2.537E-31	2.399E-14		
		3	2.097E-03	-5.952E-04	-1.502E-03	2.255E-06	1.016E-31	1.378E-14	3.778E-14	1.53E 02
						3.827E-06				
29.	5/2	1	-1.536E-03	0.	1.536E-03	2.358E-06	1.657E-31	2.350E-14		
		3	3.670E-03	-2.976E-04	-3.372E-03	1.137E-05	6.632E-32	4.535E-14	6.885E-14	4.26E 01
						1.373E-05				
73.	7/2	3	-0.	7.290E-04	-7.290E-04	5.314E-07	3.492E-32	1.116E-15		
		5	3.463E-03	-7.973E-04	-2.666E-03	7.105E-06	6.775E-33	2.895E-15	4.011E-15	7.65E 01
						7.637E-06				
107.	9/2	3	-4.540E-03	-5.155E-04	5.055E-03	2.556E-05	2.107E-32	3.239E-14		
		5	3.872E-03	0.	-3.872E-03	1.499E-05	4.083E-33	3.681E-15	3.607E-14	1.44E 01
						4.054E-05				
172.*	11/2	5	-1.037E-03	7.506E-04	2.867E-04	8.222E-08	1.536E-33	7.594E-18		
		7	2.642E-03	-3.208E-04	-2.322E-03	5.390E-06	1.461E-34	4.735E-17	5.494E-17	1.07E 02
						5.473E-06				
248.*	13/2	5	-5.187E-03	-6.824E-04	5.869E-03	3.445E-05	4.714E-34	9.767E-16		
		7	2.482E-03	5.478E-05	-2.537E-03	6.436E-06	4.464E-35	1.728E-17	9.940E-16	1.43E 01
						4.088E-05				
336.*	15/2	7	-1.033E-03	2.718E-04	7.616E-04	5.801E-07	1.097E-35	3.828E-19		
		9	9.329E-04	1.952E-04	-1.128E-03	1.272E-06	5.169E-37	3.956E-20	4.223E-19	3.15E 02
						1.853E-06				
									1.478E-13	

* ESTIMATED WITH ROT. CONST.= 5.88 KEV

PA 231 1/2-530 - 3/2+651 FGAP I = 3/2 KI = 1/2 M = 1 KF = 3/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
28.	3/2	1	1.254E-03	0.	-1.254E-03	1.572E-06	1.703E-31	1.611E-14		
		3	2.097E-03	-5.952E-04	-1.502E-03	2.255E-06	6.818E-32	9.247E-15	2.535E-14	1.53E 02
						3.827E-06				
46.	5/2	1	-1.536E-03	0.	1.536E-03	2.358E-06	1.300E-31	1.844E-14		
		3	3.670E-03	-2.976E-04	-3.372E-03	1.137E-05	5.203E-32	3.558E-14	5.402E-14	4.26E 01
						1.373E-05				
73.	7/2	3	-0.	7.290E-04	-7.290E-04	5.314E-07	3.492E-32	1.116E-15		
		5	3.463E-03	-7.973E-04	-2.666E-03	7.105E-06	6.775E-33	2.895E-15	4.011E-15	7.65E 01
						7.637E-06				
107.	9/2	3	-4.540E-03	-5.155E-04	5.055E-03	2.556E-05	2.107E-32	3.239E-14		
		5	3.872E-03	0.	-3.872E-03	1.499E-05	4.083E-33	3.681E-15	3.607E-14	1.44E 01
						4.054E-05				
148.*	11/2	5	-1.037E-03	7.506E-04	2.867E-04	8.222E-08	2.212E-33	1.094E-17		
		7	2.642E-03	-3.208E-04	-2.322E-03	5.390E-06	2.106E-34	6.829E-17	7.923E-17	1.07E 02
						5.473E-06				
196.*	13/2	5	-5.187E-03	-6.824E-04	5.869E-03	3.445E-05	1.061E-33	2.199E-15		
		7	2.482E-03	5.478E-05	-2.537E-03	6.436E-06	1.008E-34	3.901E-17	2.238E-15	1.43E 01
						4.088E-05				
251.*	15/2	7	-1.033E-03	2.718E-04	7.616E-04	5.801E-07	4.246E-35	1.482E-18		
		9	9.329E-04	1.952E-04	-1.128E-03	1.272E-06	2.013E-36	1.541E-19	1.636E-18	3.15E 02
						1.853E-06				
									1.218E-13	

* ESTIMATED WITH ROT. CONST.= 3.70 KEV

PA 231 1/2-530 - 1/2+660 FGAP I = 3/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	1	2.269E-03	-5.196E-04	-1.749E-03	3.060E-06	NO STATE	0.	0.	1.91E 02
						3.060E-06				
0.*	3/2	1	-1.015E-03	9.294E-04	8.520E-05	7.260E-09	NO STATE	0.		
		3	3.212E-03	-2.224E-03	-9.878E-04	9.757E-07	NO STATE	0.	0.	5.94E 02
						9.830E-07				
0.*	5/2	1	-3.044E-03	-6.971E-04	3.741E-03	1.399E-05	NO STATE	0.		
		3	2.623E-03	4.540E-04	-3.077E-03	9.465E-06	NO STATE	0.	0.	2.49E 01
						2.346E-05				
0.*	7/2	3	-1.955E-03	2.030E-03	-7.562E-05	5.719E-09	NO STATE	0.		
		5	3.372E-03	-2.384E-03	-9.884E-04	9.770E-07	NO STATE	0.	0.	5.95E 02
						9.827E-07				
0.*	9/2	3	-4.371E-03	-2.270E-03	6.641E-03	4.410E-05	NO STATE	0.		
		5	2.384E-03	8.428E-04	-3.227E-03	1.042E-05	NO STATE	0.	0.	1.07E 01
						5.452E-05				
0.*	11/2	5	-1.984E-03	1.870E-03	1.140E-04	1.300E-08	NO STATE	0.		
		7	2.030E-03	-1.281E-03	-7.489E-04	5.608E-07	NO STATE	0.	0.	1.02E 03
						5.738E-07				
0.*	13/2	5	-4.066E-03	-2.395E-03	6.461E-03	4.175E-05	NO STATE	0.		
		7	1.353E-03	5.338E-04	-1.887E-03	3.562E-06	NO STATE	0.	0.	1.29E 01
						4.531E-05				
0.*	15/2	7	-1.183E-03	9.336E-04	2.499E-04	6.243E-08	NO STATE	0.		
		9	4.539E-04	-1.256E-04	-3.283E-04	1.078E-07	NO STATE	0.	0.	3.43E 03
						1.702E-07				
									0.	

* ESTIMATE NOT POSSIBLE

PA 231 1/2-530 - 5/2-523 FGAP I = 3/2 KI = 1/2 M = 2 KF = 5/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	2	3.648E-05	0.	3.648E-05	1.331E-09	NO STATE	0.		
		4	-5.653E-05	-3.973E-04	-4.538E-04	2.060E-07	NO STATE	0.	0.	2.82E 03

						2.073E-07				
0.*	7/2	2	-3.159E-05	0.	-3.159E-05	9.982E-10	NO STATE	0.		
		4	-1.311E-04	-3.350E-04	-4.661E-04	2.173E-07	NO STATE	0.	0.	2.68E 03

						2.183E-07				
0.*	9/2	4	-3.977E-05	5.191E-04	4.793E-04	2.298E-07	NO STATE	0.		
		6	-2.823E-04	-1.041E-03	-1.323E-03	1.750E-06	NO STATE	0.	0.	2.95E 02

						1.980E-06				
0.*	11/2	4	1.509E-04	-3.031E-04	-1.521E-04	2.315E-08	NO STATE	0.		
		6	-4.004E-04	-2.271E-04	-6.275E-04	3.938E-07	NO STATE	0.	0.	1.40E 03

						4.169E-07				
0.*	13/2	6	-7.958E-11	1.050E-03	1.050E-03	1.103E-06	NO STATE	0.		
		8	-3.589E-04	-9.969E-04	-1.356E-03	1.838E-06	NO STATE	0.	0.	1.99E 02

						2.941E-06				
0.*	15/2	6	4.846E-04	-7.940E-04	-3.094E-04	9.574E-08	NO STATE	0.		
		8	-4.144E-04	-9.168E-10	-4.144E-04	1.717E-07	NO STATE	0.	0.	2.18E 03

						2.675E-07				

									0.	

* ESTIMATE NOT POSSIBLE

PA 231 1/2-530 - 5/2+642 FGAP I = 3/2 KI = 1/2 M = 2 KF = 5/2 Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	3	1.030E-03	-3.887E-05	-9.916E-04	9.832E-07	NO STATE	0.	0.	5.94E 02
						9.832E-07				
0.*	7/2	3	6.517E-04	3.278E-05	-6.845E-04	4.685E-07	NO STATE	0.		
		5	1.095E-03	1.272E-04	-1.222E-03	1.493E-06	NO STATE	0.	0.	2.98E 02
						1.962E-06				
0.*	9/2	3	-1.219E-03	-1.533E-05	1.235E-03	1.524E-06	NO STATE	0.		
		5	1.851E-03	5.376E-05	-1.904E-03	3.627E-06	NO STATE	0.	0.	1.13E 02
						5.151E-06				
0.*	11/2	5	2.295E-04	-1.400E-04	-8.952E-05	8.014E-09	NO STATE	0.		
		7	1.273E-03	2.891E-04	-1.562E-03	2.439E-06	NO STATE	0.	0.	2.39E 02
						2.447E-06				
0.*	13/2	5	-2.178E-03	9.488E-05	2.083E-03	4.338E-06	NO STATE	0.		
		7	1.604E-03	2.602E-05	-1.630E-03	2.656E-06	NO STATE	0.	0.	8.35E 01
						6.994E-06				
0.*	15/2	7	-1.515E-04	-2.752E-04	4.267E-04	1.820E-07	NO STATE	0.		
		9	6.739E-04	2.967E-04	-9.706E-04	9.421E-07	NO STATE	0.	0.	5.20E 02
						1.124E-06				
									0.	

* ESTIMATE NOT POSSIBLE

PA 231 1/2-530 - 1/2+400 FGAP   I = 3/2   KI = 1/2   M = 0   KF = 1/2   Q ALPHA 5.170 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	1	5.708E-04	3.950E-05	-6.103E-04	3.725E-07	NO STATE	0.	0.	1.57E 03
						3.725E-07				
0.*	3/2	1	-2.553E-04	-7.066E-05	3.259E-04	1.062E-07	NO STATE	0.		
		3	3.991E-04	1.475E-04	-5.466E-04	2.988E-07	NO STATE	0.	0.	1.44E 03
						4.050E-07				
0.*	5/2	1	-7.659E-04	5.299E-05	7.129E-04	5.082E-07	NO STATE	0.		
		3	3.259E-04	-3.011E-05	-2.957E-04	8.747E-08	NO STATE	0.	0.	9.81E 02
						5.956E-07				
0.*	7/2	3	-2.429E-04	-1.347E-04	3.775E-04	1.425E-07	NO STATE	0.		
		5	-6.305E-04	-3.567E-04	9.872E-04	9.746E-07	NO STATE	0.	0.	5.23E 02
						1.117E-06				
0.*	9/2	3	-5.431E-04	1.506E-04	3.925E-04	1.541E-07	NO STATE	0.		
		5	-4.458E-04	1.261E-04	3.197E-04	1.022E-07	NO STATE	0.	0.	2.28E 03
						2.563E-07				
0.*	11/2	5	3.710E-04	2.798E-04	-6.508E-04	4.235E-07	NO STATE	0.		
		7	-6.366E-05	-1.206E-05	7.571E-05	5.733E-09	NO STATE	0.	0.	1.36E 03
						4.292E-07				
0.*	13/2	5	7.602E-04	-3.584E-04	-4.018E-04	1.615E-07	NO STATE	0.		
		7	-4.244E-05	5.024E-06	3.741E-05	1.400E-09	NO STATE	0.	0.	3.59E 03
						1.629E-07				
0.*	15/2	7	3.711E-05	8.787E-06	-4.590E-05	2.107E-09	NO STATE	0.		
		9	-4.855E-05	-2.000E-05	6.855E-05	4.699E-09	NO STATE	0.	0.	8.58E 04
						6.806E-09				
									0.	

* ESTIMATE NOT POSSIBLE

U 229 FAVORED 3/2+631 FGAP V I = 3/2 KI = 3/2 M = 0 KF = 3/2 Q ALPHA 6.504 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	3/2	0	2.501E-02	0.	-2.501E-02	6.253E-04	9.219E-25	3.467E-05		
		2	1.028E-02	0.	-1.028E-02	1.057E-04	5.413E-25	3.440E-06	3.811E-05	7.99E-01
						7.310E-04				
29.	5/2	2	1.649E-02	0.	-1.649E-02	2.718E-04	4.020E-25	6.570E-06		
		4	2.813E-03	0.	-2.813E-03	7.913E-06	1.166E-25	5.551E-08	6.626E-06	2.09E 00
						2.797E-04				
65.	7/2	2	1.229E-02	0.	-1.229E-02	1.510E-04	2.770E-25	2.516E-06		
		4	6.891E-03	0.	-6.891E-03	4.748E-05	8.029E-26	2.293E-07	2.745E-06	2.94E 00
						1.985E-04				
102.	9/2	4	8.691E-03	0.	-8.691E-03	7.553E-05	5.451E-26	2.477E-07		
		6	6.798E-05	0.	-6.798E-05	4.621E-09	7.895E-27	2.195E-12	2.477E-07	7.73E 00
						7.554E-05				
166.*	11/2	4	5.937E-03	0.	-5.937E-03	3.525E-05	2.773E-26	5.880E-08		
		6	1.442E-04	0.	-1.442E-04	2.080E-08	4.005E-27	5.009E-12	5.880E-08	1.66E 01
						3.527E-05				
241.*	13/2	6	1.687E-04	0.	-1.687E-04	2.847E-08	1.771E-27	3.032E-12		
		8	-4.651E-04	0.	4.651E-04	2.163E-07	1.295E-28	1.685E-12	4.717E-12	2.39E 03
						2.448E-07				
328.*	15/2	6	1.105E-04	0.	-1.105E-04	1.220E-08	6.775E-28	4.971E-13		
		8	-9.302E-04	0.	9.302E-04	8.653E-07	4.927E-29	2.564E-12	3.061E-12	6.66E 02
						8.775E-07				
									4.779E-05	

* ESTIMATED WITH ROT. CONST.= 5.80 KEV

U 233 FAVORED 5/2+633 FGAP V I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	0	2.065E-02	0.	2.065E-02	4.263E-04	2.742E-33	7.031E-14		
		2	1.160E-02	0.	1.160E-02	1.345E-04	1.582E-33	1.280E-14		
		4	1.650E-03	0.	1.650E-03	2.722E-06	4.408E-34	7.216E-17	8.318E-14	1.04E 00
						5.635E-04				
42.	7/2	2	1.339E-02	0.	1.339E-02	1.793E-04	8.101E-34	8.738E-15		
		4	4.449E-03	0.	4.449E-03	1.980E-05	2.254E-34	2.684E-16		
		6	-1.809E-05	0.	-1.809E-05	3.274E-10	3.064E-35	6.035E-22	9.006E-15	2.93E 00
						1.991E-04				
97.	9/2	2	7.922E-03	0.	7.922E-03	6.276E-05	3.356E-34	1.267E-15		
		4	6.581E-03	0.	6.581E-03	4.330E-05	9.324E-35	2.428E-16		
		6	-6.398E-05	0.	-6.398E-05	4.093E-09	1.264E-35	3.112E-21	1.510E-15	5.51E 00
						1.061E-04				
163.	11/2	4	6.108E-03	0.	6.108E-03	3.731E-05	3.157E-35	7.084E-17		
		6	-1.254E-04	0.	-1.254E-04	1.572E-08	4.268E-36	4.034E-21		
		8	-2.258E-04	0.	-2.258E-04	5.099E-08	2.861E-37	8.775E-22	7.085E-17	1.56E 01
						3.738E-05				
242.*	13/2	4	3.346E-03	0.	3.346E-03	1.119E-05	8.437E-36	5.680E-18		
		6	-1.606E-04	0.	-1.606E-04	2.579E-08	1.136E-36	1.762E-21		
		8	-6.680E-04	0.	-6.680E-04	4.462E-07	7.579E-38	2.034E-21	5.683E-18	5.01E 01
						1.166E-05				
333.*	15/2	6	-1.381E-04	0.	-1.381E-04	1.907E-08	2.365E-37	2.712E-22		
		8	-1.181E-03	0.	-1.181E-03	1.396E-06	1.568E-38	1.316E-21	1.587E-21	4.13E 02
						1.415E-06				
									9.377E-14	

* ESTIMATED WITH ROT. CONST.= 6.05 KEV

U 233 5/2+633 - 5/2-752 FGAP I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
29.	5/2	1	9.206E-04	0.	-9.206E-04	8.475E-07	1.445E-33	7.368E-17		
		3	4.333E-04	0.	-4.333E-04	1.877E-07	5.784E-34	6.531E-18		
		5	2.817E-06	-3.316E-05	3.034E-05	9.207E-10	1.123E-34	6.221E-21	8.022E-17	5.64E 02
						1.036E-06				
71.	7/2	1	5.822E-04	0.	-5.822E-04	3.390E-07	7.355E-34	1.500E-17		
		3	7.751E-04	0.	-7.751E-04	6.007E-07	2.941E-34	1.063E-17		
		5	1.260E-05	2.472E-05	-3.731E-05	1.392E-09	5.702E-35	4.775E-21	2.563E-17	6.21E 02
						9.411E-07				
124.	9/2	3	7.729E-04	0.	-7.729E-04	5.973E-07	1.255E-34	4.507E-18		
		5	2.734E-05	-1.533E-05	-1.202E-05	1.444E-10	2.428E-35	2.108E-22		
		7	-1.021E-04	-4.337E-04	5.358E-04	2.871E-07	2.311E-36	3.990E-20	4.547E-18	6.60E 02
						8.846E-07				
191.*	11/2	3	4.372E-04	0.	-4.372E-04	1.911E-07	4.176E-35	4.801E-19		
		5	3.698E-05	7.773E-06	-4.475E-05	2.002E-09	8.061E-36	9.709E-22		
		7	-3.229E-04	5.143E-04	-1.914E-04	3.663E-08	7.644E-37	1.684E-21	4.828E-19	2.54E 03
						2.298E-07				
269.*	13/2	5	3.281E-05	-3.066E-06	-2.975E-05	8.849E-10	2.124E-36	1.130E-22		
		7	-5.952E-04	-4.213E-04	1.016E-03	1.033E-06	2.005E-37	1.246E-20		
		9	-1.295E-04	-6.872E-04	8.167E-04	6.670E-07	9.459E-39	3.795E-22	1.295E-20	3.43E 02
						1.701E-06				
360.*	15/2	5	1.754E-05	8.193E-07	-1.836E-05	3.370E-10	4.362E-37	8.843E-24		
		7	-7.347E-04	2.600E-04	4.747E-04	2.253E-07	4.098E-38	5.552E-22		
		9	-3.662E-04	9.719E-04	-6.057E-04	3.669E-07	1.920E-39	4.238E-23	6.064E-22	9.86E 02
						5.926E-07				
									1.109E-16	

* ESTIMATED WITH ROT. CONST.= 6.06 KEV

U 233 5/2+633 - 1/2-501 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
194.	1/2	3	8.527E-05	3.250E-05	-1.178E-04	1.387E-08	3.948E-35	3.293E-20	3.293E-20	4.21E 04
						1.387E-08				
202.	3/2	3	1.907E-04	-3.634E-05	-1.543E-04	2.382E-08	3.453E-35	4.947E-20	4.947E-20	2.45E 04
						2.382E-08				
242.	5/2	3	2.335E-04	2.967E-05	-2.632E-04	6.927E-08	1.759E-35	7.330E-20		
		5	2.064E-04	1.402E-04	-3.466E-04	1.201E-07	3.389E-36	2.449E-20	9.779E-20	3.08E 03
						1.894E-07				
262.	7/2	3	1.969E-04	-1.877E-05	-1.782E-04	3.174E-08	1.252E-35	2.389E-20		
		5	4.352E-04	-2.216E-04	-2.136E-04	4.561E-08	2.410E-36	6.611E-21	3.050E-20	7.55E 03
						7.735E-08				
334.*	9/2	3	1.174E-04	8.946E-06	-1.263E-04	1.595E-08	3.606E-36	3.459E-21		
		5	5.645E-04	2.300E-04	-7.945E-04	6.312E-07	6.922E-37	2.628E-20		
		7	-7.799E-05	-3.203E-05	1.100E-04	1.210E-08	6.512E-38	4.741E-23	2.979E-20	8.86E 02
						6.592E-07				
363.*	11/2	3	4.453E-05	-2.829E-06	-4.170E-05	1.739E-09	2.153E-36	2.252E-22		
		5	5.121E-04	-1.738E-04	-3.382E-04	1.144E-07	4.129E-37	2.841E-21		
		7	-1.654E-04	5.662E-05	1.088E-04	1.184E-08	3.878E-38	2.762E-23	3.094E-21	4.56E 03
						1.280E-07				
467.*	13/2	5	3.272E-04	9.521E-05	-4.224E-04	1.784E-07	6.339E-38	6.804E-22		
		7	-2.196E-04	-6.441E-05	2.840E-04	8.065E-08	5.919E-39	2.871E-23		
		9	2.414E-06	6.343E-06	-8.757E-06	7.668E-11	2.752E-40	1.269E-27	7.091E-22	2.25E 03
						2.592E-07				
507.*	15/2	5	1.322E-04	-3.366E-05	-9.855E-05	9.712E-09	3.029E-38	1.769E-23		
		7	-2.049E-04	5.259E-05	1.523E-04	2.320E-08	2.822E-39	3.937E-24		
		9	5.161E-06	-1.187E-05	6.706E-06	4.497E-11	1.308E-40	3.537E-28	2.163E-23	1.77E 04
						3.295E-08				
									2.443E-19	

* ESTIMATED WITH ROT. CONST.= 5.33 KEV, AND DEC. PARAM.= -0.500

U 233 5/2+633 - 3/2+651 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
291.	3/2	2	2.253E-04	0.	2.253E-04	5.076E-08	1.322E-35	4.035E-20		
		4	2.293E-05	4.849E-04	5.078E-04	2.578E-07	3.651E-36	5.663E-20	9.698E-20	1.89E 03
						3.086E-07				
317.	5/2	2	2.759E-04	0.	2.759E-04	7.614E-08	8.428E-36	3.860E-20		
		4	7.943E-05	-4.199E-04	-3.405E-04	1.159E-07	2.327E-36	1.622E-20	5.482E-20	3.04E 03
						1.921E-07				
353.*	7/2	2	2.057E-04	0.	2.057E-04	4.230E-08	4.459E-36	1.135E-20		
		4	1.383E-04	2.924E-04	4.307E-04	1.855E-07	1.230E-36	1.372E-20		
		6	-2.871E-05	1.058E-03	1.030E-03	1.060E-06	1.648E-37	1.051E-20	3.557E-20	4.54E 02
						1.288E-06				
400.*	9/2	2	9.198E-05	0.	9.198E-05	8.460E-09	1.945E-36	9.895E-22		
		4	1.546E-04	-1.634E-04	-8.856E-06	7.843E-11	5.355E-37	2.526E-24		
		6	-7.673E-05	-1.414E-03	-1.491E-03	2.224E-06	7.159E-38	9.575E-21	1.057E-20	2.62E 02
						2.232E-06				
457.*	11/2	4	1.162E-04	7.023E-05	1.865E-04	3.477E-08	1.904E-37	3.982E-22		
		6	-1.218E-04	1.283E-03	1.161E-03	1.349E-06	2.539E-38	2.059E-21		
		8	-4.424E-05	1.167E-03	1.123E-03	1.260E-06	1.670E-39	1.266E-22	2.584E-21	2.21E 02
						2.643E-06				
525.*	13/2	4	5.369E-05	-2.027E-05	3.342E-05	1.117E-09	5.463E-38	3.669E-24		
		6	-1.316E-04	-8.662E-04	-9.977E-04	9.955E-07	7.262E-39	4.348E-22		
		8	-1.103E-04	-1.819E-03	-1.929E-03	3.723E-06	4.755E-40	1.065E-22	5.449E-22	1.24E 02
						4.719E-06				
603.*	15/2	6	-9.798E-05	4.300E-04	3.321E-04	1.103E-07	1.651E-39	1.095E-23		
		8	-1.690E-04	1.857E-03	1.688E-03	2.851E-06	1.076E-40	1.844E-23	2.940E-23	1.97E 02
						2.961E-06				
									2.011E-19	

* ESTIMATED WITH ROT. CONST.= 5.20 KEV

U 233 5/2+633 - 1/2+631 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	2	-3.070E-04	0.	-3.070E-04	9.423E-08	NO STATE	0.	0.	6.20E 03
						9.423E-08				
0.*	3/2	2	-3.282E-04	0.	-3.282E-04	1.077E-07	NO STATE	0.		
		4	-3.130E-04	-2.249E-05	-3.355E-04	1.126E-07	NO STATE	0.	0.	2.65E 03
						2.203E-07				
0.*	5/2	2	-2.461E-04	0.	-2.461E-04	6.058E-08	NO STATE	0.		
		4	-6.640E-04	3.180E-05	-6.322E-04	3.997E-07	NO STATE	0.	0.	1.27E 03
						4.603E-07				
0.*	7/2	2	-1.340E-04	0.	-1.340E-04	1.795E-08	NO STATE	0.		
		4	-8.441E-04	-3.032E-05	-8.745E-04	7.647E-07	NO STATE	0.		
		6	-3.121E-04	-3.504E-05	-3.472E-04	1.205E-07	NO STATE	0.	0.	6.47E 02
						9.031E-07				
0.*	9/2	2	-4.737E-05	0.	-4.737E-05	2.244E-09	NO STATE	0.		
		4	-7.461E-04	2.144E-05	-7.247E-04	5.252E-07	NO STATE	0.		
		6	-6.595E-04	5.923E-05	-6.002E-04	3.603E-07	NO STATE	0.	0.	6.58E 02
						8.877E-07				
0.*	11/2	4	-4.646E-04	-1.113E-05	-4.757E-04	2.263E-07	NO STATE	0.		
		6	-8.669E-04	-6.489E-05	-9.318E-04	8.682E-07	NO STATE	0.		
		8	-1.347E-04	-2.363E-05	-1.583E-04	2.507E-08	NO STATE	0.	0.	5.22E 02
						1.120E-06				
0.*	13/2	4	-1.832E-04	3.761E-06	-1.795E-04	3.221E-08	NO STATE	0.		
		6	-7.995E-04	5.130E-05	-7.482E-04	5.599E-07	NO STATE	0.		
		8	-2.869E-04	4.314E-05	-2.438E-04	5.943E-08	NO STATE	0.	0.	8.97E 02
						6.515E-07				
0.*	15/2	6	-5.197E-04	-2.918E-05	-5.489E-04	3.013E-07	NO STATE	0.		
		8	-3.836E-04	-5.047E-05	-4.341E-04	1.884E-07	NO STATE	0.	0.	1.19E 03
						4.897E-07				
									0.	

* ESTIMATE NOT POSSIBLE

U 233   5/2+633 - 7/2-743   FGAP   I = 5/2   KI = 5/2   M = 1   KF = 7/2   Q ALPHA   4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	1	2.117E-04	0.	-2.117E-04	4.481E-08	NO STATE	0.		
		3	2.816E-04	0.	-2.816E-04	7.928E-08	NO STATE	0.		
		5	4.008E-05	0.	-4.008E-05	1.606E-09	NO STATE	0.	0.	4.65E 03
						1.257E-07				
0.*	9/2	3	4.245E-04	0.	-4.245E-04	1.802E-07	NO STATE	0.		
		5	1.315E-04	0.	-1.315E-04	1.730E-08	NO STATE	0.		
		7	-5.717E-06	-1.503E-04	1.560E-04	2.434E-08	NO STATE	0.	0.	2.63E 03
						2.218E-07				
0.*	11/2	3	3.119E-04	0.	-3.119E-04	9.729E-08	NO STATE	0.		
		5	2.310E-04	0.	-2.310E-04	5.338E-08	NO STATE	0.		
		7	-2.348E-05	1.372E-04	-1.137E-04	1.293E-08	NO STATE	0.	0.	3.57E 03
						1.636E-07				
0.*	13/2	5	2.495E-04	0.	-2.495E-04	6.227E-08	NO STATE	0.		
		7	-5.268E-05	-9.233E-05	1.450E-04	2.103E-08	NO STATE	0.		
		9	-2.439E-05	-2.440E-04	2.684E-04	7.201E-08	NO STATE	0.	0.	3.76E 03
						1.553E-07				
0.*	15/2	5	1.564E-04	0.	-1.564E-04	2.446E-08	NO STATE	0.		
		7	-7.626E-05	4.860E-05	2.766E-05	7.649E-10	NO STATE	0.		
		9	-8.089E-05	2.942E-04	-2.133E-04	4.551E-08	NO STATE	0.	0.	8.26E 03
						7.074E-08				
									0.	

* ESTIMATE NOT POSSIBLE

U 233   5/2+633 - 5/2+622 FGAP   I = 5/2   KI = 5/2   M = 0   KF = 5/2   Q ALPHA 4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	0	-1.651E-04	0.	-1.651E-04	2.725E-08	NO STATE	0.		
		2	-4.236E-05	0.	-4.236E-05	1.795E-09	NO STATE	0.		
		4	1.783E-05	0.	1.783E-05	3.178E-10	NO STATE	0.	0.	1.99E 04
						2.937E-08				
0.*	7/2	2	-4.892E-05	0.	-4.892E-05	2.393E-09	NO STATE	0.		
		4	4.807E-05	0.	4.807E-05	2.311E-09	NO STATE	0.		
		6	4.568E-06	1.516E-04	1.562E-04	2.440E-08	NO STATE	0.	0.	2.01E 04
						2.910E-08				
0.*	9/2	2	-2.894E-05	0.	-2.894E-05	8.375E-10	NO STATE	0.		
		4	7.110E-05	0.	7.110E-05	5.055E-09	NO STATE	0.		
		6	1.615E-05	-1.532E-04	-1.370E-04	1.878E-08	NO STATE	0.	0.	2.37E 04
						2.467E-08				
0.*	11/2	4	6.599E-05	0.	6.599E-05	4.355E-09	NO STATE	0.		
		6	3.165E-05	1.126E-04	1.442E-04	2.080E-08	NO STATE	0.		
		8	-4.302E-06	2.331E-04	2.288E-04	5.234E-08	NO STATE	0.	0.	7.54E 03
						7.749E-08				
0.*	13/2	4	3.615E-05	0.	3.615E-05	1.307E-09	NO STATE	0.		
		6	4.054E-05	-6.408E-05	-2.354E-05	5.541E-10	NO STATE	0.		
		8	-1.272E-05	-3.064E-04	-3.192E-04	1.019E-07	NO STATE	0.	0.	5.63E 03
						1.037E-07				
0.*	15/2	6	3.486E-05	2.755E-05	6.241E-05	3.895E-09	NO STATE	0.		
		8	-2.250E-05	2.710E-04	2.485E-04	6.174E-08	NO STATE	0.	0.	8.90E 03
						6.563E-08				
									0.	

* ESTIMATE NOT POSSIBLE

U 233   5/2+633 - 13/2+606 FGAP   I = 5/2   KI = 5/2   M = 4   KF = 13/2   Q ALPHA   4.936 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	13/2	4	-2.552E-05	0.	-2.552E-05	6.512E-10	NO STATE	0.		
		6	7.229E-05	0.	7.229E-05	5.226E-09	NO STATE	0.		
		8	8.206E-07	0.	8.206E-07	6.733E-13	NO STATE	0.	0.	9.94E 04
						5.878E-09				
0.*	15/2	6	1.645E-04	0.	1.645E-04	2.705E-08	NO STATE	0.		
		8	3.840E-06	0.	3.840E-06	1.474E-11	NO STATE	0.	0.	2.16E 04
						2.707E-08				
									0.	

* ESTIMATE NOT POSSIBLE

U 235 FAVORED 7/2-743 FGAP V I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 4.708 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
387.	7/2	0	2.027E-02	0.	-2.027E-02	4.109E-04	6.816E-38	1.685E-18		
		2	1.317E-02	0.	-1.317E-02	1.733E-04	3.906E-38	4.072E-19		
		4	2.445E-03	0.	-2.445E-03	5.976E-06	1.071E-38	3.851E-21		
		6	-5.327E-05	0.	5.327E-05	2.837E-09	1.423E-39	2.429E-25	2.096E-18	9.90E-01
						5.902E-04				
448.	9/2	2	1.255E-02	0.	-1.255E-02	1.576E-04	1.191E-38	1.129E-19		
		4	4.794E-03	0.	-4.794E-03	2.298E-05	3.261E-39	4.508E-21		
		6	-1.993E-04	0.	1.993E-04	3.972E-08	4.320E-40	1.032E-24		
		8	-4.482E-05	0.	4.482E-05	2.009E-09	2.815E-41	3.402E-27	1.174E-19	3.23E 00
						1.806E-04				
523.*	11/2	2	6.365E-03	0.	-6.365E-03	4.052E-05	2.691E-39	6.558E-21		
		4	5.649E-03	0.	-5.649E-03	3.191E-05	7.352E-40	1.411E-21		
		6	-4.228E-04	0.	4.228E-04	1.787E-07	9.706E-41	1.044E-24		
		8	-2.054E-04	0.	2.054E-04	4.219E-08	6.294E-42	1.597E-26	7.970E-21	8.04E 00
						7.265E-05				
611.*	13/2	4	4.394E-03	0.	-4.394E-03	1.931E-05	1.199E-40	1.392E-22		
		6	-6.066E-04	0.	6.066E-04	3.680E-07	1.576E-41	3.488E-25		
		8	-5.338E-04	0.	5.338E-04	2.850E-07	1.016E-42	1.742E-26	1.396E-22	2.93E 01
						1.996E-05				
712.*	15/2	4	2.082E-03	0.	-2.082E-03	4.334E-06	1.371E-41	3.574E-24		
		6	-6.209E-04	0.	6.209E-04	3.855E-07	1.794E-42	4.160E-26		
		8	-9.464E-04	0.	9.464E-04	8.956E-07	1.149E-43	6.189E-27	3.622E-24	1.04E 02
						5.615E-06				
									2.221E-18	

* ESTIMATED WITH ROT. CONST.= 6.78 KEV

U 235 7/2-743 - 5/2+633 FGAP V I = 7/2 KI = 7/2 M = -1 KF = 5/2 Q ALPHA 4.708 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	1	-6.377E-04	0.	-6.377E-04	4.066E-07	6.047E-35	1.479E-18		
		3	-8.481E-04	0.	-8.481E-04	7.193E-07	2.414E-35	1.044E-18		
		5	-1.207E-04	0.	-1.207E-04	1.457E-08	4.667E-36	4.091E-21	2.527E-18	5.12E 02
						1.141E-06				
42.	7/2	1	-3.471E-04	0.	-3.471E-04	1.205E-07	2.962E-35	2.147E-19		
		3	-1.253E-03	0.	-1.253E-03	1.569E-06	1.182E-35	1.115E-18		
		5	-3.668E-04	0.	-3.668E-04	1.345E-07	2.281E-36	1.845E-20		
		7	1.568E-05	-4.123E-04	-3.967E-04	1.573E-07	2.162E-37	2.046E-21	1.350E-18	2.95E 02
						1.982E-06				
97.	9/2	1	-1.227E-04	0.	-1.227E-04	1.506E-08	1.146E-35	1.038E-20		
		3	-1.172E-03	0.	-1.172E-03	1.373E-06	4.566E-36	3.772E-19		
		5	-6.484E-04	0.	-6.484E-04	4.204E-07	8.796E-37	2.224E-20		
		7	6.138E-05	4.610E-04	5.224E-04	2.729E-07	8.314E-38	1.365E-21	4.111E-19	2.81E 02
						2.082E-06				
163.*	11/2	3	-7.506E-04	0.	-7.506E-04	5.634E-07	1.426E-36	4.831E-20		
		5	-7.924E-04	0.	-7.924E-04	6.278E-07	2.739E-37	1.034E-20		
		7	1.384E-04	-3.897E-04	-2.514E-04	6.319E-08	2.580E-38	9.805E-23		
		9	5.966E-05	-5.967E-04	-5.371E-04	2.884E-07	1.213E-39	2.104E-23	5.877E-20	3.79E 02
						1.543E-06				
241.*	13/2	3	-3.009E-04	0.	-3.009E-04	9.055E-08	3.482E-37	1.896E-21		
		5	-7.031E-04	0.	-7.031E-04	4.944E-07	6.671E-38	1.984E-21		
		7	2.157E-04	2.701E-04	4.858E-04	2.360E-07	6.255E-39	8.878E-23		
		9	1.981E-04	8.806E-04	1.079E-03	1.164E-06	2.924E-40	2.046E-23	3.989E-21	2.94E 02
						1.984E-06				
331.*	15/2	5	-4.466E-04	0.	-4.466E-04	1.994E-07	1.246E-38	1.495E-22		
		7	2.482E-04	-1.553E-04	9.282E-05	8.616E-09	1.163E-39	6.026E-25		
		9	4.081E-04	-9.072E-04	-4.990E-04	2.490E-07	5.398E-41	8.086E-25	1.509E-22	1.28E 03
						4.571E-07				
									4.352E-18	

* ESTIMATED WITH ROT. CONST.= 6.00 KEV

U 235 7/2-743 - 5/2-752 FGAP V I = 7/2 KI = 7/2 M = -1 KF = 5/2 Q ALPHA 4.708 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
185.	5/2	2	-1.480E-03	0.	1.480E-03	2.191E-06	1.671E-36	2.202E-19		
		4	-6.401E-04	0.	6.401E-04	4.097E-07	4.611E-37	1.136E-20		
		6	-3.292E-05	1.527E-04	-1.198E-04	1.436E-08	6.184E-38	5.340E-23	2.316E-19	2.23E 02
						2.615E-06				
204.	7/2	2	-1.450E-03	0.	1.450E-03	2.103E-06	1.187E-36	1.501E-19		
		4	-1.349E-03	0.	1.349E-03	1.821E-06	3.273E-37	3.585E-20		
		6	-1.613E-04	-1.247E-04	2.860E-04	8.178E-08	4.385E-38	2.157E-22	1.862E-19	1.46E 02
						4.006E-06				
234.	9/2	2	-9.146E-04	0.	9.146E-04	8.365E-07	6.883E-37	3.463E-20		
		4	-1.751E-03	0.	1.751E-03	3.064E-06	1.896E-37	3.495E-20		
		6	-3.991E-04	8.819E-05	3.109E-04	9.666E-08	2.537E-38	1.475E-22		
		8	2.730E-05	1.791E-04	-2.065E-04	4.262E-08	1.676E-39	4.297E-24	6.973E-20	1.45E 02
						4.040E-06				
279.	11/2	2	-3.570E-04	0.	3.570E-04	1.275E-07	3.007E-37	2.305E-21		
		4	-1.588E-03	0.	1.588E-03	2.522E-06	8.274E-38	1.255E-20		
		6	-6.517E-04	-5.400E-05	7.057E-04	4.981E-07	1.105E-38	3.309E-22		
		8	9.632E-05	-2.370E-04	1.407E-04	1.979E-08	7.278E-40	8.662E-25	1.519E-20	1.84E 02
						3.167E-06				
337.	13/2	4	-1.015E-03	0.	1.015E-03	1.030E-06	2.787E-38	1.726E-21		
		6	-7.683E-04	2.830E-05	7.400E-04	5.476E-07	3.711E-39	1.222E-22		
		8	2.057E-04	2.249E-04	-4.306E-04	1.854E-07	2.436E-40	2.716E-24	1.851E-21	3.31E 02
						1.763E-06				
378.*	15/2	4	-4.100E-04	0.	4.100E-04	1.681E-07	1.281E-38	1.295E-22		
		6	-6.706E-04	-1.235E-05	6.830E-04	4.664E-07	1.703E-39	4.777E-23		
		8	3.109E-04	-1.700E-04	-1.409E-04	1.986E-08	1.115E-40	1.331E-25	1.775E-22	8.93E 02
						6.544E-07				
									5.048E-19	

* ESTIMATED WITH ROT. CONST.= 2.71 KEV

U 235 7/2-743 - 1/2-501 FGAP I = 7/2 KI = 7/2 M = -3 KF = 1/2 Q ALPHA 4.708 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	4	-1.341E-06	-2.910E-05	3.044E-05	9.265E-10	NO STATE	0.	0.	6.31E 05

						9.265E-10				
0.*	3/2	4	-3.173E-06	3.443E-05	-3.126E-05	9.769E-10	NO STATE	0.	0.	5.98E 05

						9.769E-10				
0.*	5/2	4	-4.305E-06	-3.114E-05	3.545E-05	1.256E-09	NO STATE	0.		
		6	-9.386E-06	-9.070E-05	1.001E-04	1.002E-08	NO STATE	0.	0.	5.18E 04

						1.127E-08				
0.*	7/2	4	-4.278E-06	2.321E-05	-1.893E-05	3.585E-10	NO STATE	0.		
		6	-2.168E-05	1.571E-04	-1.354E-04	1.834E-08	NO STATE	0.	0.	3.12E 04

						1.870E-08				
0.*	9/2	4	-3.317E-06	-1.440E-05	1.771E-05	3.137E-10	NO STATE	0.		
		6	-3.206E-05	-1.859E-04	2.179E-04	4.750E-08	NO STATE	0.		
		8	-9.341E-05	-2.829E-04	3.763E-04	1.416E-07	NO STATE	0.	0.	3.08E 03

						1.894E-07				
0.*	11/2	4	-2.018E-06	7.300E-06	-5.282E-06	2.789E-11	NO STATE	0.		
		6	-3.512E-05	1.697E-04	-1.346E-04	1.811E-08	NO STATE	0.		
		8	-2.210E-04	5.578E-04	-3.368E-04	1.134E-07	NO STATE	0.	0.	4.44E 03

						1.316E-07				
0.*	13/2	4	-9.287E-07	-2.879E-06	3.808E-06	1.450E-11	NO STATE	0.		
		6	-2.981E-05	-1.235E-04	1.533E-04	2.349E-08	NO STATE	0.		
		8	-3.399E-04	-7.351E-04	1.075E-03	1.156E-06	NO STATE	0.	0.	4.95E 02

						1.179E-06				
0.*	15/2	4	-2.837E-07	7.695E-07	-4.858E-07	2.360E-13	NO STATE	0.		
		6	-1.967E-05	7.128E-05	-5.161E-05	2.664E-09	NO STATE	0.		
		8	-3.884E-04	7.351E-04	-3.467E-04	1.202E-07	NO STATE	0.	0.	4.75E 03

						1.229E-07				

									0.	

* ESTIMATE NOT POSSIBLE

NP 233   5/2+642   FAVORED   FGAP   I = 5/2   KI = 5/2   M = 0   KF = 5/2   Q ALPHA   0.   MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	0	2.418E-02	0.	2.418E-02	5.846E-04	NO DATA	0.		
		2	1.359E-02	0.	1.359E-02	1.847E-04	NO DATA	0.		
		4	1.647E-03	0.	1.647E-03	2.712E-06	NO DATA	0.	0.	7.57E-01
						7.720E-04				
0.*	7/2	2	1.569E-02	0.	1.569E-02	2.462E-04	NO DATA	0.		
		4	4.441E-03	0.	4.441E-03	1.972E-05	NO DATA	0.		
		6	-1.077E-04	0.	-1.077E-04	1.160E-08	NO DATA	0.	0.	2.20E 00
						2.660E-04				
0.*	9/2	2	9.283E-03	0.	9.283E-03	8.618E-05	NO DATA	0.		
		4	6.568E-03	0.	6.568E-03	4.314E-05	NO DATA	0.		
		6	-3.808E-04	0.	-3.808E-04	1.450E-07	NO DATA	0.	0.	4.51E 00
						1.295E-04				
0.*	11/2	4	6.097E-03	0.	6.097E-03	3.717E-05	NO DATA	0.		
		6	-7.461E-04	0.	-7.461E-04	5.567E-07	NO DATA	0.		
		8	-2.211E-04	0.	-2.211E-04	4.888E-08	NO DATA	0.	0.	1.55E 01
						3.777E-05				
0.*	13/2	4	3.339E-03	0.	3.339E-03	1.115E-05	NO DATA	0.		
		6	-9.557E-04	0.	-9.557E-04	9.134E-07	NO DATA	0.		
		8	-6.540E-04	0.	-6.540E-04	4.277E-07	NO DATA	0.	0.	4.68E 01
						1.249E-05				
0.*	15/2	6	-8.218E-04	0.	-8.218E-04	6.754E-07	NO DATA	0.		
		8	-1.157E-03	0.	-1.157E-03	1.338E-06	NO DATA	0.	0.	2.90E 02
						2.013E-06				
									0.	

* ESTIMATE NOT POSSIBLE

NP 233 5/2+642 - 3/2+651 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	3/2	2	-1.973E-03	0.	-1.973E-03	3.891E-06	NO DATA	0.		
		4	-5.095E-04	-3.481E-04	-8.576E-04	7.355E-07	NO DATA	0.	0.	1.26E 02
						4.627E-06				
0.*	5/2	2	-2.416E-03	0.	-2.416E-03	5.837E-06	NO DATA	0.		
		4	-1.765E-03	3.014E-04	-1.464E-03	2.142E-06	NO DATA	0.	0.	7.32E 01
						7.979E-06				
0.*	7/2	2	-1.801E-03	0.	-1.801E-03	3.243E-06	NO DATA	0.		
		4	-3.073E-03	-2.099E-04	-3.282E-03	1.077E-05	NO DATA	0.		
		6	-5.617E-04	-6.271E-04	-1.189E-03	1.413E-06	NO DATA	0.	0.	3.79E 01
						1.543E-05				
0.*	9/2	2	-8.053E-04	0.	-8.053E-04	6.485E-07	NO DATA	0.		
		4	-3.435E-03	1.173E-04	-3.318E-03	1.101E-05	NO DATA	0.		
		6	-1.501E-03	8.380E-04	-6.631E-04	4.397E-07	NO DATA	0.	0.	4.83E 01
						1.210E-05				
0.*	11/2	4	-2.583E-03	-5.042E-05	-2.633E-03	6.935E-06	NO DATA	0.		
		6	-2.383E-03	-7.602E-04	-3.143E-03	9.879E-06	NO DATA	0.		
		8	-1.882E-04	-6.764E-04	-8.646E-04	7.475E-07	NO DATA	0.	0.	3.33E 01
						1.756E-05				
0.*	13/2	4	-1.193E-03	1.455E-05	-1.178E-03	1.389E-06	NO DATA	0.		
		6	-2.574E-03	5.132E-04	-2.061E-03	4.246E-06	NO DATA	0.		
		8	-4.695E-04	1.054E-03	5.849E-04	3.421E-07	NO DATA	0.	0.	9.77E 01
						5.977E-06				
0.*	15/2	6	-1.917E-03	-2.548E-04	-2.172E-03	4.716E-06	NO DATA	0.		
		8	-7.192E-04	-1.077E-03	-1.796E-03	3.225E-06	NO DATA	0.	0.	7.36E 01
						7.941E-06				
									0.	

* ESTIMATE NOT POSSIBLE

NP 233 5/2+642 - 1/2+400 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	2	1.517E-04	0.	1.517E-04	2.300E-08	NO DATA	0.	0.	2.54E 04
						2.300E-08				
0.*	3/2	2	1.621E-04	0.	1.621E-04	2.629E-08	NO DATA	0.		
		4	2.038E-04	4.793E-05	2.518E-04	6.339E-08	NO DATA	0.	0.	6.51E 03
						8.968E-08				
0.*	5/2	2	1.216E-04	0.	1.216E-04	1.479E-08	NO DATA	0.		
		4	4.324E-04	-6.778E-05	3.646E-04	1.330E-07	NO DATA	0.	0.	3.95E 03
						1.478E-07				
0.*	7/2	2	6.619E-05	0.	6.619E-05	4.381E-09	NO DATA	0.		
		4	5.497E-04	6.463E-05	6.144E-04	3.774E-07	NO DATA	0.		
		6	3.162E-04	9.721E-05	4.134E-04	1.709E-07	NO DATA	0.	0.	1.06E 03
						5.527E-07				
0.*	9/2	2	2.340E-05	0.	2.340E-05	5.477E-10	NO DATA	0.		
		4	4.859E-04	-4.570E-05	4.402E-04	1.938E-07	NO DATA	0.		
		6	6.681E-04	-1.643E-04	5.038E-04	2.538E-07	NO DATA	0.	0.	1.30E 03
						4.481E-07				
0.*	11/2	4	3.025E-04	2.371E-05	3.263E-04	1.064E-07	NO DATA	0.		
		6	8.782E-04	1.800E-04	1.058E-03	1.120E-06	NO DATA	0.		
		8	-1.231E-04	-2.146E-04	-3.377E-04	1.140E-07	NO DATA	0.	0.	4.36E 02
						1.340E-06				
0.*	13/2	4	1.193E-04	-8.016E-06	1.113E-04	1.239E-08	NO DATA	0.		
		6	8.100E-04	-1.423E-04	6.677E-04	4.458E-07	NO DATA	0.		
		8	-2.621E-04	3.919E-04	1.297E-04	1.683E-08	NO DATA	0.	0.	1.23E 03
						4.751E-07				
0.*	15/2	6	5.265E-04	8.094E-05	6.075E-04	3.690E-07	NO DATA	0.		
		8	-3.505E-04	-4.584E-04	-8.089E-04	6.543E-07	NO DATA	0.	0.	5.71E 02
						1.023E-06				
									0.	

* ESTIMATE NOT POSSIBLE

NP 235 FAVORED FGAP 5/2+642 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.220 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
84.	5/2	0	2.235E-02	0.	2.235E-02	4.997E-04	1.732E-32	5.204E-13		
		2	1.265E-02	0.	1.265E-02	1.600E-04	1.004E-32	9.665E-14		
		4	1.393E-03	0.	1.393E-03	1.940E-06	2.832E-33	3.304E-16	6.174E-13	8.83E-01
						6.616E-04				
102.	7/2	2	1.461E-02	0.	1.461E-02	2.134E-04	7.693E-33	9.872E-14		
		4	3.756E-03	0.	3.756E-03	1.411E-05	2.168E-33	1.840E-15		
		6	-1.352E-04	0.	-1.352E-04	1.828E-08	3.007E-34	3.305E-19	1.006E-13	2.57E 00
						2.275E-04				
125.*	9/2	2	8.642E-03	0.	8.642E-03	7.468E-05	5.449E-33	2.448E-14		
		4	5.556E-03	0.	5.556E-03	3.087E-05	1.535E-33	2.849E-15		
		6	-4.780E-04	0.	-4.780E-04	2.285E-07	2.126E-34	2.922E-18	2.733E-14	5.52E 00
						1.058E-04				
153.*	11/2	4	5.157E-03	0.	5.157E-03	2.659E-05	1.003E-33	1.604E-15		
		6	-9.367E-04	0.	-9.367E-04	8.774E-07	1.388E-34	7.322E-18		
		8	-2.099E-04	0.	-2.099E-04	4.405E-08	9.600E-36	2.544E-20	1.611E-15	2.12E 01
						2.751E-05				
186.*	13/2	4	2.824E-03	0.	2.824E-03	7.978E-06	6.037E-34	2.897E-16		
		6	-1.200E-03	0.	-1.200E-03	1.439E-06	8.340E-35	7.220E-18		
		8	-6.209E-04	0.	-6.209E-04	3.855E-07	5.758E-36	1.335E-19	2.970E-16	5.96E 01
						9.802E-06				
224.*	15/2	6	-1.032E-03	0.	-1.032E-03	1.064E-06	4.606E-35	2.949E-18		
		8	-1.098E-03	0.	-1.098E-03	1.206E-06	3.172E-36	2.300E-19	3.179E-18	2.57E 02
						2.270E-06				
									7.472E-13	

* ESTIMATED WITH ROT. CONST.= 2.54 KEV

NP 235 5/2+642 - 1/2-530 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 5.220 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
8.	1/2	3	-9.628E-04	-6.513E-05	1.028E-03	1.057E-06	1.809E-32	1.150E-15	1.150E-15	5.53E 02

						1.057E-06				
0.	3/2	3	-2.153E-03	7.282E-05	2.080E-03	4.327E-06	2.021E-32	5.259E-15	5.259E-15	1.35E 02

						4.327E-06				
76.	5/2	3	-2.637E-03	-5.945E-05	2.696E-03	7.270E-06	6.581E-33	2.878E-15		
		5	-1.665E-03	1.908E-04	1.474E-03	2.173E-06	1.300E-33	1.699E-16	3.048E-15	6.19E 01

						9.443E-06				
59.	7/2	3	-2.224E-03	3.760E-05	2.186E-03	4.778E-06	8.547E-33	2.456E-15		
		5	-3.510E-03	-3.017E-04	3.812E-03	1.453E-05	1.689E-33	1.476E-15	3.933E-15	3.03E 01

						1.931E-05				
196.*	9/2	3	-1.325E-03	-1.793E-05	1.343E-03	1.804E-06	1.074E-33	1.165E-16		
		5	-4.553E-03	3.131E-04	4.240E-03	1.798E-05	2.112E-34	2.284E-16		
		7	-1.462E-03	3.382E-04	1.123E-03	1.262E-06	2.057E-35	1.561E-18	3.464E-16	2.78E 01

						2.104E-05				
168.*	11/2	3	-5.028E-04	5.669E-06	4.972E-04	2.472E-07	1.649E-33	2.452E-17		
		5	-4.130E-03	-2.367E-04	4.367E-03	1.907E-05	3.247E-34	3.724E-16		
		7	-3.101E-03	-5.979E-04	3.699E-03	1.368E-05	3.166E-35	2.605E-17	4.229E-16	1.77E 01

						3.300E-05				
366.*	13/2	5	-2.639E-03	1.296E-04	2.510E-03	6.298E-06	1.412E-35	5.350E-18		
		7	-4.115E-03	6.802E-04	3.435E-03	1.180E-05	1.363E-36	9.670E-19		
		9	-6.563E-04	3.064E-04	3.499E-04	1.225E-07	6.611E-38	4.869E-22	6.318E-18	3.21E 01

						1.822E-05				
328.*	15/2	5	-1.066E-03	-4.583E-05	1.112E-03	1.237E-06	2.618E-35	1.948E-18		
		7	-3.840E-03	-5.554E-04	4.395E-03	1.932E-05	2.531E-36	2.941E-18		
		9	-1.403E-03	-5.732E-04	1.976E-03	3.906E-06	1.231E-37	2.893E-20	4.918E-18	2.39E 01

						2.446E-05				

									1.417E-14	

* ESTIMATED WITH ROT. CONST.= 6.34 KEV, AND DEC. PARAM.= -1.399

NP 235 5/2+642 - 3/2+651 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 5.220 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
238.	3/2	2	-1.837E-03	0.	-1.837E-03	3.375E-06	9.565E-34	1.941E-16		
		4	-4.716E-04	-3.250E-04	-7.967E-04	6.347E-07	2.685E-34	1.025E-17	2.044E-16	1.46E 02
						4.009E-06				
0.*	5/2	2	-2.250E-03	0.	-2.250E-03	5.062E-06	NO STATE	0.		
		4	-1.634E-03	2.815E-04	-1.352E-03	1.829E-06	NO STATE	0.	0.	8.48E 01
						6.891E-06				
0.*	7/2	2	-1.677E-03	0.	-1.677E-03	2.812E-06	NO STATE	0.		
		4	-2.844E-03	-1.960E-04	-3.040E-03	9.242E-06	NO STATE	0.		
		6	-5.117E-04	-6.041E-04	-1.116E-03	1.245E-06	NO STATE	0.	0.	4.39E 01
						1.330E-05				
0.*	9/2	2	-7.500E-04	0.	-7.500E-04	5.624E-07	NO STATE	0.		
		4	-3.180E-03	1.096E-04	-3.070E-03	9.427E-06	NO STATE	0.		
		6	-1.368E-03	8.072E-04	-5.605E-04	3.141E-07	NO STATE	0.	0.	5.67E 01
						1.030E-05				
0.*	11/2	4	-2.391E-03	-4.708E-05	-2.438E-03	5.944E-06	NO STATE	0.		
		6	-2.171E-03	-7.322E-04	-2.903E-03	8.429E-06	NO STATE	0.		
		8	-1.607E-04	-6.489E-04	-8.096E-04	6.555E-07	NO STATE	0.	0.	3.89E 01
						1.503E-05				
0.*	13/2	4	-1.104E-03	1.359E-05	-1.091E-03	1.190E-06	NO STATE	0.		
		6	-2.345E-03	4.943E-04	-1.851E-03	3.425E-06	NO STATE	0.		
		8	-4.009E-04	1.012E-03	6.108E-04	3.730E-07	NO STATE	0.	0.	1.17E 02
						4.988E-06				
0.*	15/2	6	-1.746E-03	-2.454E-04	-1.992E-03	3.968E-06	NO STATE	0.		
		8	-6.140E-04	-1.033E-03	-1.647E-03	2.713E-06	NO STATE	0.	0.	8.75E 01
						6.680E-06				
									2.044E-16	

* ESTIMATE NOT POSSIBLE

NP 235 5/2+642 - 1/2+400 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 5.220 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	2	1.458E-04	0.	1.458E-04	2.125E-08	NO STATE	0.	0.	2.75E 04
						2.125E-08				
0.*	3/2	2	1.558E-04	0.	1.558E-04	2.429E-08	NO STATE	0.		
		4	1.997E-04	5.296E-05	2.526E-04	6.382E-08	NO STATE	0.	0.	6.63E 03
						8.811F-08				
0.*	5/2	2	1.169E-04	0.	1.169E-04	1.366E-08	NO STATE	0.		
		4	4.236E-04	-7.490E-05	3.487E-04	1.216E-07	NO STATE	0.	0.	4.32E 03
						1.352E-07				
0.*	7/2	2	6.362E-05	0.	6.362E-05	4.048E-09	NO STATE	0.		
		4	5.385E-04	7.141E-05	6.099E-04	3.719E-07	NO STATE	0.		
		6	2.943E-04	8.949E-05	3.838E-04	1.473E-07	NO STATE	0.	0.	1.12E 03
						5.233E-07				
0.*	9/2	2	2.249E-05	0.	2.249E-05	5.060E-10	NO STATE	0.		
		4	4.759E-04	-5.050E-05	4.254E-04	1.810E-07	NO STATE	0.		
		6	6.217E-04	-1.513E-04	4.705E-04	2.213E-07	NO STATE	0.	0.	1.45E 03
						4.028E-07				
0.*	11/2	4	2.963E-04	2.620E-05	3.225E-04	1.040E-07	NO STATE	0.		
		6	8.173E-04	1.657E-04	9.830E-04	9.663E-07	NO STATE	0.		
		8	-1.113E-04	-1.951E-04	-3.064E-04	9.389E-08	NO STATE	0.	0.	5.02E 02
						1.164E-06				
0.*	13/2	4	1.169E-04	-8.858E-06	1.080E-04	1.167E-08	NO STATE	0.		
		6	7.538E-04	-1.310E-04	6.228E-04	3.879E-07	NO STATE	0.		
		8	-2.371E-04	3.562E-04	1.192E-04	1.420E-08	NO STATE	0.	0.	1.41E 03
						4.138E-07				
0.*	15/2	6	4.900E-04	7.451E-05	5.645E-04	3.187E-07	NO STATE	0.		
		8	-3.169E-04	-4.167E-04	-7.337E-04	5.383E-07	NO STATE	0.	0.	6.82E 02
						8.570E-07				
									0.	

* ESTIMATE NOT POSSIBLE

NP 235 5/2+642 - 5/2-523 FGAP I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.220 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	1	-3.602E-04	0.	3.602E-04	1.298E-07	NO STATE	0.		
		3	-1.774E-04	0.	1.774E-04	3.146E-08	NO STATE	0.		
		5	2.247E-06	-4.571E-05	4.346E-05	1.889E-09	NO STATE	0.	0.	3.58E 03

						1.631E-07				
0.*	7/2	1	-2.278E-04	0.	2.278E-04	5.191E-08	NO STATE	0.		
		3	-3.173E-04	0.	3.173E-04	1.007E-07	NO STATE	0.		
		5	1.005E-05	3.407E-05	-4.412E-05	1.946E-09	NO STATE	0.	0.	3.78E 03

						1.545E-07				
0.*	9/2	3	-3.164E-04	0.	3.164E-04	1.001E-07	NO STATE	0.		
		5	2.182E-05	-2.113E-05	-6.878E-07	4.731E-13	NO STATE	0.		
		7	5.514E-05	-3.937E-04	3.385E-04	1.146E-07	NO STATE	0.	0.	2.72E 03

						2.147E-07				
0.*	11/2	3	-1.790E-04	0.	1.790E-04	3.204E-08	NO STATE	0.		
		5	2.950E-05	1.071E-05	-4.021E-05	1.617E-09	NO STATE	0.		
		7	1.744E-04	4.668E-04	-6.412E-04	4.111E-07	NO STATE	0.	0.	1.31E 03

						4.448E-07				
0.*	13/2	5	2.618E-05	-4.226E-06	-2.195E-05	4.819E-10	NO STATE	0.		
		7	3.214E-04	-3.824E-04	6.104E-05	3.726E-09	NO STATE	0.		
		9	5.747E-05	-5.859E-04	5.284E-04	2.792E-07	NO STATE	0.	0.	2.06E 03

						2.834E-07				
0.*	15/2	5	1.399E-05	1.129E-06	-1.512E-05	2.287E-10	NO STATE	0.		
		7	3.967E-04	2.360E-04	-6.327E-04	4.003E-07	NO STATE	0.		
		9	1.626E-04	8.286E-04	-9.911E-04	9.823E-07	NO STATE	0.	0.	4.22E 02

						1.383E-06				

									0.	

* ESTIMATE NOT POSSIBLE

NP 237 FAVORED FGAP V 5/2+642 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 4.986 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
86.	5/2	0	2.128E-02	0.	2.128E-02	4.527E-04	4.921E-34	1.340E-14		
		2	1.220E-02	0.	1.220E-02	1.489E-04	2.849E-34	2.552E-15		
		4	1.143E-03	0.	1.143E-03	1.307E-06	7.997E-35	6.288E-18	1.596E-14	9.69E-01
						6.030E-04				
109.	7/2	2	1.409E-02	0.	1.409E-02	1.986E-04	1.976E-34	2.360E-15		
		4	3.083E-03	0.	3.083E-03	9.508E-06	5.543E-35	3.170E-17		
		6	-1.607E-04	0.	-1.607E-04	2.583E-08	7.630E-36	1.186E-20	2.392E-15	2.81E 00
						2.081E-04				
142.	9/2	2	8.337E-03	0.	8.337E-03	6.951E-05	1.156E-34	4.831E-16		
		4	4.561E-03	0.	4.561E-03	2.080E-05	3.239E-35	4.051E-17		
		6	-5.683E-04	0.	-5.683E-04	3.229E-07	4.451E-36	8.646E-20	5.237E-16	6.45E 00
						9.063E-05				
178.*	11/2	4	4.233E-03	0.	4.233E-03	1.792E-05	1.800E-35	1.940E-17		
		6	-1.114E-03	0.	-1.114E-03	1.240E-06	2.470E-36	1.842E-19		
		8	-1.876E-04	0.	-1.876E-04	3.520E-08	1.689E-37	3.577E-22	1.959E-17	3.04E 01
						1.919E-05				
220.*	13/2	4	2.319E-03	0.	2.319E-03	5.376E-06	8.916E-36	2.883E-18		
		6	-1.426E-03	0.	-1.426E-03	2.034E-06	1.221E-36	1.494E-19		
		8	-5.550E-04	0.	-5.550E-04	3.080E-07	8.327E-38	1.543E-21	3.033E-18	7.57E 01
						7.718E-06				
268.*	15/2	6	-1.227E-03	0.	-1.227E-03	1.504E-06	5.351E-37	4.842E-20		
		8	-9.815E-04	0.	-9.815E-04	9.634E-07	3.638E-38	2.108E-21	5.053E-20	2.37E 02
						2.468E-06				
									1.890E-14	

* ESTIMATED WITH ROT. CONST.= 3.24 KEV

NP 237 5/2+642 - 1/2-530 FGAP V I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 4.986 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
6.	1/2	3	-9.449E-04	-5.371E-05	9.986E-04	9.972E-07	5.904E-34	3.541E-17	3.541E-17	5.86E 02
						9.972E-07				
0.	3/2	3	-2.113E-03	6.005E-05	2.053E-03	4.214E-06	6.486E-34	1.644E-16	1.644E-16	1.39E 02
						4.214E-06				
69.	5/2	3	-2.588E-03	-4.903E-05	2.637E-03	6.952E-06	2.179E-34	9.110E-17		
		5	-1.618E-03	1.801E-04	1.438E-03	2.069E-06	4.280E-35	5.325E-18	9.642E-17	6.48E 01
						9.021E-06				
57.	7/2	3	-2.182E-03	3.101E-05	2.151E-03	4.627E-06	2.638E-34	7.343E-17		
		5	-3.412E-03	-2.847E-04	3.697E-03	1.367E-05	5.185E-35	4.262E-17	1.160E-16	3.19E 01
						1.829E-05				
181.*	9/2	3	-1.300E-03	-1.478E-05	1.315E-03	1.730E-06	3.512E-35	3.653E-18		
		5	-4.426E-03	2.955E-04	4.131E-03	1.706E-05	6.869E-36	7.049E-18		
		7	-1.379E-03	3.285E-04	1.050E-03	1.103E-06	6.638E-37	4.404E-20	1.075E-17	2.94E 01
						1.989E-05				
159.*	11/2	3	-4.935E-04	4.675E-06	4.888E-04	2.389E-07	5.049E-35	7.254E-19		
		5	-4.015E-03	-2.234E-04	4.238E-03	1.796E-05	9.884E-36	1.068E-17		
		7	-2.925E-03	-5.807E-04	3.506E-03	1.229E-05	9.562E-37	7.068E-19	1.211E-17	1.92E 01
						3.049E-05				
339.*	13/2	5	-2.566E-03	1.223E-04	2.443E-03	5.969E-06	4.711E-37	1.691E-19		
		7	-3.882E-03	6.605E-04	3.221E-03	1.038E-05	4.513E-38	2.817E-20		
		9	-5.804E-04	2.958E-04	2.845E-04	8.096E-08	2.168E-39	1.056E-23	1.973E-19	3.56E 01
						1.643E-05				
309.*	15/2	5	-1.037E-03	-4.326E-05	1.080E-03	1.166E-06	7.935E-37	5.566E-20		
		7	-3.622E-03	-5.393E-04	4.162E-03	1.732E-05	7.614E-38	7.932E-20		
		9	-1.241E-03	-5.534E-04	1.794E-03	3.219E-06	3.666E-39	7.099E-22	1.357E-19	2.69E 01
						2.171E-05				
									4.355E-16	

* ESTIMATED WITH ROT. CONST.= 5.90 KEV, AND DEC. PARAM.= -1.339

NP 237 5/2+642 - 1/2+400 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 4.986 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
182.	1/2	2	1.432E-04	0.	1.432E-04	2.051E-08	5.986E-35	7.384E-20	7.384E-20	2.85E 04
						2.051E-08				
217.	3/2	2	1.531E-04	0.	1.531E-04	2.344E-08	3.343E-35	4.713E-20		
		4	2.053E-04	6.620E-05	2.715E-04	7.373E-08	9.349E-36	4.146E-20	8.858E-20	6.01E 03
						9.717E-08				
212.	5/2	2	1.148E-04	0.	1.148E-04	1.319E-08	3.634E-35	2.882E-20		
		4	4.356E-04	-9.362E-05	3.419E-04	1.169E-07	1.017E-35	7.149E-20	1.003E-19	4.49E 03
						1.301E-07				
294.*	7/2	2	6.251E-05	0.	6.251E-05	3.907E-09	9.116E-36	2.142E-21		
		4	5.537E-04	8.926E-05	6.430E-04	4.134E-07	2.544E-36	6.325E-20		
		6	2.821E-04	8.435E-05	3.664E-04	1.343E-07	3.472E-37	2.804E-21	6.820E-20	1.06E 03
						5.516E-07				
285.*	9/2	2	2.210E-05	0.	2.210E-05	4.884E-10	1.064E-35	3.124E-22		
		4	4.894E-04	-6.312E-05	4.263E-04	1.817E-07	2.969E-36	3.245E-20		
		6	5.960E-04	-1.426E-04	4.534E-04	2.056E-07	4.054E-37	5.012E-21	3.778E-20	1.51E 03
						3.878E-07				
413.*	11/2	4	3.047E-04	3.275E-05	3.375E-04	1.139E-07	3.139E-37	2.151E-21		
		6	7.834E-04	1.562E-04	9.396E-04	8.829E-07	4.261E-38	2.263E-21		
		8	-1.026E-04	-1.808E-04	-2.834E-04	8.033E-08	2.870E-39	1.387E-23	4.427E-21	5.42E 02
						1.077E-06				
400.*	13/2	4	1.202E-04	-1.107E-05	1.091E-04	1.191E-08	3.959E-37	2.835E-22		
		6	7.226E-04	-1.235E-04	5.991E-04	3.590E-07	5.377E-38	1.161E-21		
		8	-2.185E-04	3.302E-04	1.117E-04	1.247E-08	3.625E-39	2.719E-24	1.447E-21	1.52E 03
						3.833E-07				
575.*	15/2	6	4.697E-04	7.023E-05	5.400E-04	2.915E-07	2.153E-39	3.774E-23		
		8	-2.921E-04	-3.862E-04	-6.783E-04	4.601E-07	1.435E-40	3.971E-24	4.172E-23	7.77E 02
						7.517E-07				
									3.746E-19	

* ESTIMATED WITH ROT. CONST.= 5.33 KEV, AND DEC. PARAM.= 1.187

NP 237 5/2+642 - 3/2+651 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 4.986 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
105.	3/2	2	-1.758E-03	0.	-1.758E-03	3.091E-06	2.108E-34	3.919E-17		
		4	-4.477E-04	-3.139E-04	-7.615E-04	5.799E-07	5.914E-35	2.063E-18	4.126E-17	1.59E 02
						3.671E-06				
0.*	5/2	2	-2.153E-03	0.	-2.153E-03	4.637E-06	NO STATE	0.		
		4	-1.551E-03	2.718E-04	-1.279E-03	1.636E-06	NO STATE	0.	0.	9.31E 01
						6.273E-06				
0.*	7/2	2	-1.605E-03	0.	-1.605E-03	2.576E-06	NO STATE	0.		
		4	-2.699E-03	-1.893E-04	-2.889E-03	8.345E-06	NO STATE	0.		
		6	-4.760E-04	-6.100E-04	-1.086E-03	1.179E-06	NO STATE	0.	0.	4.83E 01
						1.210E-05				
0.*	9/2	2	-7.178E-04	0.	-7.178E-04	5.152E-07	NO STATE	0.		
		4	-3.018E-03	1.058E-04	-2.912E-03	8.482E-06	NO STATE	0.		
		6	-1.272E-03	8.151E-04	-4.570E-04	2.088E-07	NO STATE	0.	0.	6.35E 01
						9.206E-06				
0.*	11/2	4	-2.269E-03	-4.546E-05	-2.315E-03	5.359E-06	NO STATE	0.		
		6	-2.019E-03	-7.394E-04	-2.759E-03	7.611E-06	NO STATE	0.		
		8	-1.370E-04	-6.477E-04	-7.848E-04	6.159E-07	NO STATE	0.	0.	4.30E 01
						1.358E-05				
0.*	13/2	4	-1.048E-03	1.312E-05	-1.035E-03	1.071E-06	NO STATE	0.		
		6	-2.181E-03	4.991E-04	-1.682E-03	2.829E-06	NO STATE	0.		
		8	-3.418E-04	1.010E-03	6.680E-04	4.462E-07	NO STATE	0.	0.	1.34E 02
						4.347E-06				
0.*	15/2	6	-1.624E-03	-2.478E-04	-1.872E-03	3.505E-06	NO STATE	0.		
		8	-5.236E-04	-1.031E-03	-1.555E-03	2.417E-06	NO STATE	0.	0.	9.86E 01
						5.922E-06				
									4.126E-17	

* ESTIMATE NOT POSSIBLE

NP 237 5/2+642 - 5/2-523 FGAP   I = 5/2   KI = 5/2   M = 0   KF = 5/2   Q ALPHA 4.986 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	1	-3.370E-04	0.	3.370E-04	1.135E-07	NO STATE	0.		
		3	-1.708E-04	0.	1.708E-04	2.916E-08	NO STATE	0.		
		5	2.164E-06	-5.337E-05	5.121E-05	2.622E-09	NO STATE	0.	0.	4.02E 03
						1.453E-07				
0.*	7/2	1	-2.131E-04	0.	2.131E-04	4.541E-08	NO STATE	0.		
		3	-3.055E-04	0.	3.055E-04	9.331E-08	NO STATE	0.		
		5	9.678E-06	3.978E-05	-4.946E-05	2.446E-09	NO STATE	0.	0.	4.14E 03
						1.412E-07				
0.*	9/2	3	-3.046E-04	0.	3.046E-04	9.278E-08	NO STATE	0.		
		5	2.101E-05	-2.467E-05	3.663E-06	1.342E-11	NO STATE	0.		
		7	5.437E-05	-3.976E-04	3.432E-04	1.178E-07	NO STATE	0.	0.	2.77E 03
						2.106E-07				
0.*	11/2	3	-1.723E-04	0.	1.723E-04	2.969E-08	NO STATE	0.		
		5	2.841E-05	1.251E-05	-4.092E-05	1.674E-09	NO STATE	0.		
		7	1.719E-04	4.715E-04	-6.434E-04	4.140E-07	NO STATE	0.	0.	1.31E 03
						4.454E-07				
0.*	13/2	5	2.521E-05	-4.934E-06	-2.027E-05	4.111E-10	NO STATE	0.		
		7	3.169E-04	-3.862E-04	6.931E-05	4.804E-09	NO STATE	0.		
		9	5.511E-05	-5.926E-04	5.375E-04	2.889E-07	NO STATE	0.	0.	1.99E 03
						2.941E-07				
0.*	15/2	5	1.347E-05	1.319E-06	-1.479E-05	2.188E-10	NO STATE	0.		
		7	3.912E-04	2.384E-04	-6.296E-04	3.964E-07	NO STATE	0.		
		9	1.559E-04	8.381E-04	-9.939E-04	9.879E-07	NO STATE	0.	0.	4.22E 02
						1.385E-06				
									0.	

* ESTIMATE NOT POSSIBLE

PU 239 FAVORED FGAP 1/2+631 I = 1/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	1/2	0	1.447E-02	0.	1.447E-02	2.093E-04	4.288E-32	5.396E-13	5.396E-13	2.79E 00
						2.093E-04				
13.	3/2	2	7.911E-03	0.	7.911E-03	6.258E-05	2.069E-32	7.790E-14	7.790E-14	9.33E 00
						6.258E-05				
52.	5/2	2	9.689E-03	0.	9.689E-03	9.388E-05	1.175E-32	6.632E-14	6.632E-14	6.22E 00
						9.388E-05				
82.	7/2	4	1.504E-03	0.	1.504E-03	2.263E-06	2.145E-33	2.920E-16	2.920E-16	2.58E 02
						2.263E-06				
150.	9/2	4	1.682E-03	0.	1.682E-03	2.829E-06	7.642E-34	1.300E-16	1.300E-16	2.07E 02
						2.829E-06				
197.	11/2	6	-2.299E-03	0.	-2.299E-03	5.286E-06	5.252E-35	1.670E-17	1.670E-17	1.11E 02
						5.286E-06				
298.*	13/2	6	-2.483E-03	0.	-2.483E-03	6.167E-06	1.084E-35	4.019E-18	4.019E-18	9.47E 01
						6.167E-06				
363.*	15/2	8	-1.156E-03	0.	-1.156E-03	1.335E-06	2.651E-37	2.129E-20	2.129E-20	4.38E 02
						1.335E-06				
									6.843E-13	

* ESTIMATED WITH ROT. CONST.= 6.03 KEV, AND DEC. PARAM.= -0.282

PU 239 1/2+631 - 7/2-743 FGAP V I = 1/2 KI = 1/2 M = 3 KF = 7/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	3	-2.733E-04	0.	2.733E-04	7.467E-08	1.461E-32	6.562E-17	6.562E-17	7.82E 03
						7.467E-08				
46.	9/2	5	-7.510E-04	1.508E-03	2.259E-03	5.105E-06	1.489E-33	4.573E-16	4.573E-16	1.14E 02
						5.105E-06				
103.	11/2	5	-1.593E-03	-7.110E-04	8.822E-04	7.782E-07	6.407E-34	2.999E-17	2.999E-17	7.51E 02
						7.782E-07				
170.*	13/2	7	-1.581E-03	3.232E-03	4.813E-03	2.316E-05	2.314E-35	3.223E-17	3.223E-17	2.52E 01
						2.316E-05				
247.*	15/2	7	-2.622E-03	-1.949E-03	6.734E-04	4.534E-07	6.992E-36	1.907E-19	1.907E-19	1.29E 03
						4.534E-07				
									5.853E-16	

* ESTIMATED WITH ROT. CONST.= 5.13 KEV

PU 239 1/2+631 - 5/2+622 FGAP   I = 1/2   KI = 1/2   M = 2   KF = 5/2   Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
129.	5/2	2	1.841E-04	0.	1.841E-04	3.389E-08	3.693E-33	7.528E-18	7.528E-18	1.72E 04
						3.389E-08				
171.	7/2	4	1.312E-04	-7.436E-04	-6.124E-04	3.750E-07	5.549E-34	1.252E-17	1.252E-17	1.56E 03
						3.750E-07				
225.	9/2	4	2.455E-04	3.975E-04	6.429E-04	4.134E-07	2.417E-34	6.009E-18	6.009E-18	1.41E 03
						4.134E-07				
291.*	11/2	6	5.719E-05	-1.233E-03	-1.176E-03	1.383E-06	1.197E-35	9.956E-19	9.956E-19	4.22E 02
						1.383E-06				
369.*	13/2	6	8.579E-05	8.222E-04	9.080E-04	8.244E-07	3.408E-36	1.690E-19	1.690E-19	7.09E 02
						8.244E-07				
459.*	15/2	8	-4.251E-05	-7.753E-04	-8.178E-04	6.688E-07	5.330E-38	2.144E-21	2.144E-21	8.74E 02
						6.688E-07				
									2.722E-17	

* ESTIMATED WITH ROT. CONST.= 6.00 KEV

PU 239 1/2+631 - 5/2+633 FGAP I = 1/2 KI = 1/2 M = 2 KF = 5/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
333.	5/2	2	-1.782E-03	0.	-1.782E-03	3.174E-06	1.560E-34	2.979E-17	2.979E-17	1.84E 02
						3.174E-06				
368.	7/2	4	-2.254E-03	1.684E-04	-2.086E-03	4.351E-06	2.522E-35	6.601E-18	6.601E-18	1.34E 02
						4.351E-06				
415.	9/2	4	-4.218E-03	-9.002E-05	-4.308E-03	1.856E-05	1.169E-35	1.304E-17	1.304E-17	3.15E 01
						1.856E-05				
469.*	11/2	6	-2.643E-03	3.165E-04	-2.326E-03	5.411E-06	6.554E-37	2.133E-19	2.133E-19	1.08E 02
						5.411E-06				
533.*	13/2	6	-3.964E-03	-2.110E-04	-4.175E-03	1.743E-05	2.199E-37	2.305E-19	2.305E-19	3.35E 01
						1.743E-05				
607.*	15/2	8	-1.096E-03	2.275E-04	-8.685E-04	7.543E-07	4.159E-39	1.887E-22	1.887E-22	7.74E 02
						7.543E-07				
									4.988E-17	

* ESTIMATED WITH ROT. CONST.= 4.94 KEV

PU 239 1/2+631 - 3/2+631 FGAP I = 1/2 KI = 1/2 M = 1 KF = 3/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
393.	3/2	2	1.105E-04	-1.846E-03	-1.735E-03	3.012E-06	5.856E-35	1.061E-17	1.061E-17	1.94E 02
						3.012E-06				
427.	5/2	2	2.210E-04	9.229E-04	1.144E-03	1.309E-06	3.382E-35	2.662E-18	2.662E-18	4.46E 02
						1.309E-06				
474.	7/2	4	3.226E-05	-4.536E-03	-4.503E-03	2.028E-05	4.327E-36	5.278E-18	5.278E-18	2.88E 01
						2.028E-05				
533.	9/2	4	4.562E-05	3.207E-03	3.253E-03	1.058E-05	1.585E-36	1.009E-18	1.009E-18	5.52E 01
						1.058E-05				
607.*	11/2	6	-1.820E-04	-4.316E-03	-4.498E-03	2.024E-05	6.104E-38	7.428E-20	7.428E-20	2.89E 01
						2.024E-05				
694.*	13/2	6	-2.302E-04	3.412E-03	3.182E-03	1.013E-05	1.296E-38	7.894E-21	7.894E-21	5.77E 01
						1.013E-05				
794.*	15/2	8	-1.976E-04	-1.569E-03	-1.766E-03	3.120E-06	1.389E-40	2.607E-23	2.607E-23	1.87E 02
						3.120E-06				
									1.964E-17	

* ESTIMATED WITH ROT. CONST.= 6.68 KEV

PU 239 1/2+631 - 1/2-501 FGAP I = 1/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	1	-5.356E-04	-9.261E-05	6.282E-04	3.946E-07	NO STATE	0.	0.	1.48E 03
						3.946E-07				
0.*	3/2	1	-7.574E-04	6.549E-05	6.919E-04	4.788E-07	NO STATE	0.	0.	1.22E 03
						4.788E-07				
0.*	5/2	3	-2.533E-04	-1.887E-04	4.420E-04	1.953E-07	NO STATE	0.	0.	2.99E 03
						1.953E-07				
0.*	7/2	3	-2.925E-04	1.634E-04	1.291E-04	1.666E-08	NO STATE	0.	0.	3.51E 04
						1.666E-08				
0.*	9/2	5	8.015E-04	1.733E-04	-9.748E-04	9.502E-07	NO STATE	0.	0.	6.15E 02
						9.502E-07				
0.*	11/2	5	8.780E-04	-1.582E-04	-7.198E-04	5.180E-07	NO STATE	0.	0.	1.13E 03
						5.180E-07				
0.*	13/2	7	-1.589E-04	-2.597E-05	1.849E-04	3.418E-08	NO STATE	0.	0.	1.71E 04
						3.418E-08				
0.*	15/2	7	-1.699E-04	2.429E-05	1.456E-04	2.120E-08	NO STATE	0.	0.	2.76E 04
						2.120E-08				
									0.	

* ESTIMATE NOT POSSIBLE

PU 239 1/2+631 - 7/2+624 FGAP I = 1/2 KI = 1/2 M = 3 KF = 7/2 Q ALPHA 5.272 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	4	-1.608E-04	-5.075E-05	-2.115E-04	4.473E-08	NO STATE	0.	0.	1.31E 04
						4.473E-08				
0.*	9/2	4	-4.547E-04	1.794E-05	-4.367E-04	1.907E-07	NO STATE	0.	0.	3.06E 03
						1.907E-07				
0.*	11/2	6	-4.048E-04	-3.967E-05	-4.445E-04	1.975E-07	NO STATE	0.	0.	2.96E 03
						1.975E-07				
0.*	13/2	6	-7.390E-04	2.173E-05	-7.173E-04	5.145E-07	NO STATE	0.	0.	1.14E 03
						5.145E-07				
0.*	15/2	8	-3.023E-04	-1.641E-06	-3.039E-04	9.237E-08	NO STATE	0.	0.	6.32E 03
						9.237E-08				
									0.	

* ESTIMATE NOT POSSIBLE

PU 241 FAVORED FGAP 5/2+622 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.174 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
158.	5/2	0	1.781E-02	0.	1.781E-02	3.171E-04	9.851E-34	1.879E-14		
		2	1.092E-02	0.	1.092E-02	1.193E-04	5.731E-34	4.112E-15		
		4	7.788E-04	0.	7.788E-04	6.066E-07	1.628E-34	5.939E-18	2.291E-14	1.34E 00
						4.371E-04				
202.	7/2	2	1.261E-02	0.	1.261E-02	1.591E-04	2.863E-34	2.739E-15		
		4	2.100E-03	0.	2.100E-03	4.412E-06	8.123E-35	2.155E-17		
		6	-2.976E-04	0.	-2.976E-04	8.860E-08	1.138E-35	6.062E-20	2.761E-15	3.57E 00
						1.636E-04				
258.	9/2	2	7.461E-03	0.	7.461E-03	5.567E-05	1.167E-34	3.909E-16		
		4	3.106E-03	0.	3.106E-03	9.650E-06	3.307E-35	1.919E-17		
		6	-1.052E-03	0.	-1.052E-03	1.107E-06	4.620E-36	3.077E-19	4.104E-16	8.79E 00
						6.643E-05				
325.	11/2	4	2.883E-03	0.	2.883E-03	8.314E-06	1.105E-35	5.526E-18		
		6	-2.062E-03	0.	-2.062E-03	4.253E-06	1.539E-36	3.936E-19		
		8	-3.341E-04	0.	-3.341E-04	1.116E-07	1.073E-37	7.205E-22	5.920E-18	4.61E 01
						1.268E-05				
407.*	13/2	4	1.579E-03	0.	1.579E-03	2.494E-06	2.812E-36	4.218E-19		
		6	-2.641E-03	0.	-2.641E-03	6.977E-06	3.901E-37	1.637E-19		
		8	-9.882E-04	0.	-9.882E-04	9.765E-07	2.707E-38	1.590E-21	5.871E-19	5.59E 01
						1.045E-05				
501.*	15/2	6	-2.271E-03	0.	-2.271E-03	5.159E-06	7.651E-38	2.374E-20		
		8	-1.748E-03	0.	-1.748E-03	3.054E-06	5.277E-39	9.694E-22	2.471E-20	7.11E 01
						8.214E-06				
									2.609E-14	

* ESTIMATED WITH ROT. CONST.= 6.29 KEV

PU 241   5/2+622 - 1/2+631   FGAP   I = 5/2   KI = 5/2   M = -2   KF = 1/2   Q ALPHA   5.174 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	1/2	2	3.169E-04	0.	3.169E-04	1.004E-07	6.423E-33	3.881E-17	3.881E-17	5.82E 03
						1.004E-07				
11.	3/2	2	3.388E-04	0.	3.388E-04	1.148E-07	5.473E-33	3.779E-17		
		4	1.811E-04	1.026E-03	1.208E-03	1.458E-06	1.561E-33	1.369E-16	1.747E-16	3.71E 02
						1.573E-06				
57.	5/2	2	2.541E-04	0.	2.541E-04	6.457E-08	2.722E-33	1.057E-17		
		4	3.842E-04	-1.452E-03	-1.067E-03	1.139E-06	7.754E-34	5.314E-17	6.371E-17	4.85E 02
						1.204E-06				
82.	7/2	2	1.383E-04	0.	1.383E-04	1.913E-08	1.859E-33	2.140E-18		
		4	4.884E-04	1.384E-03	1.873E-03	3.506E-06	5.293E-34	1.116E-16		
		6	6.413E-05	1.383E-03	1.447E-03	2.094E-06	7.453E-35	9.387E-18	1.231E-16	1.04E 02
						5.620E-06				
165.*	9/2	2	4.890E-05	0.	4.890E-05	2.392E-09	5.108E-34	7.348E-20		
		4	4.317E-04	-9.787E-04	-5.470E-04	2.992E-07	1.451E-34	2.610E-18		
		6	1.355E-04	-2.338E-03	-2.202E-03	4.849E-06	2.035E-35	5.935E-18	8.619E-18	1.13E 02
						5.151E-06				
205.*	11/2	4	2.688E-04	5.078E-04	7.766E-04	6.032E-07	7.797E-35	2.828E-18		
		6	1.781E-04	2.561E-03	2.739E-03	7.501E-06	1.092E-35	4.926E-18		
		8	-4.306E-05	7.853E-04	7.423E-04	5.509E-07	7.673E-37	2.543E-20	7.780E-18	6.75E 01
						8.655E-06				
325.*	13/2	4	1.060E-04	-1.717E-04	-6.565E-05	4.310E-09	1.106E-35	2.867E-21		
		6	1.643E-04	-2.024E-03	-1.860E-03	3.460E-06	1.540E-36	3.205E-19		
		8	-9.171E-05	-1.434E-03	-1.525E-03	2.327E-06	1.074E-37	1.504E-20	3.384E-19	1.01E 02
						5.792E-06				
378.*	15/2	6	1.068E-04	1.151E-03	1.258E-03	1.583E-06	6.297E-37	5.996E-20		
		8	-1.226E-04	1.677E-03	1.555E-03	2.417E-06	4.377E-38	6.362E-21	6.632E-20	1.46E 02
						4.000E-06				
									4.172E-16	

* ESTIMATED WITH ROT. CONST.= 6.41 KEV, AND DEC. PARAM.= -0.444

AM 239 FAVORED FGAP V 5/2-523 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.967 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
48.	5/2	0	1.723E-02	0.	1.723E-02	2.967E-04	7.099E-29	1.267E-09		
		2	1.000E-02	0.	1.000E-02	1.000E-04	4.178E-29	2.513E-10		
		4	5.821E-04	0.	5.821E-04	3.389E-07	1.219E-29	2.485E-13	1.518E-09	1.47E 00
						3.971E-04				
0.*	7/2	2	1.155E-02	0.	1.155E-02	1.333E-04	NO STATE	0.		
		4	1.570E-03	0.	1.570E-03	2.464E-06	NO STATE	0.		
		6	-3.570E-04	0.	-3.570E-04	1.275E-07	NO STATE	0.	0.	4.30E 00
						1.359E-04				
0.*	9/2	2	6.832E-03	0.	6.832E-03	4.667E-05	NO STATE	0.		
		4	2.322E-03	0.	2.322E-03	5.391E-06	NO STATE	0.		
		6	-1.262E-03	0.	-1.262E-03	1.593E-06	NO STATE	0.	0.	1.09E 01
						5.365E-05				
0.*	11/2	4	2.155E-03	0.	2.155E-03	4.645E-06	NO STATE	0.		
		6	-2.474E-03	0.	-2.474E-03	6.119E-06	NO STATE	0.		
		8	-3.893E-04	0.	-3.893E-04	1.516E-07	NO STATE	0.	0.	5.35E 01
						1.091E-05				
0.*	13/2	4	1.180E-03	0.	1.180E-03	1.393E-06	NO STATE	0.		
		6	-3.168E-03	0.	-3.168E-03	1.004E-05	NO STATE	0.		
		8	-1.152E-03	0.	-1.152E-03	1.326E-06	NO STATE	0.	0.	4.58E 01
						1.276E-05				
0.*	15/2	6	-2.725E-03	0.	-2.725E-03	7.423E-06	NO STATE	0.		
		8	-2.037E-03	0.	-2.037E-03	4.149E-06	NO STATE	0.	0.	5.05E 01
						1.157E-05				
									1.518E-09	

* ESTIMATE NOT POSSIBLE

AM 239 5/2-523 - 5/2+642 FGAP I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.967 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	1	-6.961E-04	0.	6.961E-04	4.845E-07	1.067E-28	3.110E-12		
		3	-3.528E-04	0.	3.528E-04	1.244E-07	4.421E-29	3.309E-13		
		5	4.470E-06	1.102E-04	1.058E-04	1.119E-08	9.139E-30	6.151E-15	3.447E-12	9.42E 02
						6.201E-07				
0.*	7/2	1	-4.402E-04	0.	4.402E-04	1.938E-07	NO STATE	0.		
		3	-6.310E-04	0.	6.310E-04	3.982E-07	NO STATE	0.		
		5	1.999E-05	-8.218E-05	-1.022E-04	1.044E-08	NO STATE	0.	0.	9.70E 02
						6.024E-07				
0.*	9/2	3	-6.292E-04	0.	6.292E-04	3.959E-07	NO STATE	0.		
		5	4.340E-05	5.096E-05	7.567E-06	5.726E-11	NO STATE	0.		
		7	1.123E-04	8.213E-04	7.090E-04	5.027E-07	NO STATE	0.	0.	6.50E 02
						8.987E-07				
0.*	11/2	3	-3.559E-04	0.	3.559E-04	1.267E-07	NO STATE	0.		
		5	5.868E-05	-2.584E-05	-8.452E-05	7.144E-09	NO STATE	0.		
		7	3.552E-04	-9.740E-04	-1.329E-03	1.767E-06	NO STATE	0.	0.	3.07E 02
						1.901E-06				
0.*	13/2	5	5.208E-05	1.019E-05	-4.188E-05	1.754E-09	NO STATE	0.		
		7	6.547E-04	7.979E-04	1.432E-04	2.050E-08	NO STATE	0.		
		9	1.138E-04	1.224E-03	1.110E-03	1.233E-06	NO STATE	0.	0.	4.65E 02
						1.255E-06				
0.*	15/2	5	2.784E-05	-2.724E-06	-3.056E-05	9.339E-10	NO STATE	0.		
		7	8.081E-04	-4.924E-04	-1.301E-03	1.692E-06	NO STATE	0.		
		9	3.220E-04	-1.731E-03	-2.053E-03	4.216E-06	NO STATE	0.	0.	9.89E 01
						5.908E-06				
									3.447E-12	

* ESTIMATE NOT POSSIBLE

AM 241 FAVORED FGAP V 5/2-523 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
60.	5/2	0	1.700E-02	0.	1.700E-02	2.891E-04	1.552E-30	2.699E-11		
		2	9.862E-03	0.	9.862E-03	9.726E-05	9.109E-31	5.328E-12		
		4	5.084E-04	0.	5.084E-04	2.585E-07	2.641E-31	4.106E-15	3.232E-11	1.51E 00

						3.867E-04				
103.	7/2	2	1.139E-02	0.	1.139E-02	1.297E-04	5.091E-31	3.971E-12		
		4	1.371E-03	0.	1.371E-03	1.880E-06	1.474E-31	1.667E-14		
		6	-3.488E-04	0.	-3.488E-04	1.217E-07	2.133E-32	1.561E-16	3.988E-12	4.44E 00

						1.317E-04				
159.	9/2	2	6.737E-03	0.	6.737E-03	4.539E-05	2.396E-31	6.540E-13		
		4	2.028E-03	0.	2.028E-03	4.112E-06	6.928E-32	1.713E-14		
		6	-1.233E-03	0.	-1.233E-03	1.521E-06	9.998E-33	9.146E-16	6.721E-13	1.15E 01

						5.102E-05				
225.	11/2	4	1.882E-03	0.	1.882E-03	3.542E-06	2.755E-32	5.870E-15		
		6	-2.417E-03	0.	-2.417E-03	5.840E-06	3.965E-33	1.393E-15		
		8	-3.549E-04	0.	-3.549E-04	1.260E-07	2.892E-34	2.191E-18	7.265E-15	6.14E 01

						9.508E-06				
305.	13/2	4	1.031E-03	0.	1.031E-03	1.063E-06	8.931E-33	5.709E-16		
		6	-3.095E-03	0.	-3.095E-03	9.581E-06	1.281E-33	7.379E-16		
		8	-1.050E-03	0.	-1.050E-03	1.102E-06	9.293E-35	6.160E-18	1.315E-15	4.97E 01

						1.175E-05				
394.	15/2	6	-2.662E-03	0.	-2.662E-03	7.085E-06	3.489E-34	1.487E-16		
		8	-1.857E-03	0.	-1.857E-03	3.447E-06	2.518E-35	5.221E-18	1.539E-16	5.55E 01

						1.053E-05				

									3.699E-11	

* ESTIMATED WITH ROT. CONST.= 0. KEV

AM 241 5/2-523 - 5/2+642 FGAP V I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	1	-6.642E-04	0.	6.642E-04	4.412E-07	2.852E-30	7.567E-14		
		3	-3.500E-04	0.	3.500E-04	1.225E-07	1.177E-30	8.668E-15		
		5	3.868E-06	1.158E-04	1.119E-04	1.252E-08	2.413E-31	1.817E-16	8.452E-14	1.01E 03
						5.762E-07				
33.	7/2	1	-4.201E-04	0.	4.201E-04	1.765E-07	1.843E-30	1.956E-14		
		3	-6.261E-04	0.	6.261E-04	3.920E-07	7.598E-31	1.791E-14		
		5	1.730E-05	-8.629E-05	-1.036E-04	1.073E-08	1.556E-31	1.004E-16	3.757E-14	1.01E 03
						5.792E-07				
76.	9/2	3	-6.243E-04	0.	6.243E-04	3.897E-07	4.305E-31	1.009E-14		
		5	3.755E-05	5.351E-05	1.596E-05	2.547E-10	8.804E-32	1.349E-18		
		7	1.121E-04	8.263E-04	7.142E-04	5.100E-07	9.071E-33	2.782E-16	1.037E-14	6.49E 02
						9.000E-07				
127.	11/2	3	-3.532E-04	0.	3.532E-04	1.247E-07	2.161E-31	1.621E-15		
		5	5.078E-05	-2.714E-05	-7.791E-05	6.071E-09	4.412E-32	1.611E-17		
		7	3.546E-04	-9.799E-04	-1.334E-03	1.781E-06	4.534E-33	4.856E-16	2.123E-15	3.06E 02
						1.912E-06				
189.*	13/2	5	4.506E-05	1.070E-05	-3.436E-05	1.181E-09	1.892E-32	1.343E-18		
		7	6.536E-04	8.027E-04	1.490E-04	2.221E-08	1.938E-33	2.589E-18		
		9	1.121E-04	1.232E-03	1.120E-03	1.255E-06	1.016E-34	7.668E-18	1.160E-17	4.57E 02
						1.278E-06				
260.*	15/2	5	2.409E-05	-2.860E-06	-2.695E-05	7.261E-10	6.992E-33	3.054E-19		
		7	8.068E-04	-4.954E-04	-1.302E-03	1.696E-06	7.133E-34	7.276E-17		
		9	3.172E-04	-1.743E-03	-2.060E-03	4.244E-06	3.721E-35	9.498E-18	8.256E-17	9.83E 01
						5.940E-06				
									1.347E-13	

* ESTIMATED WITH ROT. CONST.= 4.74 KEV

AM 241 5/2-523 - 1/2+400 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
332.	1/2	3	-1.568E-05	1.690E-04	1.847E-04	3.412E-08	1.224E-32	2.511E-17	2.511E-17	1.71E 04
						3.412E-08				
371.	3/2	3	-3.506E-05	-1.890E-04	-1.539E-04	2.369E-08	7.008E-33	9.984E-18	9.984E-18	2.47E 04
						2.369E-08				
369.	5/2	3	-4.295E-05	1.543E-04	1.972E-04	3.890E-08	7.246E-33	1.696E-17		
		5	-4.501E-05	5.152E-04	5.602E-04	3.138E-07	1.466E-33	2.768E-17	4.463E-17	1.66E 03
						3.527E-07				
463.	7/2	3	-3.621E-05	-9.759E-05	-6.137E-05	3.766E-09	1.801E-33	4.079E-19		
		5	-9.490E-05	-8.146E-04	-7.197E-04	5.179E-07	3.631E-34	1.131E-17	1.172E-17	1.12E 03
						5.217E-07				
456.	9/2	3	-2.158E-05	4.652E-05	6.810E-05	4.638E-09	1.999E-33	5.577E-19		
		5	-1.231E-04	8.453E-04	9.684E-04	9.378E-07	4.032E-34	2.274E-17		
		7	4.264E-06	5.423E-05	4.997E-05	2.497E-09	4.071E-35	6.113E-21	2.331E-17	6.18E 02
						9.449E-07				
597.*	11/2	3	-8.189E-06	-1.471E-05	-6.522E-06	4.254E-11	2.324E-34	5.947E-22		
		5	-1.117E-04	-6.390E-04	-5.273E-04	2.781E-07	4.664E-35	7.801E-19		
		7	9.044E-06	-9.587E-05	-1.049E-04	1.101E-08	4.674E-36	3.094E-21	7.838E-19	2.02E 03
						2.891E-07				
591.*	13/2	5	-7.136E-05	3.500E-04	4.213E-04	1.775E-07	5.120E-35	5.467E-19		
		7	1.200E-05	1.091E-04	9.705E-05	9.419E-09	5.132E-36	2.907E-21		
		9	7.339E-06	-2.324E-05	-3.058E-05	9.349E-10	2.614E-37	1.470E-23	5.497E-19	3.11E 03
						1.879E-07				
784.*	15/2	5	-2.883E-05	-1.237E-04	-9.491E-05	9.007E-09	2.332E-36	1.264E-21		
		7	1.120E-05	-8.904E-05	-1.002E-04	1.005E-08	2.314E-37	1.399E-22		
		9	1.569E-05	4.347E-05	2.778E-05	7.719E-10	1.163E-38	5.397E-25	1.404E-21	2.95E 04
						1.983E-08				
									1.161E-16	

* ESTIMATED WITH ROT. CONST.= 6.19 KEV, AND DEC. PARAM.= 1.074

AM 241 5/2-523 - 1/2-530 FGAP V I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
280.	1/2	2	-6.984E-05	0.	-6.984E-05	4.878E-09	4.388E-32	1.287E-17	1.287E-17	1.20E 05
						4.878E-09				
267.	3/2	2	-7.466E-05	0.	-7.466E-05	5.574E-09	5.273E-32	1.768E-17		
		4	7.223E-05	-6.887E-04	7.609E-04	5.790E-07	1.520E-32	5.293E-16	5.470E-16	9.99E 02
						5.845E-07				
357.	5/2	2	-5.600E-05	0.	-5.600E-05	3.136E-09	1.464E-32	2.762E-18		
		4	1.532E-04	9.739E-04	-8.207E-04	6.735E-07	4.211E-33	1.706E-16	1.733E-16	8.63E 02
						6.767E-07				
327.	7/2	2	-3.048E-05	0.	-3.048E-05	9.291E-10	2.257E-32	1.261E-18		
		4	1.948E-04	-9.286E-04	1.123E-03	1.262E-06	6.496E-33	4.930E-16		
		6	2.785E-04	-1.102E-03	1.380E-03	1.905E-06	9.304E-34	1.066E-16	6.009E-16	1.84E 02
						3.168E-06				
485.	9/2	2	-1.078E-05	0.	-1.078E-05	1.161E-10	2.213E-33	1.546E-20		
		4	1.722E-04	6.566E-04	-4.844E-04	2.347E-07	6.342E-34	8.951E-18		
		6	5.885E-04	1.862E-03	-1.274E-03	1.623E-06	9.020E-35	8.803E-18	1.777E-17	3.15E 02
						1.857E-06				
438.	11/2	4	1.072E-04	-3.407E-04	4.479E-04	2.006E-07	1.281E-33	1.546E-17		
		6	7.735E-04	-2.040E-03	2.814E-03	7.916E-06	1.826E-34	8.696E-17		
		8	2.981E-04	-8.424E-04	1.141E-03	1.301E-06	1.315E-35	1.029E-18	1.035E-16	6.20E 01
						9.418E-06				
671.*	13/2	4	4.228E-05	1.152E-04	-7.289E-05	5.314E-09	3.552E-35	1.135E-20		
		6	7.135E-04	1.613E-03	-8.993E-04	8.088E-07	5.011E-36	2.437E-19		
		8	6.350E-04	1.538E-03	-9.031E-04	8.156E-07	3.554E-37	1.744E-20	2.725E-19	3.58E 02
						1.630E-06				
606.*	15/2	6	4.638E-04	-9.173E-04	1.381E-03	1.908E-06	1.402E-35	1.608E-18		
		8	8.489E-04	-1.799E-03	2.648E-03	7.013E-06	9.985E-37	4.211E-19	2.030E-18	6.55E 01
						8.920E-06				
									1.458E-15	

* ESTIMATED WITH ROT. CONST.= 6.79 KEV, AND DEC. PARAM.= -1.638

AM 241 5/2-523 - 3/2-521 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
438.	3/2	2	-1.661E-04	0.	-1.661E-04	2.760E-08	4.467E-33	7.415E-18		
		4	-3.461E-05	-2.269E-04	1.923E-04	3.698E-08	1.281E-33	2.850E-18	1.027E-17	9.05E 03
						6.458E-08				
485.	5/2	2	-2.035E-04	0.	-2.035E-04	4.141E-08	2.213E-33	5.512E-18		
		4	-1.199E-04	1.965E-04	-3.164E-04	1.001E-07	6.342E-34	3.819E-18	9.331E-18	4.13E 03
						1.415E-07				
549.	7/2	2	-1.517E-04	0.	-1.517E-04	2.300E-08	8.374E-34	1.159E-18		
		4	-2.087E-04	-1.368E-04	-7.188E-05	5.167E-09	2.395E-34	7.443E-20		
		6	-8.045E-06	-4.397E-04	4.316E-04	1.863E-07	3.397E-35	3.806E-19	1.614E-18	2.72E 03
						2.145E-07				
634.*	9/2	2	-6.783E-05	0.	-6.783E-05	4.601E-09	2.251E-34	6.228E-20		
		4	-2.333E-04	7.649E-05	-3.098E-04	9.600E-08	6.422E-35	3.708E-19		
		6	-2.150E-05	5.876E-04	-6.091E-04	3.709E-07	9.074E-36	2.024E-19	6.355E-19	1.24E 03
						4.715E-07				
737.*	11/2	4	-1.755E-04	-3.287E-05	-1.426E-04	2.033E-08	1.226E-35	1.500E-20		
		6	-3.413E-05	-5.330E-04	4.988E-04	2.488E-07	1.725E-36	2.581E-20		
		8	3.367E-05	-3.807E-04	4.143E-04	1.717E-07	1.218E-37	1.258E-21	4.207E-20	1.33E 03
						4.408E-07				
859.*	13/2	4	-8.104E-05	9.487E-06	-9.053E-05	8.195E-09	1.616E-36	7.963E-22		
		6	-3.687E-05	3.598E-04	-3.967E-04	1.573E-07	2.260E-37	2.139E-21		
		8	8.398E-05	5.935E-04	-5.095E-04	2.596E-07	1.584E-38	2.474E-22	3.182E-21	1.37E 03
						4.251E-07				
1000.*	15/2	6	-2.745E-05	-1.786E-04	1.512E-04	2.286E-08	1.959E-38	2.693E-23		
		8	1.286E-04	-6.060E-04	7.346E-04	5.396E-07	1.361E-39	4.418E-23	7.111E-23	1.04E 03
						5.625E-07				
									2.189E-17	

* ESTIMATED WITH ROT. CONST.= 9.40 KEV

AM 241   5/2-523 - 3/2+651   FGAP   I = 5/2   KI = 5/2   M = -1   KF = 3/2   Q ALPHA   5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
357.	3/2	1	-1.397E-04	0.	1.397E-04	1.952E-08	2.093E-32	2.458E-17		
		3	-3.932E-05	0.	3.932E-05	1.546E-09	8.576E-33	7.974E-19	2.538E-17	2.77E 04
						2.107E-08				
0.*	5/2	1	-9.147E-05	0.	9.147E-05	8.367E-09	NO STATE	0.		
		3	-7.864E-05	0.	7.864E-05	6.184E-09	NO STATE	0.		
		5	8.983E-05	1.676E-06	-8.815E-05	7.771E-09	NO STATE	0.	0.	2.62E 04
						2.232E-08				
0.*	7/2	1	-3.734E-05	0.	3.734E-05	1.395E-09	NO STATE	0.		
		3	-9.081E-05	0.	9.081E-05	8.246E-09	NO STATE	0.		
		5	2.593E-04	-1.935E-06	-2.612E-04	6.825E-08	NO STATE	0.	0.	7.50E 03
						7.789E-08				
0.*	9/2	3	-6.845E-05	0.	6.845E-05	4.685E-09	NO STATE	0.		
		5	4.255E-04	1.587E-06	-4.239E-04	1.797E-07	NO STATE	0.		
		7	1.730E-04	3.599E-04	1.870E-04	3.495E-08	NO STATE	0.	0.	2.66E 03
						2.193E-07				
0.*	11/2	3	-3.137E-05	0.	3.137E-05	9.839E-10	NO STATE	0.		
		5	4.661E-04	-9.936E-07	-4.671E-04	2.182E-07	NO STATE	0.		
		7	4.431E-04	-5.269E-04	-9.701E-04	9.410E-07	NO STATE	0.	0.	5.04E 02
						1.160E-06				
0.*	13/2	5	3.488E-04	4.647E-07	-3.483E-04	1.213E-07	NO STATE	0.		
		7	6.888E-04	5.118E-04	-1.769E-04	3.130E-08	NO STATE	0.		
		9	7.431E-05	6.367E-04	5.624E-04	3.163E-07	NO STATE	0.	0.	1.25E 03
						4.690E-07				
0.*	15/2	5	1.615E-04	-1.434E-07	-1.616E-04	2.612E-08	NO STATE	0.		
		7	7.363E-04	-3.648E-04	-1.101E-03	1.212E-06	NO STATE	0.		
		9	1.820E-04	-1.040E-03	-1.222E-03	1.493E-06	NO STATE	0.	0.	2.14E 02
						2.731E-06				
									2.538E-17	

* ESTIMATE NOT POSSIBLE

AM 241 5/2-523 - 7/2+633 FGAP I = 5/2 KI = 5/2 M = 1 KF = 7/2 Q ALPHA 5.672 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
770.	7/2	1	-7.893E-05	0.	7.893E-05	6.230E-09	3.613E-35	1.354E-20		
		3	-1.087E-04	0.	1.087E-04	1.182E-08	1.468E-35	1.044E-20		
		5	-1.437E-05	0.	1.437E-05	2.066E-10	2.928E-36	3.638E-23	2.401E-20	3.20E 04
						1.826E-08				
0.*	9/2	3	-1.639E-04	0.	1.639E-04	2.687E-08	NO STATE	0.		
		5	-4.717E-05	0.	4.717E-05	2.225E-09	NO STATE	0.		
		7	5.170E-06	1.547E-04	1.495E-04	2.236E-08	NO STATE	0.	0.	1.14E 04
						5.145E-08				
0.*	11/2	3	-1.205E-04	0.	1.205E-04	1.451E-08	NO STATE	0.		
		5	-8.285E-05	0.	8.285E-05	6.864E-09	NO STATE	0.		
		7	2.124E-05	-1.412E-04	-1.625E-04	2.639E-08	NO STATE	0.	0.	1.22E 04
						4.777E-08				
0.*	13/2	5	-8.949E-05	0.	8.949E-05	8.008E-09	NO STATE	0.		
		7	4.765E-05	9.504E-05	4.740E-05	2.246E-09	NO STATE	0.		
		9	1.370E-05	2.534E-04	2.397E-04	5.745E-08	NO STATE	0.	0.	8.63E 03
						6.770E-08				
0.*	15/2	5	-5.609E-05	0.	5.609E-05	3.146E-09	NO STATE	0.		
		7	6.897E-05	-5.003E-05	-1.190E-04	1.416E-08	NO STATE	0.		
		9	4.543E-05	-3.056E-04	-3.510E-04	1.232E-07	NO STATE	0.	0.	4.16E 03
						1.405E-07				
									2.401E-20	

* ESTIMATE NOT POSSIBLE

AM 243 FAVORED FGAP 5/2-523 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 5.472 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
74.	5/2	0	1.476E-02	0.	1.476E-02	2.180E-04	8.938E-32	1.172E-12		
		2	8.164E-03	0.	8.164E-03	6.665E-05	5.238E-32	2.100E-13		
		4	3.290E-04	0.	3.290E-04	1.082E-07	1.513E-32	9.848E-17	1.382E-12	2.05E 00
						2.847E-04				
117.	7/2	2	9.427E-03	0.	9.427E-03	8.886E-05	2.841E-32	1.518E-13		
		4	8.872E-04	0.	8.872E-04	7.870E-07	8.196E-33	3.880E-16		
		6	-2.737E-04	0.	-2.737E-04	7.494E-08	1.179E-33	5.312E-18	1.522E-13	6.51E 00
						8.972E-05				
173.	9/2	2	5.577E-03	0.	5.577E-03	3.110E-05	1.266E-32	2.368E-14		
		4	1.312E-03	0.	1.312E-03	1.722E-06	3.646E-33	3.776E-16		
		6	-9.678E-04	0.	-9.678E-04	9.367E-07	5.230E-34	2.947E-17	2.408E-14	1.73E 01
						3.376E-05				
241.*	11/2	4	1.218E-03	0.	1.218E-03	1.483E-06	1.348E-33	1.203E-16		
		6	-1.897E-03	0.	-1.897E-03	3.597E-06	1.928E-34	4.171E-17		
		8	-2.268E-04	0.	-2.268E-04	5.144E-08	1.394E-35	4.312E-20	1.620E-16	1.14E 02
						5.132E-06				
320.*	13/2	4	6.671E-04	0.	6.671E-04	4.450E-07	4.053E-34	1.085E-17		
		6	-2.429E-03	0.	-2.429E-03	5.901E-06	5.775E-35	2.050E-17		
		8	-6.709E-04	0.	-6.709E-04	4.501E-07	4.155E-36	1.125E-19	3.146E-17	8.60E 01
						6.796E-06				
413.*	15/2	6	-2.089E-03	0.	-2.089E-03	4.364E-06	1.386E-35	3.639E-18		
		8	-1.186E-03	0.	-1.186E-03	1.408E-06	9.916E-37	8.396E-20	3.722E-18	1.01E 02
						5.772E-06				
									1.558E-12	

* ESTIMATED WITH ROT. CONST.= 6.14 KEV

AM 243   5/2-523 - 5/2+642 FGAP V   I = 5/2   KI = 5/2   M = 0   KF = 5/2   Q ALPHA   5.472 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	1	-5.050E-04	0.	5.050E-04	2.550E-07	2.105E-31	3.229E-15		
		3	-3.023E-04	0.	3.023E-04	9.136E-08	8.665E-32	4.761E-16		
		5	1.955E-06	9.662E-05	9.467E-05	8.962E-09	1.769E-32	9.537E-18	3.715E-15	1.64E 03
						3.554E-07				
31.	7/2	1	-3.194E-04	0.	3.194E-04	1.020E-07	1.368E-31	8.395E-16		
		3	-5.407E-04	0.	5.407E-04	2.923E-07	5.628E-32	9.896E-16		
		5	8.742E-06	-7.202E-05	-8.076E-05	6.522E-09	1.148E-32	4.503E-18	1.834E-15	1.46E 03
						4.009E-07				
71.*	9/2	3	-5.392E-04	0.	5.392E-04	2.907E-07	3.213E-32	5.618E-16		
		5	1.898E-05	4.466E-05	2.569E-05	6.599E-10	6.544E-33	2.598E-19		
		7	9.745E-05	7.244E-04	6.270E-04	3.931E-07	6.700E-34	1.584E-17	5.779E-16	8.54E 02
						6.845E-07				
120.*	11/2	3	-3.050E-04	0.	3.050E-04	9.302E-08	1.606E-32	8.983E-17		
		5	2.566E-05	-2.265E-05	-4.831E-05	2.334E-09	3.264E-33	4.582E-19		
		7	3.081E-04	-8.591E-04	-1.167E-03	1.362E-06	3.334E-34	2.732E-17	1.176E-16	4.01E 02
						1.458E-06				
177.*	13/2	5	2.277E-05	8.933E-06	-1.384E-05	1.915E-10	1.417E-33	1.632E-20		
		7	5.680E-04	7.037E-04	1.358E-04	1.843E-08	1.442E-34	1.599E-19		
		9	9.475E-05	1.084E-03	9.892E-04	9.786E-07	7.502E-36	4.415E-19	6.178E-19	5.86E 02
						9.972E-07				
244.*	15/2	5	1.217E-05	-2.387E-06	-1.456E-05	2.120E-10	5.315E-34	6.775E-21		
		7	7.011E-04	-4.343E-04	-1.135E-03	1.289E-06	5.391E-35	4.180E-18		
		9	2.680E-04	-1.533E-03	-1.801E-03	3.244E-06	2.791E-36	5.444E-19	4.732E-18	1.29E 02
						4.533E-06				
									6.249E-15	

* ESTIMATED WITH ROT. CONST.= 4.43 KEV

CM 241 FAVORED FGAP 1/2+631 I = 1/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 6.219 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
145.	1/2	0	1.286E-02	0.	1.286E-02	1.654E-04	1.586E-28	1.579E-09	1.579E-09	3.53E 00
						1.654E-04				
156.	3/2	2	6.761E-03	0.	6.761E-03	4.571E-05	8.263E-29	2.272E-10	2.272E-10	1.28E 01
						4.571E-05				
202.	5/2	2	8.281E-03	0.	8.281E-03	6.857E-05	4.732E-29	1.951E-10	1.951E-10	8.52E 00
						6.857E-05				
227.*	7/2	4	7.017E-04	0.	7.017E-04	4.924E-07	1.031E-29	3.053E-13	3.053E-13	1.19E 03
						4.924E-07				
310.*	9/2	4	7.845E-04	0.	7.845E-04	6.155E-07	3.682E-30	1.363E-13	1.363E-13	9.49E 02
						6.155E-07				
349.*	11/2	6	-2.341E-03	0.	-2.341E-03	5.479E-06	3.335E-31	1.099E-13	1.099E-13	1.07E 02
						5.479E-06				
470.*	13/2	6	-2.528E-03	0.	-2.528E-03	6.393E-06	7.087E-32	2.725E-14	2.725E-14	9.14E 01
						6.393E-06				
523.*	15/2	8	-9.068E-04	0.	-9.068E-04	8.223E-07	2.634E-33	1.303E-16	1.303E-16	7.10E 02
						8.223E-07				
									2.002E-09	

* ESTIMATED WITH ROT. CONST.= 6.41 KEV, AND DEC. PARAM.= -0.448

CM 241 1/2+631 - 7/2-743 FGAP I = 1/2 KI = 1/2 M = 3 KF = 7/2 Q ALPHA 6.219 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	3	-2.481E-04	0.	2.481E-04	6.157E-08	3.031E-28	1.122E-12	1.122E-12	9.49E 03
						6.157E-08				
0.*	9/2	5	-6.737E-04	1.401E-03	-7.274E-04	5.291E-07	NO STATE	0.	0.	1.10E 03
						5.291E-07				
0.*	11/2	5	-1.429E-03	-6.605E-04	2.090E-03	4.366E-06	NO STATE	0.	0.	1.34E 02
						4.366E-06				
0.*	13/2	7	-1.405E-03	2.982E-03	-1.577E-03	2.487E-06	NO STATE	0.	0.	2.35E 02
						2.487E-06				
0.*	15/2	7	-2.331E-03	-1.798E-03	4.129E-03	1.705E-05	NO STATE	0.	0.	3.43E 01
						1.705E-05				
									1.122E-12	

* ESTIMATE NOT POSSIBLE

CM 243 FAVORED FGAP 5/2+622 I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
286.	5/2	0	1.572E-02	0.	1.572E-02	2.471E-04	2.518E-29	3.742E-10		
		2	9.306E-03	0.	9.306E-03	8.660E-05	1.487E-29	7.745E-11		
		4	5.013E-04	0.	5.013E-04	2.513E-07	4.373E-30	6.609E-14	4.517E-10	1.75E 00
						3.339E-04				
330.	7/2	2	1.075E-02	0.	1.075E-02	1.155E-04	8.521E-30	5.918E-11		
		4	1.352E-03	0.	1.352E-03	1.827E-06	2.503E-30	2.751E-13		
		6	-3.088E-04	0.	-3.088E-04	9.535E-08	3.702E-31	2.123E-15	5.945E-11	4.98E 00
						1.174E-04				
388.	9/2	2	6.357E-03	0.	6.357E-03	4.042E-05	4.100E-30	9.966E-12		
		4	1.999E-03	0.	1.999E-03	3.997E-06	1.202E-30	2.891E-13		
		6	-1.092E-03	0.	-1.092E-03	1.192E-06	1.774E-31	1.272E-14	1.027E-11	1.28E 01
						4.560E-05				
461.	11/2	4	1.856E-03	0.	1.856E-03	3.444E-06	4.681E-31	9.695E-14		
		6	-2.139E-03	0.	-2.139E-03	4.577E-06	6.884E-32	1.895E-14		
		8	-2.835E-04	0.	-2.835E-04	8.037E-08	5.171E-33	2.500E-17	1.159E-13	7.21E 01
						8.101E-06				
544.*	13/2	4	1.016E-03	0.	1.016E-03	1.033E-06	1.571E-31	9.762E-15		
		6	-2.740E-03	0.	-2.740E-03	7.509E-06	2.302E-32	1.040E-14		
		8	-8.386E-04	0.	-8.386E-04	7.032E-07	1.720E-33	7.276E-17	2.023E-14	6.32E 01
						9.245E-06				
639.*	15/2	6	-2.356E-03	0.	-2.356E-03	5.553E-06	6.304E-33	2.106E-15		
		8	-1.483E-03	0.	-1.483E-03	2.199E-06	4.684E-34	6.196E-17	2.167E-15	7.54E 01
						7.752E-06				
									5.215E-10	

* ESTIMATED WITH ROT. CONST.= 6.37 KEV

CM 243 5/2+622 - 1/2+631 FGAP V I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	1/2	2	2.943E-04	0.	2.943E-04	8.659E-08	4.526E-28	2.357E-12	2.357E-12	6.75E 03
						8.659E-08				
8.	3/2	2	3.146E-04	0.	3.146E-04	9.896E-08	4.134E-28	2.460E-12		
		4	1.700E-04	9.637E-04	1.134E-03	1.285E-06	1.225E-28	9.470E-12	1.193E-11	4.22E 02
						1.384E-06				
57.	5/2	2	2.359E-04	0.	2.359E-04	5.566E-08	2.327E-28	7.790E-13		
		4	3.605E-04	-1.363E-03	-1.002E-03	1.005E-06	6.887E-29	4.162E-12	4.941E-12	5.51E 02
						1.060E-06				
76.	7/2	2	1.284E-04	0.	1.284E-04	1.649E-08	1.874E-28	1.859E-13		
		4	4.583E-04	1.299E-03	1.758E-03	3.090E-06	5.545E-29	1.030E-11		
		6	5.488E-05	1.279E-03	1.334E-03	1.779E-06	8.295E-30	8.875E-13	1.138E-11	1.20E 02
						4.885E-06				
164.	9/2	2	4.541E-05	0.	4.541E-05	2.062E-09	6.580E-29	8.159E-15		
		4	4.051E-04	-9.189E-04	-5.137E-04	2.639E-07	1.942E-29	3.082E-13		
		6	1.160E-04	-2.162E-03	-2.046E-03	4.185E-06	2.894E-30	7.284E-13	1.045E-12	1.31E 02
						4.451E-06				
193.	11/2	4	2.522E-04	4.768E-04	7.290E-04	5.315E-07	1.361E-29	4.352E-13		
		6	1.524E-04	2.368E-03	2.520E-03	6.353E-06	2.026E-30	7.742E-13		
		8	-4.664E-05	6.980E-04	6.513E-04	4.243E-07	1.547E-31	3.948E-15	1.213E-12	7.99E 01
						7.308E-06				
322.*	13/2	4	9.949E-05	-1.612E-04	-6.169E-05	3.806E-09	2.785E-30	6.376E-16		
		6	1.406E-04	-1.872E-03	-1.732E-03	2.998E-06	4.122E-31	7.432E-14		
		8	-9.935E-05	-1.274E-03	-1.374E-03	1.887E-06	3.123E-32	3.545E-15	7.851E-14	1.19E 02
						4.889E-06				
361.*	15/2	6	9.139E-05	1.065E-03	1.156E-03	1.337E-06	2.507E-31	2.016E-14		
		8	-1.328E-04	1.491E-03	1.358E-03	1.844E-06	1.895E-32	2.102E-15	2.226E-14	1.84E 02
						3.181E-06				
									3.297E-11	

* ESTIMATED WITH ROT. CONST.= 6.25 KEV, AND DEC. PARAM.= -0.581

CM 243   5/2+622 - 7/2-743   FGAP   I = 5/2   KI = 5/2   M = 1   KF = 7/2   Q ALPHA   6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
392.	7/2	1	-9.149E-04	0.	9.149E-04	8.370E-07	5.560E-30	2.799E-13		
		3	-9.540E-04	0.	9.540E-04	9.101E-07	2.310E-30	1.264E-13		
		5	-2.077E-05	0.	2.077E-05	4.313E-10	4.795E-31	1.244E-17	4.064E-13	3.34E 02
						1.748E-06				
434.	9/2	3	-1.438E-03	0.	1.438E-03	2.068E-06	1.337E-30	1.663E-13		
		5	-6.815E-05	0.	6.815E-05	4.645E-09	2.771E-31	7.742E-17		
		7	7.041E-05	1.808E-04	-2.513E-04	6.313E-08	2.910E-32	1.105E-16	1.665E-13	2.73E 02
						2.136E-06				
486.	11/2	3	-1.057E-03	0.	1.057E-03	1.117E-06	6.808E-31	4.574E-14		
		5	-1.197E-04	0.	1.197E-04	1.433E-08	1.409E-31	1.214E-16		
		7	2.892E-04	-1.651E-04	-1.241E-04	1.541E-08	1.475E-32	1.367E-17	4.587E-14	5.09E 02
						1.147E-06				
547.*	13/2	5	-1.293E-04	0.	1.293E-04	1.672E-08	6.239E-32	6.274E-17		
		7	6.488E-04	1.111E-04	-7.599E-04	5.775E-07	6.513E-33	2.262E-16		
		9	6.210E-05	6.104E-05	-1.231E-04	1.516E-08	3.500E-34	3.192E-19	2.893E-16	9.59E 02
						6.094E-07				
618.*	15/2	5	-8.105E-05	0.	8.105E-05	6.569E-09	2.396E-32	9.467E-18		
		7	9.392E-04	-5.848E-05	-8.807E-04	7.756E-07	2.492E-33	1.163E-16		
		9	2.060E-04	-7.362E-05	-1.323E-04	1.751E-08	1.332E-34	1.403E-19	1.259E-16	7.30E 02
						7.997E-07				
									6.192E-13	

* ESTIMATED WITH ROT. CONST.= 4.73 KEV

CM 243 5/2+622 - 1/2-501 FGAP I = 5/2 KI = 5/2 M = -2 KF = 1/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
470.	1/2	3	2.655E-05	-1.966E-04	1.700E-04	2.891E-08	8.415E-31	1.463E-15	1.463E-15	2.02E 04
						2.891E-08				
492.	3/2	3	5.936E-05	2.198E-04	-2.791E-04	7.792E-08	6.276E-31	2.941E-15	2.941E-15	7.50E 03
						7.792E-08				
505.	5/2	3	7.270E-05	-1.794E-04	1.068E-04	1.140E-08	5.283E-31	3.621E-16		
		5	-3.463E-05	-5.500E-04	5.847E-04	3.418E-07	1.092E-31	2.246E-15	2.608E-15	1.65E 03
						3.532E-07				
556.	7/2	3	6.130E-05	1.135E-04	-1.748E-04	3.055E-08	2.689E-31	4.942E-16		
		5	-7.301E-05	8.697E-04	-7.967E-04	6.347E-07	5.550E-32	2.119E-15	2.613E-15	8.78E 02
						6.652E-07				
580.*	9/2	3	3.653E-05	-5.411E-05	1.757E-05	3.088E-10	1.961E-31	3.642E-18		
		5	-9.471E-05	-9.025E-04	9.972E-04	9.945E-07	4.043E-32	2.418E-15		
		7	1.367E-05	1.115E-04	-1.252E-04	1.567E-08	4.213E-33	3.970E-18	2.426E-15	5.78E 02
						1.010E-06				
662.*	11/2	3	1.386E-05	1.711E-05	-3.097E-05	9.593E-10	6.416E-32	3.702E-18		
		5	-8.592E-05	6.822E-04	-5.963E-04	3.556E-07	1.319E-32	2.821E-16		
		7	2.900E-05	-1.971E-04	1.681E-04	2.825E-08	1.369E-33	2.326E-18	2.881E-16	1.52E 03
						3.848E-07				
696.*	13/2	5	-5.490E-05	-3.737E-04	4.286E-04	1.837E-07	8.228E-33	9.090E-17		
		7	3.849E-05	2.242E-04	-2.627E-04	6.901E-08	8.522E-34	3.537E-18		
		9	-1.181E-06	1.446E-05	-1.327E-05	1.762E-10	4.532E-35	4.803E-22	9.443E-17	2.31E 03
						2.529E-07				
808.*	15/2	5	-2.218E-05	1.321E-04	-1.099E-04	1.208E-08	1.687E-33	1.226E-18		
		7	3.592E-05	-1.831E-04	1.471E-04	2.165E-08	1.737E-34	2.263E-19		
		9	-2.526E-06	-2.705E-05	2.957E-05	8.744E-10	9.166E-36	4.821E-22	1.453E-18	1.69E 04
						3.461E-08				
									1.243E-14	

* ESTIMATED WITH ROT. CONST.= 5.04 KEV, AND DEC. PARAM.= 0.481

CM 243 5/2+622 - 3/2+631 FGAP I = 5/2 KI = 5/2 M = -1 KF = 3/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
735.	3/2	2	-1.423E-03	0.	-1.423E-03	2.025E-06	3.950E-32	4.810E-15		
		4	-1.421E-04	-1.452E-04	-2.873E-04	8.254E-08	1.147E-32	5.695E-17	4.867E-15	2.77E 02
						2.107E-06				
759.	5/2	2	-1.743E-03	0.	-1.743E-03	3.037E-06	2.817E-32	5.147E-15		
		4	-4.923E-04	1.257E-04	-3.665E-04	1.343E-07	8.178E-33	6.607E-17	5.213E-15	1.84E 02
						3.172E-06				
800.	7/2	2	-1.299E-03	0.	-1.299E-03	1.687E-06	1.573E-32	1.597E-15		
		4	-8.569E-04	-8.755E-05	-9.445E-04	8.920E-07	4.562E-33	2.447E-16		
		6	1.747E-04	-1.697E-04	4.953E-06	2.453E-11	6.609E-34	9.751E-22	1.842E-15	2.26E 02
						2.579E-06				
849.	9/2	2	-5.809E-04	0.	-5.809E-04	3.375E-07	7.772E-33	1.578E-16		
		4	-9.581E-04	4.894E-05	-9.091E-04	8.265E-07	2.250E-33	1.119E-16		
		6	4.669E-04	2.268E-04	6.937E-04	4.812E-07	3.253E-34	9.415E-18	2.790E-16	3.55E 02
						1.645E-06				
902.*	11/2	4	-7.204E-04	-2.103E-05	-7.414E-04	5.497E-07	1.039E-33	3.436E-17		
		6	7.411E-04	-2.057E-04	5.354E-04	2.866E-07	1.499E-34	2.584E-18		
		8	2.374E-04	-1.188E-04	1.186E-04	1.407E-08	1.096E-35	9.271E-21	3.695E-17	6.87E 02
						8.504E-07				
964.*	13/2	4	-3.327E-04	6.071E-06	-3.267E-04	1.067E-07	4.106E-34	2.635E-18		
		6	8.005E-04	1.389E-04	9.394E-04	8.824E-07	5.906E-35	3.134E-18		
		8	5.922E-04	1.852E-04	7.774E-04	6.044E-07	4.301E-36	1.564E-19	5.926E-18	3.67E 02
						1.594E-06				
1036.*	15/2	6	5.962E-04	-6.896E-05	5.272E-04	2.779E-07	1.974E-35	3.299E-19		
		8	9.070E-04	-1.891E-04	7.179E-04	5.154E-07	1.431E-36	4.436E-20	3.743E-19	7.36E 02
						7.933E-07				
									1.224E-14	

* ESTIMATED WITH ROT. CONST.= 4.80 KEV

CM 243 5/2+622 - 5/2+633 FGAP I = 5/2 KI = 5/2 M = 0 KF = 5/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
512.	5/2	0	-6.877E-04	0.	-6.877E-04	4.729E-07	1.394E-30	3.966E-14		
		2	-1.772E-04	0.	-1.772E-04	3.141E-08	8.212E-31	1.551E-15		
		4	8.184E-05	0.	8.184E-05	6.697E-09	2.400E-31	9.667E-17	4.131E-14	1.14E 03
						5.110E-07				
0.*	7/2	2	-2.047E-04	0.	-2.047E-04	4.189E-08	NO STATE	0.		
		4	2.207E-04	0.	2.207E-04	4.871E-08	NO STATE	0.		
		6	1.809E-05	-6.690E-04	-6.510E-04	4.237E-07	NO STATE	0.	0.	1.14E 03
						5.143E-07				
0.*	9/2	2	-1.211E-04	0.	-1.211E-04	1.466E-08	NO STATE	0.		
		4	3.264E-04	0.	3.264E-04	1.065E-07	NO STATE	0.		
		6	6.395E-05	6.758E-04	7.398E-04	5.473E-07	NO STATE	0.	0.	8.74E 02
						6.685E-07				
0.*	11/2	4	3.030E-04	0.	3.030E-04	9.180E-08	NO STATE	0.		
		6	1.253E-04	-4.966E-04	-3.713E-04	1.379E-07	NO STATE	0.		
		8	-2.395E-05	-1.023E-03	-1.047E-03	1.097E-06	NO STATE	0.	0.	4.40E 02
						1.327E-06				
0.*	13/2	4	1.659E-04	0.	1.659E-04	2.754E-08	NO STATE	0.		
		6	1.605E-04	2.827E-04	4.432E-04	1.965E-07	NO STATE	0.		
		8	-7.085E-05	1.345E-03	1.275E-03	1.625E-06	NO STATE	0.	0.	3.16E 02
						1.849E-06				
0.*	15/2	6	1.380E-04	-1.216E-04	1.648E-05	2.715E-10	NO STATE	0.		
		8	-1.253E-04	-1.190E-03	-1.315E-03	1.729E-06	NO STATE	0.	0.	3.38E 02
						1.730E-06				
									4.131E-14	

* ESTIMATE NOT POSSIBLE

CM 243 5/2+622 - 7/2+624 FGAP I = 5/2 KI = 5/2 M = 1 KF = 7/2 Q ALPHA 6.201 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
512.	7/2	2	-7.957E-05	0.	-7.957E-05	6.332E-09	8.212E-31	3.127E-16		
		4	-5.331E-06	0.	-5.331E-06	2.842E-11	2.400E-31	4.102E-19		
		6	1.818E-06	-1.659E-04	-1.640E-04	2.691E-08	3.522E-32	5.699E-17	3.701E-16	1.76E 04
						3.327E-08				
0.*	9/2	2	-7.117E-05	0.	-7.117E-05	5.065E-09	NO STATE	0.		
		4	-1.192E-05	0.	-1.192E-05	1.421E-10	NO STATE	0.		
		6	9.715E-06	1.108E-04	1.205E-04	1.453E-08	NO STATE	0.	0.	2.96E 04
						1.974E-08				
0.*	11/2	4	-1.437E-05	0.	-1.437E-05	2.066E-10	NO STATE	0.		
		6	2.473E-05	-6.269E-05	-3.796E-05	1.441E-09	NO STATE	0.		
		8	9.842E-07	-2.799E-04	-2.789E-04	7.781E-08	NO STATE	0.	0.	7.35E 03
						7.946E-08				
0.*	13/2	4	-9.582E-06	0.	-9.582E-06	9.181E-11	NO STATE	0.		
		6	3.856E-05	2.932E-05	6.787E-05	4.607E-09	NO STATE	0.		
		8	3.543E-06	3.024E-04	3.059E-04	9.357E-08	NO STATE	0.	0.	5.94E 03
						9.827E-08				
0.*	15/2	6	3.888E-05	-1.075E-05	2.813E-05	7.911E-10	NO STATE	0.		
		8	7.348E-06	-2.280E-04	-2.207E-04	4.869E-08	NO STATE	0.	0.	1.18E 04
						4.948E-08				
									3.701E-16	

* ESTIMATE NOT POSSIBLE

CM 245 FAVORED FGAP 7/2+624 I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 5.662 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
173.	7/2	0	1.260E-02	0.	-1.260E-02	1.587E-04	1.016E-31	9.698E-13		
		2	8.093E-03	0.	-8.093E-03	6.550E-05	5.976E-32	2.354E-13		
		4	6.494E-04	0.	-6.494E-04	4.217E-07	1.741E-32	4.415E-16		
		6	-1.570E-04	0.	1.570E-04	2.465E-08	2.541E-33	3.766E-18	1.206E-12	2.60E 00
						2.246E-04				
230.	9/2	2	7.716E-03	0.	-7.716E-03	5.954E-05	2.683E-32	9.609E-14		
		4	1.273E-03	0.	-1.273E-03	1.622E-06	7.804E-33	7.612E-16		
		6	-5.874E-04	0.	5.874E-04	3.450E-07	1.136E-33	2.358E-17		
		8	-4.139E-05	0.	4.139E-05	1.713E-09	8.414E-35	8.671E-21	9.688E-14	9.50E 00
						6.151E-05				
291.	11/2	2	3.913E-03	0.	-3.913E-03	1.531E-05	1.122E-32	1.034E-14		
		4	1.501E-03	0.	-1.501E-03	2.252E-06	3.259E-33	4.414E-16		
		6	-1.246E-03	0.	1.246E-03	1.553E-06	4.731E-34	4.418E-17		
		8	-1.897E-04	0.	1.897E-04	3.598E-08	3.491E-35	7.555E-20	1.082E-14	3.05E 01
						1.915E-05				
373.*	13/2	4	1.167E-03	0.	-1.167E-03	1.362E-06	9.784E-34	8.017E-17		
		6	-1.788E-03	0.	1.788E-03	3.197E-06	1.415E-34	2.721E-17		
		8	-4.930E-04	0.	4.930E-04	2.430E-07	1.039E-35	1.519E-19	1.075E-16	1.22E 02
						4.802E-06				
468.*	15/2	4	5.530E-04	0.	-5.530E-04	3.058E-07	2.354E-34	4.330E-18		
		6	-1.830E-03	0.	1.830E-03	3.349E-06	3.391E-35	6.830E-18		
		8	-8.740E-04	0.	8.740E-04	7.638E-07	2.475E-36	1.137E-19	1.127E-17	1.32E 02
						4.419E-06				
									1.313E-12	

* ESTIMATED WITH ROT. CONST.= 6.33 KEV

CM 245   7/2+624 - 5/2+622 FGAP   I = 7/2   KI = 7/2   M = -1   KF = 5/2   Q ALPHA   5.662 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	2	2.810E-04	0.	-2.810E-04	7.894E-08	6.290E-31	2.986E-15		
		4	1.882E-05	0.	-1.882E-05	3.543E-10	1.841E-31	3.923E-18		
		6	-6.417E-06	-5.856E-04	-5.792E-04	3.354E-07	2.708E-32	5.463E-16	3.537E-15	1.41E 03
						4.147E-07				
72.	7/2	2	2.753E-04	0.	-2.753E-04	7.578E-08	2.394E-31	1.091E-15		
		4	3.968E-05	0.	-3.968E-05	1.575E-09	6.994E-32	6.623E-18		
		6	-3.144E-05	4.781E-04	5.096E-04	2.597E-07	1.025E-32	1.601E-16	1.258E-15	1.73E 03
						3.370E-07				
165.*	9/2	2	1.736E-04	0.	-1.736E-04	3.014E-08	6.720E-32	1.218E-16		
		4	5.147E-05	0.	-5.147E-05	2.649E-09	1.958E-32	3.120E-18		
		6	-7.781E-05	-3.381E-04	-2.603E-04	6.775E-08	2.859E-33	1.165E-17		
		8	-2.963E-06	-8.429E-04	-8.399E-04	7.055E-07	2.126E-34	9.020E-18	1.456E-16	7.25E 02
						8.060E-07				
278.*	11/2	2	6.777E-05	0.	-6.777E-05	4.593E-09	1.359E-32	3.753E-18		
		4	4.669E-05	0.	-4.669E-05	2.180E-09	3.947E-33	5.175E-19		
		6	-1.271E-04	2.070E-04	3.341E-04	1.116E-07	5.733E-34	3.849E-18		
		8	-1.045E-05	1.115E-03	1.125E-03	1.267E-06	4.234E-35	3.226E-18	1.135E-17	4.22E 02
						1.385E-06				
411.*	13/2	4	2.984E-05	0.	-2.984E-05	8.902E-10	5.552E-34	2.973E-20		
		6	-1.498E-04	-1.085E-04	4.130E-05	1.706E-09	8.019E-35	8.228E-21		
		8	-2.232E-05	-1.058E-03	-1.036E-03	1.073E-06	5.873E-36	3.790E-19	4.169E-19	5.43E 02
						1.076E-06				
566.*	15/2	4	1.206E-05	0.	-1.206E-05	1.453E-10	5.238E-35	4.579E-22		
		6	-1.307E-04	4.734E-05	1.781E-04	3.171E-08	7.513E-36	1.433E-20		
		8	-3.375E-05	7.999E-04	8.336E-04	6.949E-07	5.451E-37	2.278E-20	3.757E-20	8.04E 02
						7.268E-07				
									4.952E-15	

* ESTIMATED WITH ROT. CONST.=10.29 KEV

BK 243 FAVORED FGAP V 3/2-521 I = 3/2 KI = 3/2 M = 0 KF = 3/2 Q ALPHA 6.911 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
559.	3/2	0	1.636E-02	0.	-1.636E-02	2.675E-04	1.392E-27	2.239E-08		
		2	6.725E-03	0.	-6.725E-03	4.522E-05	8.273E-28	2.250E-09	2.464E-08	1.87E 00
						3.127E-04				
587.	5/2	2	1.078E-02	0.	-1.078E-02	1.163E-04	6.075E-28	4.249E-09		
		4	5.582E-04	0.	-5.582E-04	3.116E-07	1.813E-28	3.398E-12	4.252E-09	5.01E 00
						1.166E-04				
625.*	7/2	2	8.038E-03	0.	-8.038E-03	6.460E-05	3.928E-28	1.526E-09		
		4	1.367E-03	0.	-1.367E-03	1.870E-06	1.171E-28	1.317E-11	1.540E-09	8.79E 00
						6.647E-05				
674.*	9/2	4	1.725E-03	0.	-1.725E-03	2.975E-06	6.636E-29	1.187E-11		
		6	-1.118E-03	0.	1.118E-03	1.250E-06	1.003E-29	7.538E-13	1.263E-11	1.38E 02
						4.225E-06				
735.*	11/2	4	1.178E-03	0.	-1.178E-03	1.388E-06	3.283E-29	2.741E-12		
		6	-2.372E-03	0.	2.372E-03	5.626E-06	4.947E-30	1.674E-12	4.415E-12	8.33E 01
						7.014E-06				
806.*	13/2	6	-2.775E-03	0.	2.775E-03	7.701E-06	2.117E-30	9.805E-13		
		8	-6.820E-04	0.	6.820E-04	4.651E-07	1.636E-31	4.578E-15	9.851E-13	7.15E 01
						8.166E-06				
888.*	15/2	6	-1.817E-03	0.	1.817E-03	3.300E-06	7.799E-31	1.548E-13		
		8	-1.364E-03	0.	1.364E-03	1.861E-06	5.998E-32	6.712E-15	1.615E-13	1.13E 02
						5.161E-06				
									3.045E-08	

* ESTIMATED WITH ROT. CONST.= 5.48 KEV

BK 243 3/2-521 - 5/2-523 FGAP V I = 3/2 KI = 3/2 M = 1 KF = 5/2 Q ALPHA 6.911 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	2	9.038E-04	0.	-9.038E-04	8.169E-07	2.961E-25	1.455E-08		
		4	1.883E-04	-1.234E-03	1.046E-03	1.094E-06	8.982E-26	5.912E-09	2.046E-08	3.06E 02
						1.911E-06				
40.	7/2	2	1.044E-03	0.	-1.044E-03	1.089E-06	2.000E-25	1.310E-08		
		4	7.145E-04	7.807E-04	-1.495E-03	2.236E-06	6.059E-26	8.147E-09	2.125E-08	1.76E 02
						3.325E-06				
94.	9/2	4	1.192E-03	-3.722E-04	-8.200E-04	6.724E-07	3.533E-26	1.429E-09		
		6	5.231E-05	-2.859E-03	2.807E-03	7.877E-06	5.476E-27	2.594E-09	4.023E-09	6.83E 01
						8.550E-06				
156.*	11/2	4	1.005E-03	1.177E-04	-1.123E-03	1.261E-06	1.875E-26	1.422E-09		
		6	1.370E-04	2.807E-03	-2.944E-03	8.669E-06	2.898E-27	1.511E-09	2.933E-09	5.88E 01
						9.931E-06				
230.*	13/2	6	1.900E-04	-1.731E-03	1.541E-03	2.375E-06	1.350E-27	1.928E-10		
		8	-2.377E-04	-2.688E-03	2.926E-03	8.562E-06	1.080E-28	5.563E-11	2.484E-10	5.34E 01
						1.094E-05				
315.*	15/2	6	1.437E-04	6.543E-04	-7.980E-04	6.368E-07	5.497E-28	2.105E-11		
		8	-5.491E-04	3.104E-03	-2.555E-03	6.529E-06	4.378E-29	1.719E-11	3.825E-11	8.15E 01
						7.166E-06				
									4.895E-08	

* ESTIMATED WITH ROT. CONST.= 5.67 KEV

BK 243 3/2-521 - 5/2+642 FGAP V I = 3/2 KI = 3/2 M = 1 KF = 5/2 Q ALPHA 6.911 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
188.	5/2	1	-2.489E-03	0.	-2.489E-03	6.197E-06	6.300E-26	2.348E-08		
		3	-2.038E-03	0.	-2.038E-03	4.155E-06	2.671E-26	6.674E-09	3.016E-08	5.64E 01
						1.035E-05				
220.	7/2	3	-4.297E-03	0.	-4.297E-03	1.846E-05	1.927E-26	2.140E-08		
		5	-5.447E-04	-8.100E-04	-1.355E-03	1.835E-06	4.147E-27	4.577E-10	2.186E-08	2.88E 01
						2.030E-05				
259.	9/2	3	-4.020E-03	0.	-4.020E-03	1.616E-05	1.274E-26	1.238E-08		
		5	-1.611E-03	6.846E-04	-9.267E-04	8.588E-07	2.738E-27	1.414E-10	1.253E-08	3.43E 01
						1.702E-05				
319.	11/2	5	-2.398E-03	-3.821E-04	-2.780E-03	7.730E-06	1.453E-27	6.757E-10		
		7	3.900E-04	-8.729E-04	-4.829E-04	2.332E-07	1.603E-28	2.248E-12	6.779E-10	7.34E 01
						7.963E-06				
378.*	13/2	5	-1.896E-03	1.343E-04	-1.762E-03	3.104E-06	7.745E-28	1.446E-10		
		7	9.477E-04	9.428E-04	1.890E-03	3.574E-06	8.515E-29	1.830E-11	1.629E-10	8.75E 01
						6.678E-06				
446.*	15/2	7	1.253E-03	-6.232E-04	6.297E-04	3.965E-07	4.060E-29	9.682E-13		
		9	7.681E-04	-3.496E-04	4.185E-04	1.751E-07	2.324E-30	2.448E-14	9.927E-13	1.02E 03
						5.717E-07				
									6.538E-08	

* ESTIMATED WITH ROT. CONST.= 4.51 KEV

BK 245 FAVORED FGAP 3/2-521 I = 3/2 KI = 3/2 M = 0 KF = 3/2 Q ALPHA 6.490 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
468.	3/2	0	1.427E-02	0.	-1.427E-02	2.037E-04	3.226E-29	3.952E-10		
		2	5.569E-03	0.	-5.569E-03	3.102E-05	1.912E-29	3.567E-11	4.309E-10	2.49E 00
						2.347E-04				
496.	5/2	2	8.931E-03	0.	-8.931E-03	7.976E-05	1.349E-29	6.470E-11		
		4	3.233E-04	0.	-3.233E-04	1.045E-07	3.997E-30	2.513E-14	6.472E-11	7.31E 00
						7.987E-05				
536.*	7/2	2	6.657E-03	0.	-6.657E-03	4.431E-05	8.236E-30	2.195E-11		
		4	7.920E-04	0.	-7.920E-04	6.272E-07	2.438E-30	9.199E-14	2.204E-11	1.30E 01
						4.494E-05				
587.*	9/2	4	9.989E-04	0.	-9.989E-04	9.978E-07	1.282E-30	7.693E-14		
		6	-8.609E-04	0.	8.609E-04	7.412E-07	1.915E-31	8.537E-15	8.547E-14	3.36E 02
						1.739E-06				
650.*	11/2	4	6.824E-04	0.	-6.824E-04	4.656E-07	5.773E-31	1.617E-14		
		6	-1.826E-03	0.	1.826E-03	3.335E-06	8.601E-32	1.725E-14	3.342E-14	1.54E 02
						3.801E-06				
724.*	13/2	6	-2.137E-03	0.	2.137E-03	4.566E-06	3.282E-32	9.013E-15		
		8	-3.508E-04	0.	3.508E-04	1.231E-07	2.497E-33	1.849E-17	9.032E-15	1.25E 02
						4.689E-06				
810.*	15/2	6	-1.399E-03	0.	1.399E-03	1.957E-06	1.054E-32	1.241E-15		
		8	-7.017E-04	0.	7.017E-04	4.924E-07	7.981E-34	2.363E-17	1.265E-15	2.39E 02
						2.449E-06				
									5.178E-10	

* ESTIMATED WITH ROT. CONST.= 5.70 KEV

BK 245   3/2-521 - 5/2-523 FGAP V   I = 3/2   KI = 3/2   M = 1   KF = 5/2   Q ALPHA   6.490 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	2	7.606E-04	0.	-7.606E-04	5.786E-07	4.163E-27	1.449E-10		
		4	1.586E-04	-1.162E-03	1.004E-03	1.007E-06	1.251E-27	7.577E-11	2.206E-10	3.68E 02
						1.586E-06				
43.	7/2	2	8.783E-04	0.	-8.783E-04	7.714E-07	2.612E-27	1.212E-10		
		4	6.020E-04	7.350E-04	-1.337E-03	1.788E-06	7.838E-28	8.428E-11	2.055E-10	2.28E 02
						2.559E-06				
96.	9/2	4	1.005E-03	-3.504E-04	-6.541E-04	4.278E-07	4.364E-28	1.123E-11		
		6	3.489E-05	-2.652E-03	2.617E-03	6.847E-06	6.661E-29	2.743E-11	3.866E-11	8.03E 01
						7.275E-06				
162.	11/2	4	8.471E-04	1.108E-04	-9.579E-04	9.175E-07	2.079E-28	1.147E-11		
		6	9.137E-05	2.604E-03	-2.695E-03	7.264E-06	3.164E-29	1.382E-11	2.530E-11	7.14E 01
						8.182E-06				
241.*	13/2	6	1.268E-04	-1.606E-03	1.479E-03	2.187E-06	1.273E-29	1.675E-12		
		8	-2.145E-04	-2.380E-03	2.594E-03	6.731E-06	9.974E-31	4.038E-13	2.078E-12	6.55E 01
						8.918E-06				
332.*	15/2	6	9.583E-05	6.069E-04	-7.027E-04	4.938E-07	4.354E-30	1.293E-13		
		8	-4.954E-04	2.748E-03	-2.253E-03	5.075E-06	3.392E-31	1.035E-13	2.328E-13	1.05E 02
						5.569E-06				
									4.924E-10	

* ESTIMATED WITH ROT. CONST.= 6.10 KEV

BK 245 3/2-521 - 5/2+642 FGAP V I = 3/2 KI = 3/2 M = 1 KF = 5/2 Q ALPHA 6.490 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
206.	5/2	1	-2.116E-03	0.	-2.116E-03	4.478E-06	5.907E-28	1.591E-10		
		3	-1.728E-03	0.	-1.728E-03	2.985E-06	2.487E-28	4.465E-11	2.038E-10	7.83E 01
						7.463E-06				
235.	7/2	3	-3.643E-03	0.	-3.643E-03	1.327E-05	1.795E-28	1.433E-10		
		5	-4.409E-04	-7.696E-04	-1.210E-03	1.465E-06	3.814E-29	3.361E-12	1.466E-10	3.97E 01
						1.473E-05				
270.	9/2	3	-3.407E-03	0.	-3.407E-03	1.161E-05	1.189E-28	8.304E-11		
		5	-1.304E-03	6.504E-04	-6.538E-04	4.274E-07	2.523E-29	6.487E-13	8.369E-11	4.85E 01
						1.204E-05				
321.	11/2	5	-1.941E-03	-3.630E-04	-2.304E-03	5.309E-06	1.391E-29	4.441E-12		
		7	3.658E-04	-8.062E-04	-4.404E-04	1.940E-07	1.506E-30	1.757E-14	4.458E-12	1.06E 02
						5.503E-06				
382.	13/2	5	-1.535E-03	1.276E-04	-1.407E-03	1.980E-06	6.731E-30	8.015E-13		
		7	8.891E-04	8.708E-04	1.760E-03	3.097E-06	7.267E-31	1.354E-13	9.369E-13	1.15E 02
						5.077E-06				
443.*	15/2	7	1.175E-03	-5.757E-04	5.998E-04	3.597E-07	3.473E-31	7.514E-15		
		9	6.437E-04	-2.749E-04	3.688E-04	1.360E-07	1.942E-32	1.588E-16	7.672E-15	1.18E 03
						4.957E-07				
									4.395E-10	

* ESTIMATED WITH ROT. CONST.= 4.06 KEV

BK 247 FAVORED FGAP 3/2-521 I = 3/2 KI = 3/2 M = 0 KF = 3/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	3/2	0	1.208E-02	0.	-1.208E-02	1.459E-04	NO DATA	0.		
		2	4.432E-03	0.	-4.432E-03	1.964E-05	NO DATA	0.	0.	3.53E 00
						1.655E-04				
0.*	5/2	2	7.106E-03	0.	-7.106E-03	5.050E-05	NO DATA	0.		
		4	1.751E-04	0.	-1.751E-04	3.065E-08	NO DATA	0.	0.	1.16E 01
						5.053E-05				
0.*	7/2	2	5.297E-03	0.	-5.297E-03	2.806E-05	NO DATA	0.		
		4	4.289E-04	0.	-4.289E-04	1.839E-07	NO DATA	0.	0.	2.07E 01
						2.824E-05				
0.*	9/2	4	5.409E-04	0.	-5.409E-04	2.926E-07	NO DATA	0.		
		6	-5.793E-04	0.	5.793E-04	3.356E-07	NO DATA	0.	0.	9.30E 02
						6.282E-07				
0.*	11/2	4	3.695E-04	0.	-3.695E-04	1.366E-07	NO DATA	0.		
		6	-1.229E-03	0.	1.229E-03	1.510E-06	NO DATA	0.	0.	3.55E 02
						1.647E-06				
0.*	13/2	6	-1.438E-03	0.	1.438E-03	2.067E-06	NO DATA	0.		
		8	-9.512E-05	0.	9.512E-05	9.047E-09	NO DATA	0.	0.	2.81E 02
						2.076E-06				
0.*	15/2	6	-9.412E-04	0.	9.412E-04	8.859E-07	NO DATA	0.		
		8	-1.902E-04	0.	1.902E-04	3.619E-08	NO DATA	0.	0.	6.34E 02
						9.221E-07				
									0.	

* ESTIMATE NOT POSSIBLE

BK 249 FAVORED FGAP 7/2+633 I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 5.588 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.180E-02	0.	-1.180E-02	1.392E-04	NO STATE	0.		
		2	6.464E-03	0.	-6.464E-03	4.179E-05	NO STATE	0.		
		4	7.263E-05	0.	-7.263E-05	5.275E-09	NO STATE	0.		
		6	-1.060E-04	0.	1.060E-04	1.123E-08	NO STATE	0.	0.	3.23E 00
						1.810E-04				
0.*	9/2	2	6.164E-03	0.	-6.164E-03	3.799E-05	NO STATE	0.		
		4	1.424E-04	0.	-1.424E-04	2.029E-08	NO STATE	0.		
		6	-3.966E-04	0.	3.966E-04	1.573E-07	NO STATE	0.		
		8	1.780E-06	0.	-1.780E-06	3.169E-12	NO STATE	0.	0.	1.53E 01
						3.817E-05				
0.*	11/2	2	3.126E-03	0.	-3.126E-03	9.769E-06	NO STATE	0.		
		4	1.679E-04	0.	-1.679E-04	2.817E-08	NO STATE	0.		
		6	-8.413E-04	0.	8.413E-04	7.077E-07	NO STATE	0.		
		8	8.158E-06	0.	-8.158E-06	6.656E-11	NO STATE	0.	0.	5.56E 01
						1.050E-05				
0.*	13/2	4	1.306E-04	0.	-1.306E-04	1.704E-08	NO STATE	0.		
		6	-1.207E-03	0.	1.207E-03	1.457E-06	NO STATE	0.		
		8	2.120E-05	0.	-2.120E-05	4.495E-10	NO STATE	0.	0.	3.96E 02
						1.475E-06				
0.*	15/2	4	6.186E-05	0.	-6.186E-05	3.826E-09	NO STATE	0.		
		6	-1.235E-03	0.	1.235E-03	1.526E-06	NO STATE	0.		
		8	3.759E-05	0.	-3.759E-05	1.413E-09	NO STATE	0.	0.	3.81E 02
						1.532E-06				
									0.	

* ESTIMATE NOT POSSIBLE

BK 249 7/2+633 - 5/2+642 FGAP V I = 7/2 KI = 7/2 M = -1 KF = 5/2 Q ALPHA 5.588 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	5/2	2	-1.392E-03	0.	1.392E-03	1.938E-06	8.241E-32	9.605E-15		
		4	-4.343E-04	0.	4.343E-04	1.886E-07	2.426E-32	2.753E-16		
		6	5.499E-06	1.955E-04	1.900E-04	3.611E-08	3.600E-33	7.818E-18	9.888E-15	2.70E 02
						2.162E-06				
0.*	7/2	2	-1.364E-03	0.	1.364E-03	1.860E-06	NO STATE	0.		
		4	-9.156E-04	0.	9.156E-04	8.384E-07	NO STATE	0.		
		6	2.694E-05	-1.596E-04	-1.866E-04	3.482E-08	NO STATE	0.	0.	2.14E 02
						2.733E-06				
0.*	9/2	2	-8.601E-04	0.	8.601E-04	7.399E-07	NO STATE	0.		
		4	-1.188E-03	0.	1.188E-03	1.411E-06	NO STATE	0.		
		6	6.667E-05	1.129E-04	4.622E-05	2.136E-09	NO STATE	0.		
		8	6.485E-05	2.511E-04	1.863E-04	3.470E-08	NO STATE	0.	0.	2.67E 02
						2.187E-06				
0.*	11/2	2	-3.358E-04	0.	3.358E-04	1.127E-07	NO STATE	0.		
		4	-1.077E-03	0.	1.077E-03	1.161E-06	NO STATE	0.		
		6	1.089E-04	-6.913E-05	-1.780E-04	3.169E-08	NO STATE	0.		
		8	2.288E-04	-3.322E-04	-5.610E-04	3.147E-07	NO STATE	0.	0.	3.61E 02
						1.620E-06				
0.*	13/2	4	-6.885E-04	0.	6.885E-04	4.740E-07	NO STATE	0.		
		6	1.283E-04	3.622E-05	-9.213E-05	8.488E-09	NO STATE	0.		
		8	4.885E-04	3.153E-04	-1.732E-04	3.001E-08	NO STATE	0.	0.	1.14E 03
						5.125E-07				
0.*	15/2	4	-2.782E-04	0.	2.782E-04	7.739E-08	NO STATE	0.		
		6	1.120E-04	-1.581E-05	-1.278E-04	1.634E-08	NO STATE	0.		
		8	7.386E-04	-2.383E-04	-9.769E-04	9.543E-07	NO STATE	0.	0.	5.57E 02
						1.048E-06				
									9.888E-15	

* ESTIMATE NOT POSSIBLE

BK 249 7/2+633 - 5/2-523 FGAP V I = 7/2 KI = 7/2 M = -1 KF = 5/2 Q ALPHA 5.588 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	5/2	1	2.111E-04	0.	2.111E-04	4.456E-08	NO STATE	0.		
		3	3.160E-04	0.	3.160E-04	9.988E-08	NO STATE	0.		
		5	4.181E-05	0.	4.181E-05	1.748E-09	NO STATE	0.	0.	4.00E 03
						1.462E-07				
0.*	7/2	1	1.149E-04	0.	1.149E-04	1.320E-08	NO STATE	0.		
		3	4.668E-04	0.	4.668E-04	2.179E-07	NO STATE	0.		
		5	1.270E-04	0.	1.270E-04	1.613E-08	NO STATE	0.		
		7	-1.620E-05	5.256E-04	-5.418E-04	2.935E-07	NO STATE	0.	0.	1.08E 03
						5.408E-07				
0.*	9/2	1	4.063E-05	0.	4.063E-05	1.650E-09	NO STATE	0.		
		3	4.367E-04	0.	4.367E-04	1.907E-07	NO STATE	0.		
		5	2.245E-04	0.	2.245E-04	5.042E-08	NO STATE	0.		
		7	-6.339E-05	-5.876E-04	5.243E-04	2.748E-07	NO STATE	0.	0.	1.13E 03
						5.176E-07				
0.*	11/2	3	2.797E-04	0.	2.797E-04	7.823E-08	NO STATE	0.		
		5	2.744E-04	0.	2.744E-04	7.529E-08	NO STATE	0.		
		7	-1.429E-04	4.968E-04	-6.397E-04	4.092E-07	NO STATE	0.		
		9	-3.447E-05	7.493E-04	-7.838E-04	6.143E-07	NO STATE	0.	0.	4.96E 02
						1.177E-06				
0.*	13/2	3	1.121E-04	0.	1.121E-04	1.257E-08	NO STATE	0.		
		5	2.435E-04	0.	2.435E-04	5.929E-08	NO STATE	0.		
		7	-2.228E-04	-3.442E-04	1.214E-04	1.475E-08	NO STATE	0.		
		9	-1.145E-04	-1.106E-03	9.913E-04	9.827E-07	NO STATE	0.	0.	5.46E 02
						1.069E-06				
0.*	15/2	5	1.547E-04	0.	1.547E-04	2.392E-08	NO STATE	0.		
		7	-2.563E-04	1.980E-04	-4.543E-04	2.064E-07	NO STATE	0.		
		9	-2.358E-04	1.139E-03	-1.375E-03	1.890E-06	NO STATE	0.	0.	2.75E 02
						2.121E-06				
									0.	

* ESTIMATE NOT POSSIBLE

CF 249 9/2-734 FAVORED FGAP I = 9/2 KI = 9/2 M = 0 KF = 9/2 Q ALPHA 6.335 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
394.	9/2	0	8.999E-03	0.	8.999E-03	8.098E-05	4.351E-30	2.119E-11		
		2	4.988E-03	0.	4.988E-03	2.488E-05	2.585E-30	3.868E-12		
		4	-1.895E-04	0.	-1.895E-04	3.591E-08	7.709E-31	1.665E-15		
		6	-2.153E-04	0.	-2.153E-04	4.635E-08	1.167E-31	3.254E-16		
		8	2.239E-07	0.	2.239E-07	5.014E-14	9.115E-33	2.749E-23	2.506E-11	5.51E 00
						1.059E-04				
450.	11/2	2	4.150E-03	0.	4.150E-03	1.722E-05	1.269E-30	1.315E-12		
		4	-3.095E-04	0.	-3.095E-04	9.577E-08	3.780E-31	2.178E-15		
		6	-5.861E-04	0.	-5.861E-04	3.435E-07	5.710E-32	1.180E-15		
		8	1.068E-06	0.	1.068E-06	1.140E-12	4.444E-33	3.047E-22	1.318E-12	3.31E 01
						1.766E-05				
511.	13/2	2	1.873E-03	0.	1.873E-03	3.509E-06	5.781E-31	1.220E-13		
		4	-3.143E-04	0.	-3.143E-04	9.877E-08	1.719E-31	1.021E-15		
		6	-9.898E-04	0.	-9.898E-04	9.797E-07	2.589E-32	1.526E-15		
		8	2.921E-06	0.	2.921E-06	8.534E-12	2.008E-33	1.030E-21	1.245E-13	1.27E 02
						4.587E-06				
587.*	15/2	4	-2.156E-04	0.	-2.156E-04	4.648E-08	6.291E-32	1.759E-16		
		6	-1.189E-03	0.	-1.189E-03	1.414E-06	9.446E-33	8.035E-16		
		8	5.536E-06	0.	5.536E-06	3.065E-11	7.292E-34	1.344E-21	9.794E-16	4.00E 02
						1.461E-06				
									2.650E-11	

* ESTIMATED WITH ROT. CONST.= 5.09 KEV

CF 249 9/2-734 - 7/2+624 FGAP I = 9/2 KI = 9/2 M = -1 KF = 7/2 Q ALPHA 6.335 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	1	-3.632E-04	0.	3.632E-04	1.319E-07	4.105E-28	3.258E-12		
		3	-4.536E-04	0.	4.536E-04	2.058E-07	1.739E-28	2.153E-12		
		5	6.501E-06	0.	-6.501E-06	4.226E-11	3.741E-29	9.509E-17		
		7	1.914E-05	0.	-1.914E-05	3.665E-10	4.143E-30	9.132E-17	5.411E-12	1.73E 03
						3.381E-07				
56.	9/2	1	-1.732E-04	0.	1.732E-04	2.999E-08	2.159E-28	3.893E-13		
		3	-5.627E-04	0.	5.627E-04	3.166E-07	9.137E-29	1.740E-12		
		5	1.454E-05	0.	-1.454E-05	2.113E-10	1.961E-29	2.493E-16		
		7	7.770E-05	0.	-7.770E-05	6.037E-09	2.165E-30	7.862E-16		
		9	2.452E-06	3.372E-04	3.348E-04	1.121E-07	1.251E-31	8.435E-16	2.131E-12	1.26E 03
						4.649E-07				
124.	11/2	1	-5.476E-05	0.	5.476E-05	2.999E-09	9.772E-29	1.762E-14		
		3	-4.575E-04	0.	4.575E-04	2.093E-07	4.131E-29	5.201E-13		
		5	2.069E-05	0.	-2.069E-05	4.279E-10	8.846E-30	2.276E-16		
		7	1.839E-04	0.	-1.839E-04	3.381E-08	9.732E-31	1.979E-15		
		9	1.209E-05	-3.694E-04	-3.815E-04	1.456E-07	5.597E-32	4.900E-16	5.404E-13	1.49E 03
						3.921E-07				
207.	13/2	3	-2.605E-04	0.	2.605E-04	6.784E-08	1.539E-29	6.278E-14		
		5	2.137E-05	0.	-2.137E-05	4.568E-10	3.285E-30	9.026E-17		
		7	3.056E-04	0.	-3.056E-04	9.341E-08	3.599E-31	2.022E-15		
		9	3.450E-05	3.164E-04	2.819E-04	7.945E-08	2.058E-32	9.834E-17	6.499E-14	2.42E 03
						2.412E-07				
300.*	15/2	3	-9.426E-05	0.	9.426E-05	8.884E-09	4.942E-30	2.641E-15		
		5	1.654E-05	0.	-1.654E-05	2.734E-10	1.052E-30	1.730E-17		
		7	3.831E-04	0.	-3.831E-04	1.468E-07	1.147E-31	1.012E-15		
		9	6.900E-05	-2.301E-04	-2.991E-04	8.945E-08	6.516E-33	3.506E-17	3.706E-15	2.38E 03
						2.454E-07				
									8.151E-12	

* ESTIMATED WITH ROT. CONST.= 6.22 KEV

CF 249 9/2-734 - 5/2+622 FGAP I = 9/2 KI = 9/2 M = -2 KF = 5/2 Q ALPHA 6.335 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
257.	5/2	3	-1.140E-03	0.	1.140E-03	1.299E-06	8.402E-30	6.565E-13		
		5	-2.252E-04	0.	2.252E-04	5.071E-08	1.791E-30	5.462E-15		
		7	1.494E-05	-7.088E-05	-8.582E-05	7.365E-09	1.957E-31	8.668E-17	6.620E-13	4.30E 02
						1.357E-06				
301.	7/2	3	-1.316E-03	0.	1.316E-03	1.732E-06	4.902E-30	5.107E-13		
		5	-5.200E-04	0.	5.200E-04	2.704E-07	1.043E-30	1.697E-14		
		7	7.764E-05	6.138E-05	-1.626E-05	2.644E-10	1.137E-31	1.808E-18	5.276E-13	2.92E 02
						2.003E-06				
357.	9/2	3	-1.080E-03	0.	1.080E-03	1.166E-06	2.447E-30	1.716E-13		
		5	-7.692E-04	0.	7.692E-04	5.916E-07	5.198E-31	1.850E-14		
		7	2.084E-04	-4.708E-05	-2.555E-04	6.528E-08	5.650E-32	2.218E-16		
		9	3.461E-05	5.979E-05	2.518E-05	6.342E-10	3.198E-33	1.220E-19	1.903E-13	3.20E 02
						1.823E-06				
422.	11/2	3	-6.759E-04	0.	6.759E-04	4.568E-07	1.079E-30	2.964E-14		
		5	-8.426E-04	0.	8.426E-04	7.099E-07	2.286E-31	9.761E-15		
		7	3.797E-04	3.216E-05	-3.475E-04	1.208E-07	2.477E-32	1.799E-16		
		9	1.313E-04	-8.508E-05	-2.164E-04	4.684E-08	1.396E-33	3.931E-18	3.958E-14	4.38E 02
						1.334E-06				
504.*	13/2	3	-3.161E-04	0.	3.161E-04	9.993E-08	3.776E-31	2.269E-15		
		5	-7.152E-04	0.	7.152E-04	5.116E-07	7.979E-32	2.455E-15		
		7	5.185E-04	-1.952E-05	-5.380E-04	2.895E-07	8.608E-33	1.499E-16		
		9	3.080E-04	8.868E-05	-2.193E-04	4.810E-08	4.823E-34	1.395E-18	4.876E-15	6.16E 02
						9.491E-07				
598.*	15/2	3	-9.756E-05	0.	9.756E-05	9.517E-09	1.093E-31	6.254E-17		
		5	-4.719E-04	0.	4.719E-04	2.227E-07	2.301E-32	3.083E-16		
		7	5.543E-04	1.043E-05	-5.439E-04	2.958E-07	2.471E-33	4.396E-17		
		9	5.253E-04	-7.563E-05	-6.010E-04	3.611E-07	1.376E-34	2.988E-18	4.178E-16	6.57E 02
						8.892E-07				
									1.425E-12	

* ESTIMATED WITH ROT. CONST.= 6.29 KEV

CF 251 1/2+620 FAVORED FGAP I = 1/2 KI = 1/2 M = 0 KF = 1/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	1/2	0	1.015E-02	0.	1.015E-02	1.029E-04	NO DATA	0.	0.	5.68E 00
						1.029E-04				
0.*	3/2	2	4.273E-03	0.	4.273E-03	1.826E-05	NO DATA	0.	0.	3.20E 01
						1.826E-05				
0.*	5/2	2	5.234E-03	0.	5.234E-03	2.739E-05	NO DATA	0.	0.	2.13E 01
						2.739E-05				
0.*	7/2	4	-1.634E-03	0.	-1.634E-03	2.670E-06	NO DATA	0.	0.	2.19E 02
						2.670E-06				
0.*	9/2	4	-1.827E-03	0.	-1.827E-03	3.338E-06	NO DATA	0.	0.	1.75E 02
						3.338E-06				
0.*	11/2	6	-2.085E-03	0.	-2.085E-03	4.348E-06	NO DATA	0.	0.	1.34E 02
						4.348E-06				
0.*	13/2	6	-2.252E-03	0.	-2.252E-03	5.073E-06	NO DATA	0.	0.	1.15E 02
						5.073E-06				
0.*	15/2	8	4.411E-04	0.	4.411E-04	1.946E-07	NO DATA	0.	0.	3.00E 03
						1.946E-07				
									0.	

* ESTIMATE NOT POSSIBLE

ES 249 7/2+633 FAVORED FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.213E-02	0.	-1.213E-02	1.472E-04	NO DATA	0.		
		2	5.729E-03	0.	-5.729E-03	3.283E-05	NO DATA	0.		
		4	-7.516E-04	0.	7.516E-04	5.649E-07	NO DATA	0.		
		6	-1.568E-04	0.	1.568E-04	2.460E-08	NO DATA	0.	0.	3.23E 00
						1.807E-04				
0.*	9/2	2	5.463E-03	0.	-5.463E-03	2.984E-05	NO DATA	0.		
		4	-1.474E-03	0.	1.474E-03	2.173E-06	NO DATA	0.		
		6	-5.868E-04	0.	5.868E-04	3.444E-07	NO DATA	0.		
		8	2.591E-05	0.	-2.591E-05	6.713E-10	NO DATA	0.	0.	1.81E 01
						3.236E-05				
0.*	11/2	2	2.770E-03	0.	-2.770E-03	7.674E-06	NO DATA	0.		
		4	-1.737E-03	0.	1.737E-03	3.017E-06	NO DATA	0.		
		6	-1.245E-03	0.	1.245E-03	1.550E-06	NO DATA	0.		
		8	1.187E-04	0.	-1.187E-04	1.410E-08	NO DATA	0.	0.	4.77E 01
						1.225E-05				
0.*	13/2	4	-1.351E-03	0.	1.351E-03	1.825E-06	NO DATA	0.		
		6	-1.786E-03	0.	1.786E-03	3.191E-06	NO DATA	0.		
		8	3.086E-04	0.	-3.086E-04	9.523E-08	NO DATA	0.	0.	1.14E 02
						5.111E-06				
0.*	15/2	4	-6.401E-04	0.	6.401E-04	4.097E-07	NO DATA	0.		
		6	-1.828E-03	0.	1.828E-03	3.343E-06	NO DATA	0.		
		8	5.471E-04	0.	-5.471E-04	2.993E-07	NO DATA	0.	0.	1.44E 02
						4.052E-06				
									0.	

* ESTIMATE NOT POSSIBLE

ES 251 7/2+633 FAVORED FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.055E-02	0.	-1.055E-02	1.113E-04	NO DATA	0.		
		2	4.928E-03	0.	-4.928E-03	2.429E-05	NO DATA	0.		
		4	-6.698E-04	0.	6.698E-04	4.486E-07	NO DATA	0.		
		6	-1.340E-04	0.	1.340E-04	1.796E-08	NO DATA	0.	0.	4.29E 00

						1.361E-04				
0.*	9/2	2	4.699E-03	0.	-4.699E-03	2.208E-05	NO DATA	0.		
		4	-1.314E-03	0.	1.314E-03	1.725E-06	NO DATA	0.		
		6	-5.014E-04	0.	5.014E-04	2.514E-07	NO DATA	0.		
		8	2.531E-05	0.	-2.531E-05	6.404E-10	NO DATA	0.	0.	2.43E 01

						2.406E-05				
0.*	11/2	2	2.383E-03	0.	-2.383E-03	5.678E-06	NO DATA	0.		
		4	-1.548E-03	0.	1.548E-03	2.396E-06	NO DATA	0.		
		6	-1.064E-03	0.	1.064E-03	1.131E-06	NO DATA	0.		
		8	1.160E-04	0.	-1.160E-04	1.345E-08	NO DATA	0.	0.	6.34E 01

						9.219E-06				
0.*	13/2	4	-1.204E-03	0.	1.204E-03	1.449E-06	NO DATA	0.		
		6	-1.526E-03	0.	1.526E-03	2.329E-06	NO DATA	0.		
		8	3.014E-04	0.	-3.014E-04	9.084E-08	NO DATA	0.	0.	1.51E 02

						3.870E-06				
0.*	15/2	4	-5.704E-04	0.	5.704E-04	3.254E-07	NO DATA	0.		
		6	-1.562E-03	0.	1.562E-03	2.440E-06	NO DATA	0.		
		8	5.343E-04	0.	-5.343E-04	2.855E-07	NO DATA	0.	0.	1.91E 02

						3.051E-06				

									0.	

* ESTIMATE NOT POSSIBLE

ES 253 FAVORED FGAP 7/2+633 I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 6.780 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	0	1.245E-02	0.	-1.245E-02	1.549E-04	2.450E-26	2.282E-07		
		2	5.251E-03	0.	-5.251E-03	2.757E-05	1.474E-26	2.445E-08		
		4	-8.926E-04	0.	8.926E-04	7.967E-07	4.531E-27	2.171E-10		
		6	-9.763E-05	0.	9.763E-05	9.531E-09	7.194E-28	4.124E-13	2.529E-07	3.19E 00
						1.833E-04				
42.	9/2	2	5.006E-03	0.	-5.006E-03	2.506E-05	9.538E-27	1.438E-08		
		4	-1.751E-03	0.	1.751E-03	3.064E-06	2.928E-27	5.397E-10		
		6	-3.653E-04	0.	3.653E-04	1.334E-07	4.640E-28	3.724E-12		
		8	4.380E-05	0.	-4.380E-05	1.918E-09	3.857E-29	4.449E-15	1.492E-08	2.07E 01
						2.826E-05				
94.	11/2	2	2.539E-03	0.	-2.539E-03	6.445E-06	5.518E-27	2.139E-09		
		4	-2.063E-03	0.	2.063E-03	4.255E-06	1.692E-27	4.330E-10		
		6	-7.749E-04	0.	7.749E-04	6.004E-07	2.675E-28	9.660E-12		
		8	2.007E-04	0.	-2.007E-04	4.028E-08	2.216E-29	5.369E-14	2.582E-09	5.15E 01
						1.134E-05				
154.*	13/2	4	-1.604E-03	0.	1.604E-03	2.574E-06	8.868E-28	1.373E-10		
		6	-1.112E-03	0.	1.112E-03	1.236E-06	1.399E-28	1.040E-11		
		8	5.216E-04	0.	-5.216E-04	2.721E-07	1.155E-29	1.889E-13	1.479E-10	1.43E 02
						4.082E-06				
229.	15/2	4	-7.602E-04	0.	7.602E-04	5.779E-07	3.917E-28	1.361E-11		
		6	-1.138E-03	0.	1.138E-03	1.295E-06	6.157E-29	4.796E-12		
		8	9.247E-04	0.	-9.247E-04	8.551E-07	5.061E-30	2.603E-13	1.867E-11	2.14E 02
						2.728E-06				
									2.705E-07	

* ESTIMATED WITH ROT. CONST.= 4.64 KEV

ES 253 7/2+633 - 3/2-521 FGAP I = 7/2 KI = 7/2 M = -2 KF = 3/2 Q ALPHA 6.780 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
9.	3/2	3	-1.483E-03	0.	-1.483E-03	2.198E-06	8.108E-27	1.072E-09		
		5	-1.893E-04	1.888E-04	-3.780E-04	1.429E-07	1.787E-27	1.536E-11	1.087E-09	2.50E 02
						2.341E-06				
40.	5/2	3	-2.097E-03	0.	-2.097E-03	4.397E-06	5.877E-27	1.554E-09		
		5	-7.082E-04	-1.766E-04	-5.316E-04	2.826E-07	1.294E-27	2.199E-11	1.576E-09	1.25E 02
						4.679E-06				
83.	7/2	3	-1.999E-03	0.	-1.999E-03	3.997E-06	3.738E-27	8.985E-10		
		5	-1.389E-03	1.385E-04	-1.527E-03	2.333E-06	8.218E-28	1.153E-10		
		7	2.945E-05	7.091E-05	-4.146E-05	1.719E-09	9.391E-29	9.708E-15	1.014E-09	9.23E 01
						6.331E-06				
138.	9/2	3	-1.414E-03	0.	-1.414E-03	1.998E-06	2.078E-27	2.498E-10		
		5	-1.856E-03	-9.256E-05	-1.763E-03	3.109E-06	4.561E-28	8.529E-11		
		7	8.711E-05	-1.049E-04	1.920E-04	3.686E-08	5.197E-29	1.152E-13	3.352E-10	1.14E 02
						5.145E-06				
205.	11/2	3	-7.335E-04	0.	-7.335E-04	5.381E-07	1.009E-27	3.267E-11		
		5	-1.837E-03	5.236E-05	-1.890E-03	3.571E-06	2.210E-28	4.746E-11		
		7	1.591E-04	1.094E-04	4.964E-05	2.465E-09	2.510E-29	3.720E-15		
		9	1.588E-04	-3.959E-05	1.984E-04	3.934E-08	1.504E-30	3.560E-15	8.014E-11	1.41E 02
						4.150E-06				
283.	13/2	3	-2.480E-04	0.	-2.480E-04	6.149E-08	4.255E-28	1.574E-12		
		5	-1.375E-03	-2.449E-05	-1.350E-03	1.823E-06	9.290E-29	1.019E-11		
		7	2.092E-04	-8.993E-05	2.991E-04	8.945E-08	1.051E-29	5.653E-14		
		9	4.445E-04	6.929E-05	3.753E-04	1.408E-07	6.264E-31	5.305E-15	1.182E-11	2.76E 02
						2.115E-06				
376.*	15/2	5	-7.562E-04	8.980E-06	-7.652E-04	5.855E-07	3.280E-29	1.155E-12		
		7	2.084E-04	5.973E-05	1.486E-04	2.209E-08	3.693E-30	4.907E-15		
		9	7.932E-04	-8.242E-05	8.756E-04	7.667E-07	2.188E-31	1.009E-14	1.17CE-12	4.25E 02
						1.374E-06				
									4.106E-09	

* ESTIMATED WITH ROT. CONST.= 6.17 KEV

ES 253 7/2+633 - 5/2+642 FGAP I = 7/2 KI = 7/2 M = -1 KF = 5/2 Q ALPHA 6.780 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
389.	5/2	2	-1.430E-03	0.	1.430E-03	2.045E-06	2.154E-28	2.649E-11		
		4	-4.371E-04	0.	4.371E-04	1.911E-07	6.550E-29	7.527E-13		
		6	6.714E-06	2.355E-04	2.288E-04	5.236E-08	1.023E-29	3.221E-14	2.727E-11	2.55E 02
						2.288E-06				
429.	7/2	2	-1.401E-03	0.	1.401E-03	1.963E-06	1.367E-28	1.614E-11		
		4	-9.215E-04	0.	9.215E-04	8.492E-07	4.153E-29	2.121E-12		
		6	3.289E-05	-1.923E-04	-2.252E-04	5.072E-08	6.474E-30	1.975E-14	1.828E-11	2.04E 02
						2.863E-06				
475.	9/2	2	-8.836E-04	0.	8.836E-04	7.808E-07	8.028E-29	3.770E-12		
		4	-1.195E-03	0.	1.195E-03	1.429E-06	2.436E-29	2.094E-12		
		6	8.140E-05	1.360E-04	5.459E-05	2.980E-09	3.789E-30	6.792E-16		
		8	6.594E-05	3.021E-04	2.362E-04	5.579E-08	3.070E-31	1.030E-15	5.865E-12	2.58E 02
						2.268E-06				
542.	11/2	2	-3.449E-04	0.	3.449E-04	1.190E-07	3.666E-29	2.623E-13		
		4	-1.084E-03	0.	1.084E-03	1.176E-06	1.110E-29	7.852E-13		
		6	1.329E-04	-8.328E-05	-2.162E-04	4.674E-08	1.722E-30	4.842E-15		
		8	2.326E-04	-3.997E-04	-6.323E-04	3.998E-07	1.390E-31	3.342E-15	1.056E-12	3.35E 02
						1.741E-06				
598.	13/2	4	-6.929E-04	0.	6.929E-04	4.801E-07	5.688E-30	1.642E-13		
		6	1.567E-04	4.363E-05	-1.131E-04	1.278E-08	8.801E-31	6.767E-16		
		8	4.967E-04	3.793E-04	-1.174E-04	1.378E-08	7.078E-32	5.864E-17	1.650E-13	1.15E 03
						5.067E-07				
683.*	15/2	4	-2.800E-04	0.	2.800E-04	7.839E-08	2.023E-30	9.536E-15		
		6	1.368E-04	-1.904E-05	-1.558E-04	2.428E-08	3.118E-31	4.554E-16		
		8	7.509E-04	-2.867E-04	-1.038E-03	1.077E-06	2.495E-32	1.616E-15	1.161E-14	4.95E 02
						1.179E-06				
									5.265E-11	

* ESTIMATED WITH ROT. CONST.= 5.68 KEV

ES 253 7/2+633 - 3/2+651 FGAP I = 7/2 KI = 7/2 M = -2 KF = 3/2 Q ALPHA 6.780 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
920.	3/2	2	-1.036E-04	0.	1.036E-04	1.074E-08	3.377E-31	2.182E-16		
		4	1.140E-04	0.	-1.140E-04	1.299E-08	1.013E-31	7.915E-17	2.974E-16	2.46E 04
						2.374E-08				
920.	5/2	2	-8.463E-05	0.	8.463E-05	7.162E-09	3.377E-31	1.455E-16		
		4	2.526E-04	0.	-2.526E-04	6.379E-08	1.013E-31	3.885E-16		
		6	1.235E-04	2.628E-04	1.392E-04	1.939E-08	1.546E-32	1.802E-17	5.521E-16	6.47E 03
						9.034E-08				
1010.	7/2	2	-5.352E-05	0.	5.352E-05	2.865E-09	1.032E-31	1.778E-17		
		4	3.437E-04	0.	-3.437E-04	1.181E-07	3.087E-32	2.193E-16		
		6	3.906E-04	-3.324E-04	-7.230E-04	5.227E-07	4.694E-33	1.476E-16	3.847E-16	9.08E 02
						6.437E-07				
966.	9/2	2	-2.552E-05	0.	2.552E-05	6.511E-10	1.849E-31	7.241E-18		
		4	3.370E-04	0.	-3.370E-04	1.136E-07	5.538E-32	3.783E-16		
		6	7.308E-04	3.109E-04	-4.199E-04	1.763E-07	8.437E-33	8.947E-17		
		8	1.261E-04	3.334E-04	2.073E-04	4.295E-08	6.639E-34	1.715E-18	4.767E-16	1.75E 03
						3.335E-07				
966.*	11/2	2	-8.069E-06	0.	8.069E-06	6.511E-11	1.849E-31	7.241E-19		
		4	2.477E-04	0.	-2.477E-04	6.133E-08	5.538E-32	2.043E-16		
		6	9.668E-04	-2.350E-04	-1.202E-03	1.444E-06	8.437E-33	7.329E-16		
		8	3.604E-04	-5.444E-04	-9.048E-04	8.187E-07	6.639E-34	3.269E-17	9.706E-16	2.51E 02
						2.324E-06				
966.*	13/2	4	1.335E-04	0.	-1.335E-04	1.781E-08	5.538E-32	5.932E-17		
		6	9.611E-04	1.460E-04	-8.150E-04	6.643E-07	8.437E-33	3.371E-16		
		8	6.490E-04	6.126E-04	-3.632E-05	1.319E-09	6.639E-34	5.266E-20	3.964E-16	8.55E 02
						6.834E-07				
966.*	15/2	4	4.670E-05	0.	-4.670E-05	2.181E-09	5.538E-32	7.264E-18		
		6	7.265E-04	-7.359E-05	-8.001E-04	6.401E-07	8.437E-33	3.248E-16		
		8	8.497E-04	-5.348E-04	-1.384E-03	1.917E-06	6.639E-34	7.653E-17	4.086E-16	2.28E 02
						2.559E-06				
									3.486E-15	

* ESTIMATED WITH ROT. CONST.= 0. KEV

FM 255 FAVORED FGAP 7/2+613 I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 7.276 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
106.	7/2	0	1.239E-02	0.	-1.239E-02	1.534E-04	4.614E-25	4.258E-06		
		2	5.618E-03	0.	-5.618E-03	3.157E-05	2.795E-25	5.307E-07		
		4	-9.500E-04	0.	9.500E-04	9.025E-07	8.725E-26	4.736E-09		
		6	-1.361E-04	0.	1.361E-04	1.852E-08	1.419E-26	1.581E-11	4.793E-06	3.14E 00
						1.859E-04				
166.	9/2	2	5.357E-03	0.	-5.357E-03	2.870E-05	1.565E-25	2.701E-07		
		4	-1.863E-03	0.	1.863E-03	3.471E-06	4.877E-26	1.018E-08		
		6	-5.092E-04	0.	5.092E-04	2.593E-07	7.912E-27	1.234E-10		
		8	4.970E-05	0.	-4.970E-05	2.470E-09	6.787E-28	1.008E-13	2.804E-07	1.80E 01
						3.243E-05				
240.	11/2	2	2.716E-03	0.	-2.716E-03	7.379E-06	7.574E-26	3.361E-08		
		4	-2.195E-03	0.	2.195E-03	4.820E-06	2.355E-26	6.828E-09		
		6	-1.080E-03	0.	1.080E-03	1.167E-06	3.809E-27	2.673E-10		
		8	2.278E-04	0.	-2.278E-04	5.188E-08	3.253E-28	1.015E-12	4.071E-08	4.35E 01
						1.342E-05				
326.	13/2	4	-1.708E-03	0.	1.708E-03	2.916E-06	9.957E-27	1.746E-09		
		6	-1.550E-03	0.	1.550E-03	2.403E-06	1.604E-27	2.318E-10		
		8	5.919E-04	0.	-5.919E-04	3.504E-07	1.363E-28	2.873E-12	1.981E-09	1.03E 02
						5.669E-06				
426.*	15/2	4	-8.090E-04	0.	8.090E-04	6.545E-07	3.581E-27	1.410E-10		
		6	-1.586E-03	0.	1.586E-03	2.517E-06	5.746E-28	8.698E-11		
		8	1.049E-03	0.	-1.049E-03	1.101E-06	4.854E-29	3.215E-12	2.312E-10	1.37E 02
						4.273E-06				
									5.116E-06	

* ESTIMATED WITH ROT. CONST.= 6.67 KEV

FM 255 7/2+613 - 1/2+620 FGAP V I = 7/2 KI = 7/2 M = -3 KF = 1/2 Q ALPHA 7.276 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	1/2	4	4.179E-04	-1.865E-04	-6.044E-04	3.653E-07	2.393E-25	5.258E-09	5.258E-09	1.60E 03
						3.653E-07				
25.	3/2	4	9.889E-04	2.207E-04	-7.682E-04	5.901E-07	1.890E-25	6.708E-09	6.708E-09	9.90E 02
						5.901E-07				
48.	5/2	4	1.342E-03	-1.996E-04	-1.541E-03	2.376E-06	1.520E-25	2.172E-08		
		6	2.495E-04	-1.365E-04	-3.860E-04	1.490E-07	2.477E-26	2.220E-10	2.194E-08	2.31E 02
						2.525E-06				
106.*	7/2	4	1.333E-03	1.488E-04	-1.185E-03	1.403E-06	8.697E-26	7.341E-09		
		6	5.762E-04	2.364E-04	-3.398E-04	1.155E-07	1.414E-26	9.822E-11	7.439E-09	3.85E 02
						1.519E-06				
149.	9/2	4	1.034E-03	-9.229E-05	-1.126E-03	1.268E-06	5.756E-26	4.389E-09		
		6	8.522E-04	-2.797E-04	-1.132E-03	1.281E-06	9.343E-27	7.201E-10		
		8	-1.499E-04	-4.165E-05	1.082E-04	1.172E-08	8.022E-28	5.653E-13	5.110E-09	2.28E 02
						2.561E-06				
241.*	11/2	4	6.290E-04	4.680E-05	-5.822E-04	3.390E-07	2.340E-26	4.771E-10		
		6	9.336E-04	2.554E-04	-6.782E-04	4.600E-07	3.784E-27	1.047E-10		
		8	-3.547E-04	8.214E-05	4.368E-04	1.908E-07	3.231E-28	3.709E-12	5.855E-10	5.90E 02
						9.898E-07				
300.*	13/2	4	2.894E-04	-1.846E-05	-3.079E-04	9.480E-08	1.288E-26	7.344E-11		
		6	7.925E-04	-1.858E-04	-9.783E-04	9.571E-07	2.077E-27	1.196E-10		
		8	-5.454E-04	-1.082E-04	4.371E-04	1.911E-07	1.768E-28	2.032E-12	1.950E-10	4.70E 02
						1.243E-06				
425.*	15/2	4	8.841E-05	4.933E-06	-8.347E-05	6.968E-09	3.601E-27	1.509E-12		
		6	5.229E-04	1.073E-04	-4.156E-04	1.728E-07	5.778E-28	6.003E-12		
		8	-6.233E-04	1.082E-04	7.315E-04	5.351E-07	4.881E-29	1.571E-12	9.083E-12	8.17E 02
						7.149E-07				
									4.724E-08	

* ESTIMATED WITH ROT. CONST.= 6.47 KEV, AND DEC. PARAM.= 0.289

FM 255 7/2+613 - 9/2+615 FGAP I = 7/2 KI = 7/2 M = 1 KF = 9/2 Q ALPHA 7.276 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
426.	9/2	2	-4.823E-05	0.	4.823E-05	2.327E-09	1.157E-26	1.619E-12		
		4	7.462E-06	0.	-7.462E-06	5.568E-11	3.581E-27	1.199E-14		
		6	1.929E-06	0.	-1.929E-06	3.722E-12	5.746E-28	1.286E-16		
		8	-1.163E-07	1.772E-04	1.774E-04	3.146E-08	4.854E-29	9.184E-14	1.723E-12	1.73E 04
						3.384E-08				
0.*	11/2	2	-3.646E-05	0.	3.646E-05	1.329E-09	NO STATE	0.		
		4	1.311E-05	0.	-1.311E-05	1.718E-10	NO STATE	0.		
		6	6.101E-06	0.	-6.101E-06	3.722E-11	NO STATE	0.		
		8	-7.946E-07	-1.211E-04	-1.203E-04	1.447E-08	NO STATE	0.	0.	3.65E 04
						1.601E-08				
0.*	13/2	4	1.310E-05	0.	-1.310E-05	1.715E-10	NO STATE	0.		
		6	1.124E-05	0.	-1.124E-05	1.264E-10	NO STATE	0.		
		8	-2.653E-06	7.349E-05	7.615E-05	5.798E-09	NO STATE	0.	0.	9.58E 04
						6.096E-09				
0.*	15/2	4	7.483E-06	0.	-7.483E-06	5.600E-11	NO STATE	0.		
		6	1.388E-05	0.	-1.388E-05	1.927E-10	NO STATE	0.		
		8	-5.671E-06	-3.928E-05	-3.361E-05	1.130E-09	NO STATE	0.	0.	4.24E 05
						1.379E-09				
									1.723E-12	

* ESTIMATE NOT POSSIBLE

FM 255 7/2+613 - 11/2-725 FGAP I = 7/2 KI = 7/2 M = 2 KF = 11/2 Q ALPHA 7.276 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
546.	11/2	3	-3.115E-04	0.	-3.115E-04	9.705E-08	1.991E-27	1.162E-11		
		5	-6.259E-06	0.	-6.259E-06	3.917E-11	4.411E-28	1.039E-15		
		7	1.471E-05	0.	1.471E-05	2.164E-10	5.093E-29	6.629E-16		
		9	-4.522E-07	-4.333E-05	4.288E-05	1.839E-09	3.118E-30	3.448E-16	1.162E-11	5.89E 03

						9.914E-08				
0.*	13/2	3	-2.884E-04	0.	-2.884E-04	8.319E-08	NO STATE	0.		
		5	-1.283E-05	0.	-1.283E-05	1.645E-10	NO STATE	0.		
		7	5.296E-05	0.	5.296E-05	2.805E-09	NO STATE	0.		
		9	-3.467E-06	2.769E-05	-3.116E-05	9.707E-10	NO STATE	0.	0.	6.71E 03

						8.713E-08				
0.*	15/2	5	-1.469E-05	0.	-1.469E-05	2.157E-10	NO STATE	0.		
		7	1.098E-04	0.	1.098E-04	1.206E-08	NO STATE	0.		
		9	-1.288E-05	-1.582E-05	2.944E-06	8.665E-12	NO STATE	0.	0.	4.75E 04

						1.229E-08				

									1.162E-11	

* ESTIMATE NOT POSSIBLE

FM 255 7/2+613 - 3/2+622 FGAP I = 7/2 KI = 7/2 M = -2 KF = 3/2 Q ALPHA 7.276 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
395.	3/2	2	1.092E-04	0.	-1.092E-04	1.194E-08	1.591E-26	1.142E-11		
		4	2.492E-05	0.	-2.492E-05	6.209E-10	4.929E-27	1.841E-13	1.161E-11	4.65E 04
						1.256E-08				
430.	5/2	2	8.920E-05	0.	-8.920E-05	7.957E-09	1.110E-26	5.314E-12		
		4	5.521E-05	0.	-5.521E-05	3.048E-09	3.436E-27	6.300E-13		
		6	-3.028E-06	-2.747E-04	-2.717E-04	7.383E-08	5.512E-28	2.448E-12	8.392E-12	6.89E 03
						8.483E-08				
479.*	7/2	2	5.642E-05	0.	-5.642E-05	3.183E-09	6.676E-27	1.278E-12		
		4	7.513E-05	0.	-7.513E-05	5.645E-09	2.063E-27	7.005E-13		
		6	-9.575E-06	3.475E-04	3.571E-04	1.275E-07	3.303E-28	2.533E-12	4.512E-12	4.28E 03
						1.363E-07				
542.*	9/2	2	2.690E-05	0.	-2.690E-05	7.234E-10	3.442E-27	1.497E-13		
		4	7.367E-05	0.	-7.367E-05	5.428E-09	1.062E-27	3.466E-13		
		6	-1.791E-05	-3.251E-04	-3.072E-04	9.435E-08	1.695E-28	9.620E-13		
		8	-5.043E-06	-2.467E-04	-2.417E-04	5.840E-08	1.423E-29	4.997E-14	1.508E-12	3.68E 03
						1.589E-07				
619.*	11/2	2	8.505E-06	0.	-8.505E-06	7.234E-11	1.511E-27	6.574E-15		
		4	5.414E-05	0.	-5.414E-05	2.931E-09	4.652E-28	8.201E-14		
		6	-2.370E-05	2.457E-04	2.694E-04	7.260E-08	7.404E-29	3.233E-13		
		8	-1.441E-05	4.029E-04	4.173E-04	1.741E-07	6.185E-30	6.477E-14	4.766E-13	2.34E 03
						2.497E-07				
710.*	13/2	4	2.917E-05	0.	-2.917E-05	8.511E-10	1.721E-28	8.808E-15		
		6	-2.356E-05	-1.527E-04	-1.291E-04	1.667E-08	2.728E-29	2.735E-14		
		8	-2.595E-05	-4.534E-04	-4.274E-04	1.827E-07	2.267E-30	2.491E-14	6.107E-14	2.92E 03
						2.002E-07				
815.*	15/2	4	1.021E-05	0.	-1.021E-05	1.042E-10	5.316E-29	3.332E-16		
		6	-1.781E-05	7.694E-05	9.475E-05	8.978E-09	8.390E-30	4.530E-15		
		8	-3.397E-05	3.957E-04	4.297E-04	1.847E-07	6.928E-31	7.695E-15	1.256E-14	3.02E 03
						1.937E-07				
									2.657E-11	

* ESTIMATED WITH ROT. CONST.= 7.00 KEV

FM 257 9/2+615 FAVORED FGAP I = 9/2 KI = 9/2 M = 0 KF = 9/2 Q ALPHA 6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
243.	9/2	0	1.402E-02	0.	1.402E-02	1.966E-04	2.891E-27	3.417E-08		
		2	7.139E-03	0.	7.139E-03	5.097E-05	1.743E-27	5.342E-09		
		4	-9.742E-04	0.	-9.742E-04	9.490E-07	5.377E-28	3.069E-11		
		6	-2.636E-04	0.	-2.636E-04	6.951E-08	8.587E-29	3.590E-13		
		8	3.474E-05	0.	3.474E-05	1.207E-09	7.208E-30	5.231E-16	3.955E-08	2.35E 00
						2.485E-04				
320.	11/2	2	5.940E-03	0.	5.940E-03	3.528E-05	7.546E-28	1.601E-09		
		4	-1.591E-03	0.	-1.591E-03	2.531E-06	2.324E-28	3.537E-11		
		6	-7.178E-04	0.	-7.178E-04	5.152E-07	3.699E-29	1.146E-12		
		8	1.656E-04	0.	1.656E-04	2.744E-08	3.091E-30	5.100E-15	1.638E-09	1.52E 01
						3.836E-05				
411.*	13/2	2	2.681E-03	0.	2.681E-03	7.187E-06	2.751E-28	1.189E-10		
		4	-1.615E-03	0.	-1.615E-03	2.610E-06	8.450E-29	1.326E-11		
		6	-1.212E-03	0.	-1.212E-03	1.469E-06	1.340E-29	1.184E-12		
		8	4.532E-04	0.	4.532E-04	2.054E-07	1.114E-30	1.376E-14	1.334E-10	5.09E 01
						1.147E-05				
516.*	15/2	4	-1.108E-03	0.	-1.108E-03	1.228E-06	2.558E-29	1.890E-12		
		6	-1.456E-03	0.	-1.456E-03	2.121E-06	4.038E-30	5.151E-13		
		8	8.589E-04	0.	8.589E-04	7.378E-07	3.336E-31	1.480E-14	2.419E-12	1.43E 02
						4.087E-06				
									4.132E-08	

* ESTIMATED WITH ROT. CONST.= 7.00 KEV

FM 257   9/2+615 - 7/2+613   FGAP   I = 9/2   KI = 9/2   M = -1   KF = 7/2   Q ALPHA   6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	2	1.582E-04	0.	1.582E-04	2.502E-08	2.221E-26	3.342E-11		
		4	-2.447E-05	0.	-2.447E-05	5.988E-10	6.898E-27	2.484E-13		
		6	-6.326E-06	0.	-6.326E-06	4.002E-11	1.113E-27	2.679E-15		
		8	3.814E-07	5.813E-04	5.816E-04	3.383E-07	9.475E-29	1.928E-12	3.560E-11	1.61E 03
						3.640E-07				
60.	9/2	2	1.337E-04	0.	1.337E-04	1.787E-08	1.201E-26	1.290E-11		
		4	-4.136E-05	0.	-4.136E-05	1.711E-09	3.722E-27	3.831E-13		
		6	-1.871E-05	0.	-1.871E-05	3.502E-10	5.991E-28	1.262E-14		
		8	2.412E-06	-4.595E-04	-4.571E-04	2.090E-07	5.082E-29	6.387E-13	1.394E-11	2.55E 03
						2.289E-07				
133.*	11/2	2	7.462E-05	0.	7.462E-05	5.568E-09	5.595E-27	1.873E-12		
		4	-4.531E-05	0.	-4.531E-05	2.053E-09	1.731E-27	2.138E-13		
		6	-3.418E-05	0.	-3.418E-05	1.168E-09	2.778E-28	1.951E-14		
		8	7.716E-06	3.266E-04	3.344E-04	1.118E-07	2.346E-29	1.578E-13	2.265E-12	4.84E 03
						1.206E-07				
220.*	13/2	2	2.622E-05	0.	2.622E-05	6.874E-10	2.231E-27	9.224E-14		
		4	-3.582E-05	0.	-3.582E-05	1.283E-09	6.889E-28	5.317E-14		
		6	-4.493E-05	0.	-4.493E-05	2.019E-09	1.101E-28	1.337E-14		
		8	1.644E-05	-2.087E-04	-1.923E-04	3.698E-08	9.255E-30	2.058E-14	1.794E-13	1.43E 04
						4.096E-08				
320.*	15/2	4	-2.038E-05	0.	-2.038E-05	4.152E-10	2.324E-28	5.802E-15		
		6	-4.476E-05	0.	-4.476E-05	2.004E-09	3.699E-29	4.457E-15		
		8	2.583E-05	1.193E-04	1.451E-04	2.105E-08	3.091E-30	3.913E-15	1.417E-14	2.49E 04
						2.347E-08				
									5.200E-11	

* ESTIMATED WITH ROT. CONST.= 6.67 KEV

FM 257 9/2+615 - 11/2-725 FGAP I = 9/2 KI = 9/2 M = 1 KF = 11/2 Q ALPHA 6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
243.	11/2	1	7.355E-05	0.	-7.355E-05	5.410E-09	2.442E-27	7.945E-13		
		3	8.981E-05	0.	-8.981E-05	8.066E-09	1.052E-27	5.104E-13		
		5	-2.776E-05	0.	2.776E-05	7.707E-10	2.331E-28	1.081E-14		
		7	-4.463E-06	0.	4.463E-06	1.992E-11	2.693E-29	3.227E-17		
		9	7.995E-07	0.	-7.995E-07	6.393E-13	1.650E-30	6.343E-20	1.316E-12	4.09E 04
						1.427E-08				
333.	13/2	3	9.701E-05	0.	-9.701E-05	9.410E-09	3.945E-28	2.233E-13		
		5	-5.442E-05	0.	5.442E-05	2.962E-09	8.715E-29	1.553E-14		
		7	-1.408E-05	0.	1.408E-05	1.982E-10	1.002E-29	1.195E-16		
		9	4.330E-06	0.	-4.330E-06	1.875E-11	6.102E-31	6.882E-19	2.389E-13	4.64E 04
						1.259E-08				
437.*	15/2	3	5.397E-05	0.	-5.397E-05	2.913E-09	1.239E-28	2.171E-14		
		5	-6.474E-05	0.	6.474E-05	4.191E-09	2.727E-29	6.875E-15		
		7	-2.713E-05	0.	2.713E-05	7.361E-10	3.120E-30	1.381E-16		
		9	1.332E-05	0.	-1.332E-05	1.773E-10	1.887E-31	2.012E-18	2.872E-14	7.29E 04
						8.017E-09				
									1.583E-12	

* ESTIMATED WITH ROT. CONST.= 6.92 KEV

FM 257 9/2+615 - 3/2+622 FGAP   I = 9/2   KI = 9/2   M = -3   KF = 3/2   Q ALPHA 6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
243.	3/2	4	2.696E-04	0.	2.696E-04	7.269E-08	5.378E-28	2.351E-12		
		6	2.212E-05	4.770E-05	6.982E-05	4.874E-09	8.587E-29	2.518E-14	2.376E-12	7.53E 03
						7.757E-08				
278.	5/2	4	4.118E-04	0.	4.118E-04	1.696E-07	3.679E-28	3.754E-12		
		6	8.689E-05	-4.684E-05	4.005E-05	1.604E-09	5.867E-29	5.659E-15	3.759E-12	3.41E 03
						1.712E-07				
327.*	7/2	4	4.424E-04	0.	4.424E-04	1.957E-07	2.151E-28	2.533E-12		
		6	1.832E-04	3.950E-05	2.227E-04	4.958E-08	3.423E-29	1.021E-13		
		8	-1.526E-05	1.347E-05	-1.791E-06	3.208E-12	2.859E-30	5.517E-19	2.635E-12	2.38E 03
						2.453E-07				
390.*	9/2	4	3.739E-04	0.	3.739E-04	1.398E-07	1.069E-28	8.991E-13		
		6	2.709E-04	-2.921E-05	2.417E-04	5.842E-08	1.697E-29	5.963E-14		
		8	-4.825E-05	-2.129E-05	-6.955E-05	4.837E-09	1.412E-30	4.108E-16	9.591E-13	2.88E 03
						2.031E-07				
467.*	11/2	4	2.554E-04	0.	2.554E-04	6.524E-08	4.485E-29	1.760E-13		
		6	3.085E-04	1.901E-05	3.275E-04	1.073E-07	7.094E-30	4.578E-14		
		8	-9.625E-05	2.427E-05	-7.198E-05	5.181E-09	5.877E-31	1.831E-16	2.219E-13	3.29E 03
						1.777E-07				
558.*	13/2	4	1.399E-04	0.	1.399E-04	1.957E-08	1.573E-29	1.851E-14		
		6	2.810E-04	-1.082E-05	2.702E-04	7.301E-08	2.478E-30	1.088E-14		
		8	-1.420E-04	-2.239E-05	-1.644E-04	2.704E-08	2.042E-31	3.321E-16	2.972E-14	4.88E 03
						1.196E-07				
663.*	15/2	4	5.877E-05	0.	5.877E-05	3.454E-09	4.557E-30	9.466E-16		
		6	2.068E-04	5.308E-06	2.121E-04	4.498E-08	7.149E-31	1.934E-15		
		8	-1.649E-04	1.732E-05	-1.475E-04	2.177E-08	5.855E-32	7.665E-17	2.957E-15	8.32E 03
						7.020E-08				
									9.984E-12	

* ESTIMATED WITH ROT. CONST.= 7.00 KEV

FM 257   3/2+622   FAVORED   FGAP   I = 3/2   KI = 3/2   M = 0   KF = 3/2   Q ALPHA   6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
243.	3/2	0	1.078E-02	0.	-1.078E-02	1.162E-04	2.891E-27	2.021E-08		
		2	2.757E-03	0.	-2.757E-03	7.600E-06	1.743E-27	7.966E-10	2.101E-08	4.72E 00
						1.238E-04				
278.	5/2	2	4.421E-03	0.	-4.421E-03	1.954E-05	1.193E-27	1.403E-09		
		4	-7.867E-05	0.	7.867E-05	6.189E-09	3.679E-28	1.370E-13	1.403E-09	2.99E 01
						1.955E-05				
327.*	7/2	2	3.295E-03	0.	-3.295E-03	1.086E-05	6.988E-28	4.563E-10		
		4	-1.927E-04	0.	1.927E-04	3.713E-08	2.151E-28	4.805E-13	4.568E-10	5.36E 01
						1.089E-05				
390.*	9/2	4	-2.431E-04	0.	2.431E-04	5.908E-08	1.069E-28	3.799E-13		
		6	1.106E-04	0.	-1.106E-04	1.222E-08	1.697E-29	1.248E-14	3.924E-13	8.19E 03
						7.130E-08				
467.*	11/2	4	-1.660E-04	0.	1.660E-04	2.757E-08	4.485E-29	7.436E-14		
		6	2.345E-04	0.	-2.345E-04	5.501E-08	7.094E-30	2.347E-14	9.784E-14	7.07E 03
						8.258E-08				
558.*	13/2	6	2.744E-04	0.	-2.744E-04	7.531E-08	2.478E-30	1.122E-14		
		8	8.467E-05	0.	-8.467E-05	7.168E-09	2.042E-31	8.804E-17	1.131E-14	7.08E 03
						8.247E-08				
663.*	15/2	6	1.796E-04	0.	-1.796E-04	3.227E-08	7.149E-31	1.388E-15		
		8	1.693E-04	0.	-1.693E-04	2.867E-08	5.855E-32	1.010E-16	1.489E-15	9.59E 03
						6.095E-08				
									2.287E-08	

* ESTIMATED WITH ROT. CONST.= 7.00 KEV

FM 257 3/2+622 - 7/2+613 FGAP I = 3/2 KI = 3/2 M = 2 KF = 7/2 Q ALPHA 6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.	7/2	2	4.907E-04	0.	-4.907E-04	2.408E-07	2.221E-26	3.217E-10		
		4	1.119E-04	0.	-1.119E-04	1.253E-08	6.898E-27	5.198E-12	3.269E-10	2.31E 03
						2.534E-07				
60.	9/2	4	2.824E-04	0.	-2.824E-04	7.973E-08	3.722E-27	1.785E-11		
		6	-1.666E-05	1.512E-03	1.528E-03	2.335E-06	5.991E-28	8.414E-11	1.020E-10	2.42E 02
						2.415E-06				
133.*	11/2	4	3.093E-04	0.	-3.093E-04	9.568E-08	1.731E-27	9.963E-12		
		6	-5.667E-05	-1.143E-03	-1.086E-03	1.179E-06	2.778E-28	1.970E-11	2.966E-11	4.58E 02
						1.275E-06				
220.*	13/2	6	-9.570E-05	5.789E-04	6.746E-04	4.550E-07	1.101E-28	3.014E-12		
		8	-3.497E-05	1.711E-03	1.746E-03	3.048E-06	9.255E-30	1.697E-12	4.710E-12	1.67E 02
						3.503E-06				
320.*	15/2	6	-8.483E-05	-1.866E-04	-1.018E-04	1.035E-08	3.699E-29	2.303E-14		
		8	-9.470E-05	-1.685E-03	-1.590E-03	2.528E-06	3.091E-30	4.699E-13	4.930E-13	2.30E 02
						2.539E-06				
									4.638E-10	

* ESTIMATED WITH ROT. CONST.= 6.67 KEV

FM 257 3/2+622 - 1/2+620 FGAP I = 3/2 KI = 3/2 M = -1 KF = 1/2 Q ALPHA 6.906 MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
34.	1/2	2	5.492E-05	-1.752E-03	-1.807E-03	3.267E-06	1.569E-26	3.082E-09	3.082E-09	1.79E 02
						3.267E-06				
59.	3/2	2	1.098E-04	1.752E-03	1.643E-03	2.698E-06	1.213E-26	1.968E-09	1.968E-09	2.17E 02
						2.698E-06				
82.	5/2	2	1.079E-04	-1.147E-03	-1.255E-03	1.575E-06	9.560E-27	9.058E-10		
		4	2.741E-06	-2.430E-03	-2.433E-03	5.920E-06	2.963E-27	1.055E-09	1.961E-09	7.79E 01
						7.495E-06				
140.*	7/2	2	5.871E-05	4.684E-04	4.097E-04	1.678E-07	5.198E-27	5.246E-11		
		4	4.903E-06	3.261E-03	3.256E-03	1.060E-05	1.608E-27	1.025E-09	1.078E-09	5.43E 01
						1.077E-05				
182.*	9/2	4	4.889E-06	-2.601E-03	-2.606E-03	6.791E-06	1.037E-27	4.236E-10		
		6	-5.074E-05	-5.172E-04	-4.665E-04	2.176E-07	1.661E-28	2.173E-12	4.258E-10	8.34E 01
						7.009E-06				
273.*	11/2	4	2.766E-06	1.226E-03	1.223E-03	1.497E-06	3.868E-28	3.482E-11		
		6	-8.913E-05	7.572E-04	8.463E-04	7.162E-07	6.169E-29	2.657E-12	3.748E-11	2.64E 02
						2.213E-06				
333.*	13/2	6	-8.905E-05	-6.484E-04	-5.593E-04	3.129E-07	3.196E-29	6.015E-13		
		8	-1.191E-05	9.608E-04	9.727E-04	9.462E-07	2.669E-30	1.519E-13	7.534E-13	4.64E 02
						1.259E-06				
458.*	15/2	6	-5.088E-05	3.242E-04	3.751E-04	1.407E-07	7.844E-30	6.637E-14		
		8	-2.079E-05	-1.468E-03	-1.447E-03	2.093E-06	6.502E-31	8.186E-14	1.482E-13	2.61E 02
						2.234E-06				
									8.553E-09	

* ESTIMATED WITH ROT. CONST.= 6.47 KEV, AND DEC. PARAM.= 0.289

MD 253 7/2-514 FAVORED FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.016E-02	0.	-1.016E-02	1.031E-04	NO DATA	0.		
		2	4.820E-03	0.	-4.820E-03	2.323E-05	NO DATA	0.		
		4	-6.478E-04	0.	6.478E-04	4.197E-07	NO DATA	0.		
		6	-1.449E-04	0.	1.449E-04	2.101E-08	NO DATA	0.	0.	4.61E 00
						1.268E-04				
0.*	9/2	2	4.596E-03	0.	-4.596E-03	2.112E-05	NO DATA	0.		
		4	-1.270E-03	0.	1.270E-03	1.614E-06	NO DATA	0.		
		6	-5.423E-04	0.	5.423E-04	2.941E-07	NO DATA	0.		
		8	2.254E-05	0.	-2.254E-05	5.079E-10	NO DATA	0.	0.	2.54E 01
						2.303E-05				
0.*	11/2	2	2.330E-03	0.	-2.330E-03	5.431E-06	NO DATA	0.		
		4	-1.497E-03	0.	1.497E-03	2.241E-06	NO DATA	0.		
		6	-1.150E-03	0.	1.150E-03	1.323E-06	NO DATA	0.		
		8	1.033E-04	0.	-1.033E-04	1.067E-08	NO DATA	0.	0.	6.49E 01
						9.006E-06				
0.*	13/2	4	-1.164E-03	0.	1.164E-03	1.356E-06	NO DATA	0.		
		6	-1.651E-03	0.	1.651E-03	2.725E-06	NO DATA	0.		
		8	2.684E-04	0.	-2.684E-04	7.205E-08	NO DATA	0.	0.	1.41E 02
						4.152E-06				
0.*	15/2	4	-5.517E-04	0.	5.517E-04	3.044E-07	NO DATA	0.		
		6	-1.689E-03	0.	1.689E-03	2.854E-06	NO DATA	0.		
		8	4.758E-04	0.	-4.758E-04	2.264E-07	NO DATA	0.	0.	1.73E 02
						3.385E-06				
									0.	

* ESTIMATE NOT POSSIBLE

MD 255 7/2-514 FAVORED FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.193E-02	0.	-1.193E-02	1.423E-04	NO DATA	0.		
		2	5.141E-03	0.	-5.141E-03	2.643E-05	NO DATA	0.		
		4	-8.478E-04	0.	8.478E-04	7.187E-07	NO DATA	0.		
		6	-1.136E-04	0.	1.136E-04	1.291E-08	NO DATA	0.	0.	3.45E 00
						1.694E-04				
0.*	9/2	2	4.902E-03	0.	-4.902E-03	2.403E-05	NO DATA	0.		
		4	-1.663E-03	0.	1.663E-03	2.764E-06	NO DATA	0.		
		6	-4.252E-04	0.	4.252E-04	1.808E-07	NO DATA	0.		
		8	3.961E-05	0.	-3.961E-05	1.569E-09	NO DATA	0.	0.	2.17E 01
						2.698E-05				
0.*	11/2	2	2.486E-03	0.	-2.486E-03	6.179E-06	NO DATA	0.		
		4	-1.959E-03	0.	1.959E-03	3.838E-06	NO DATA	0.		
		6	-9.020E-04	0.	9.020E-04	8.136E-07	NO DATA	0.		
		8	1.815E-04	0.	-1.815E-04	3.294E-08	NO DATA	0.	0.	5.38E 01
						1.086E-05				
0.*	13/2	4	-1.524E-03	0.	1.524E-03	2.322E-06	NO DATA	0.		
		6	-1.294E-03	0.	1.294E-03	1.675E-06	NO DATA	0.		
		8	4.717E-04	0.	-4.717E-04	2.225E-07	NO DATA	0.	0.	1.38E 02
						4.220E-06				
0.*	15/2	4	-7.220E-04	0.	7.220E-04	5.213E-07	NO DATA	0.		
		6	-1.325E-03	0.	1.325E-03	1.755E-06	NO DATA	0.		
		8	8.362E-04	0.	-8.362E-04	6.993E-07	NO DATA	0.	0.	1.96E 02
						2.975E-06				
									0.	

* ESTIMATE NOT POSSIBLE

MD 255 7/2-514 - 7/2+633 FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	1	-2.053E-04	0.	-2.053E-04	4.213E-08	NO DATA	0.		
		3	-1.207E-04	0.	-1.207E-04	1.457E-08	NO DATA	0.		
		5	5.514E-05	0.	5.514E-05	3.040E-09	NO DATA	0.		
		7	3.486E-06	-5.641E-05	-5.293E-05	2.801E-09	NO DATA	0.	0.	9.34E 03
						6.254E-08				
0.*	9/2	1	-1.097E-04	0.	-1.097E-04	1.204E-08	NO DATA	0.		
		3	-1.707E-04	0.	-1.707E-04	2.913E-08	NO DATA	0.		
		5	1.474E-04	0.	1.474E-04	2.171E-08	NO DATA	0.		
		7	2.062E-05	4.172E-05	6.234E-05	3.886E-09	NO DATA	0.	0.	8.75E 03
						6.677E-08				
0.*	11/2	3	-1.420E-04	0.	-1.420E-04	2.017E-08	NO DATA	0.		
		5	2.339E-04	0.	2.339E-04	5.472E-08	NO DATA	0.		
		7	6.039E-05	-2.715E-05	3.324E-05	1.105E-09	NO DATA	0.		
		9	-1.354E-05	-5.506E-04	-5.641E-04	3.182E-07	NO DATA	0.	0.	1.48E 03
						3.942E-07				
0.*	13/2	3	-6.930E-05	0.	-6.930E-05	4.802E-09	NO DATA	0.		
		5	2.527E-04	0.	2.527E-04	6.384E-08	NO DATA	0.		
		7	1.146E-04	1.546E-05	1.301E-04	1.692E-08	NO DATA	0.		
		9	-5.473E-05	6.675E-04	6.128E-04	3.755E-07	NO DATA	0.	0.	1.27E 03
						4.611E-07				
0.*	15/2	5	1.882E-04	0.	1.882E-04	3.541E-08	NO DATA	0.		
		7	1.546E-04	-7.581E-06	1.470E-04	2.161E-08	NO DATA	0.		
		9	-1.322E-04	-5.864E-04	-7.186E-04	5.164E-07	NO DATA	0.	0.	1.02E 03
						5.735E-07				
									0.	

* ESTIMATE NOT POSSIBLE

MD 255 7/2-514 - 3/2-521 FGAP I = 7/2 KI = 7/2 M = -2 KF = 3/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	3/2	2	4.080E-06	0.	-4.080E-06	1.665E-11	NO DATA	0.		
		4	1.048E-04	0.	-1.048E-04	1.097E-08	NO DATA	0.	0.	5.32E 04
						1.099E-08				
0.*	5/2	2	3.332E-06	0.	-3.332E-06	1.110E-11	NO DATA	0.		
		4	2.321E-04	0.	-2.321E-04	5.387E-08	NO DATA	0.		
		6	3.574E-05	8.569E-04	-8.926E-04	7.968E-07	NO DATA	0.	0.	6.87E 02
						8.506E-07				
0.*	7/2	2	2.107E-06	0.	-2.107E-06	4.440E-12	NO DATA	0.		
		4	3.158E-04	0.	-3.158E-04	9.976E-08	NO DATA	0.		
		6	1.130E-04	-1.084E-03	9.709E-04	9.426E-07	NO DATA	0.	0.	5.60E 02
						1.042E-06				
0.*	9/2	2	1.005E-06	0.	-1.005E-06	1.009E-12	NO DATA	0.		
		4	3.097E-04	0.	-3.097E-04	9.592E-08	NO DATA	0.		
		6	2.114E-04	1.014E-03	-1.225E-03	1.501E-06	NO DATA	0.		
		8	-2.994E-05	8.451E-04	-8.152E-04	6.645E-07	NO DATA	0.	0.	2.58E 02
						2.262E-06				
0.*	11/2	2	3.177E-07	0.	-3.177E-07	1.009E-13	NO DATA	0.		
		4	2.276E-04	0.	-2.276E-04	5.180E-08	NO DATA	0.		
		6	2.797E-04	-7.664E-04	4.867E-04	2.369E-07	NO DATA	0.		
		8	-8.556E-05	-1.380E-03	1.466E-03	2.148E-06	NO DATA	0.	0.	2.40E 02
						2.437E-06				
0.*	13/2	4	1.226E-04	0.	-1.226E-04	1.504E-08	NO DATA	0.		
		6	2.780E-04	4.762E-04	-7.542E-04	5.689E-07	NO DATA	0.		
		8	-1.541E-04	1.553E-03	-1.399E-03	1.957E-06	NO DATA	0.	0.	2.30E 02
						2.541E-06				
0.*	15/2	4	4.291E-05	0.	-4.291E-05	1.842E-09	NO DATA	0.		
		6	2.102E-04	-2.400E-04	2.979E-05	8.877E-10	NO DATA	0.		
		8	-2.017E-04	-1.356E-03	1.557E-03	2.425E-06	NO DATA	0.	0.	2.41E 02
						2.428E-06				
									0.	

* ESTIMATE NOT POSSIBLE

MD 257 7/2-514 FAVORED FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	0	1.373E-02	0.	-1.373E-02	1.885E-04	NO DATA	0.		
		2	5.911E-03	0.	-5.911E-03	3.494E-05	NO DATA	0.		
		4	-8.588E-04	0.	8.588E-04	7.376E-07	NO DATA	0.		
		6	-1.093E-04	0.	1.093E-04	1.195E-08	NO DATA	0.	0.	2.61E 00
						2.242E-04				
0.*	9/2	2	5.636E-03	0.	-5.636E-03	3.176E-05	NO DATA	0.		
		4	-1.684E-03	0.	1.684E-03	2.837E-06	NO DATA	0.		
		6	-4.090E-04	0.	4.090E-04	1.673E-07	NO DATA	0.		
		8	4.223E-05	0.	-4.223E-05	1.783E-09	NO DATA	0.	0.	1.68E 01
						3.477E-05				
0.*	11/2	2	2.858E-03	0.	-2.858E-03	8.167E-06	NO DATA	0.		
		4	-1.985E-03	0.	1.985E-03	3.939E-06	NO DATA	0.		
		6	-8.676E-04	0.	8.676E-04	7.527E-07	NO DATA	0.		
		8	1.935E-04	0.	-1.935E-04	3.745E-08	NO DATA	0.	0.	4.53E 01
						1.290E-05				
0.*	13/2	4	-1.544E-03	0.	1.544E-03	2.383E-06	NO DATA	0.		
		6	-1.245E-03	0.	1.245E-03	1.550E-06	NO DATA	0.		
		8	5.030E-04	0.	-5.030E-04	2.530E-07	NO DATA	0.	0.	1.40E 02
						4.186E-06				
0.*	15/2	4	-7.314E-04	0.	7.314E-04	5.350E-07	NO DATA	0.		
		6	-1.274E-03	0.	1.274E-03	1.623E-06	NO DATA	0.		
		8	8.916E-04	0.	-8.916E-04	7.950E-07	NO DATA	0.	0.	1.98E 02
						2.953E-06				
									0.	

* ESTIMATE NOT POSSIBLE

MD 257 7/2-514 - 7/2+633 FGAP I = 7/2 KI = 7/2 M = 0 KF = 7/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	7/2	1	-2.217E-04	0.	-2.217E-04	4.915E-08	NO DATA	0.		
		3	-1.442E-04	0.	-1.442E-04	2.078E-08	NO DATA	0.		
		5	6.265E-05	0.	6.265E-05	3.925E-09	NO DATA	0.		
		7	3.971E-06	-5.092E-05	-4.695E-05	2.204E-09	NO DATA	0.	0.	7.68E 03

						7.606E-08				
0.*	9/2	1	-1.185E-04	0.	-1.185E-04	1.404E-08	NO DATA	0.		
		3	-2.039E-04	0.	-2.039E-04	4.156E-08	NO DATA	0.		
		5	1.674E-04	0.	1.674E-04	2.804E-08	NO DATA	0.		
		7	2.349E-05	3.765E-05	6.115E-05	3.739E-09	NO DATA	0.	0.	6.69E 03

						8.738E-08				
0.*	11/2	3	-1.696E-04	0.	-1.696E-04	2.877E-08	NO DATA	0.		
		5	2.658E-04	0.	2.658E-04	7.066E-08	NO DATA	0.		
		7	6.881E-05	-2.450E-05	4.430E-05	1.963E-09	NO DATA	0.		
		9	-1.565E-05	-6.199E-04	-6.355E-04	4.039E-07	NO DATA	0.	0.	1.16E 03

						5.053E-07				
0.*	13/2	3	-8.277E-05	0.	-8.277E-05	6.851E-09	NO DATA	0.		
		5	2.871E-04	0.	2.871E-04	8.243E-08	NO DATA	0.		
		7	1.306E-04	1.395E-05	1.445E-04	2.088E-08	NO DATA	0.		
		9	-6.327E-05	7.516E-04	6.883E-04	4.737E-07	NO DATA	0.	0.	1.00E 03

						5.839E-07				
0.*	15/2	5	2.138E-04	0.	2.138E-04	4.572E-08	NO DATA	0.		
		7	1.761E-04	-6.843E-06	1.693E-04	2.865E-08	NO DATA	0.		
		9	-1.528E-04	-6.603E-04	-8.131E-04	6.611E-07	NO DATA	0.	0.	7.94E 02

						7.355E-07				

									0.	

* ESTIMATE NOT POSSIBLE

MD 257 7/2-514 - 3/2-521 FGAP I = 7/2 KI = 7/2 M = -2 KF = 3/2 Q ALPHA 0. MEV

E (KEV)	I	L	H(L,KI-KF)	H(L,KI+KF)	SUM	RED.TRANS.PROB.	PENET.	NORM.TRANS.PROB.	SUM	RCP.FORM.
0.*	3/2	2	-9.942E-06	0.	9.942E-06	9.884E-11	NO DATA	0.		
		4	1.176E-04	0.	-1.176E-04	1.382E-08	NO DATA	0.	0.	4.20E 04
						1.392E-08				
0.*	5/2	2	-8.117E-06	0.	8.117E-06	6.589E-11	NO DATA	0.		
		4	2.605E-04	0.	-2.605E-04	6.784E-08	NO DATA	0.		
		6	4.120E-05	9.816E-04	-1.023E-03	1.046E-06	NO DATA	0.	0.	5.24E 02
						1.114E-06				
0.*	7/2	2	-5.134E-06	0.	5.134E-06	2.636E-11	NO DATA	0.		
		4	3.544E-04	0.	-3.544E-04	1.256E-07	NO DATA	0.		
		6	1.303E-04	-1.242E-03	1.111E-03	1.235E-06	NO DATA	0.	0.	4.29E 02
						1.361E-06				
0.*	9/2	2	-2.448E-06	0.	2.448E-06	5.990E-12	NO DATA	0.		
		4	3.475E-04	0.	-3.475E-04	1.208E-07	NO DATA	0.		
		6	2.437E-04	1.161E-03	-1.405E-03	1.974E-06	NO DATA	0.		
		8	-3.490E-05	9.559E-04	-9.210E-04	8.482E-07	NO DATA	0.	0.	1.98E 02
						2.943E-06				
0.*	11/2	2	-7.740E-07	0.	7.740E-07	5.990E-13	NO DATA	0.		
		4	2.554E-04	0.	-2.554E-04	6.523E-08	NO DATA	0.		
		6	3.224E-04	-8.779E-04	5.555E-04	3.086E-07	NO DATA	0.		
		8	-9.973E-05	-1.561E-03	1.661E-03	2.758E-06	NO DATA	0.	0.	1.87E 02
						3.132E-06				
0.*	13/2	4	1.376E-04	0.	-1.376E-04	1.894E-08	NO DATA	0.		
		6	3.205E-04	5.455E-04	-8.660E-04	7.500E-07	NO DATA	0.		
		8	-1.796E-04	1.757E-03	-1.577E-03	2.487E-06	NO DATA	0.	0.	1.79E 02
						3.256E-06				
0.*	15/2	4	4.816E-05	0.	-4.816E-05	2.319E-09	NO DATA	0.		
		6	2.423E-04	-2.749E-04	3.260E-05	1.063E-09	NO DATA	0.		
		8	-2.351E-04	-1.533E-03	1.768E-03	3.127E-06	NO DATA	0.	0.	1.87E 02
						3.131E-06				
									0.	

* ESTIMATE NOT POSSIBLE

REFERENCES

1. G. Gamow, Z. Physik 51, 204 (1928).
2. E. U. Condon and R. W. Gurney, Nature 122, 439 (1928).
3. G. H. Winslow, Phys. Rev. 96, 1032 (1954).
4. R. S. Thomas, Progr. Theoret. Phys. 12, 253 (1954).
5. H. J. Mang, Z. Physik 148, 582 (1957); Phys. Rev. 119, 1069 (1960).
6. H. J. Mang and J. O. Rasmussen, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Skrifter 2, No. 3 (1962).
7. S. G. Nilsson, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Medd. 29, No. 16 (1955); and B. R. Mottelson and S. G. Nilsson, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Skrifter 1, No. 8 (1959).
8. R. Hofstadter, Rev. Mod. Phys. 28, 214 (1956).
9. H. J. Mang, Ann. Rev. Nucl. Sci. 14, 1 (1964).
10. H. D. Zeh, Z. Physik 175, 490 (1963).
11. A. Bohr and B. R. Mottelson, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Medd. 27, No. 16 (1953).
12. A. Sandulescu, Nucl. Phys. 37, 322 (1962); Nucl. Phys. 37, 344 (1962).
13. J. Bardeen, L. N. Cooper, and J. R. Schrieffer, Phys. Rev. 108, 1175 (1957).
14. H. J. Mang, J. K. Poggenburg, and J. O. Rasmussen, Nucl. Phys. 64, 353 (1965).
15. S. T. Belyaev, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Medd. 31, No. 11 (1959).
16. K. Dietrich, H. J. Mang, and J. H. Pradal, Phys. Rev. 135, B22 (1964).
17. J. O. Rasmussen and B. Segall, Phys. Rev. 103, 1298 (1956).
18. J. O. Rasmussen and E. R. Hansen, Phys. Rev. 109, 1656 (1958).
19. P. O. Fröman, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Skrifter 1, No. 3 (1957).
20. R. R. Chasman and J. O. Rasmussen, Phys. Rev. 112, 512 (1958).
21. E. M. Pennington and M. A. Preston, Can. J. Phys. 36, 944 (1958).
22. V. G. Nosov, Soviet Phys. JETP (trans.) 10, 631 (1960).
23. K. Harada, Phys. Letters 10, 80 (1964).
24. M. G. Huber, Phys. Letters 13, 242 (1964).

25. J. O. Rasmussen, Phys. Rev. 113, 1593 (1959); Phys. Rev. 115, 1675 (1959).

26. G. Igo, Phys. Rev. 115, 1665 (1959).

27. R. D. Woods and D. S. Saxon, Phys. Rev. 95, 577 (1954).

28. G. Igo, Phys. Rev. Letters 1, 72 (1958).

29. R. M. Drisko, G. R. Satchler, and R. H. Bassel, Phys. Letters 5, 347 (1963).

30. H. W. Broek, J. L. Yntema, B. Buck, and G. R. Satchler, Nucl. Phys. 64, 259 (1965).

31. H. L. Wilson and M. B. Sampson, Phys. Rev. 137, B305 (1965).

32. M. El-Nadi and F. Riad, Nucl. Phys. 65, 99 (1965).

33. O. H. Gailar, E. Bleuler, and D. J. Tendam, Phys. Rev. 112, 1989 (1958).

34. A. G. Blair and H. E. Wegner, Phys. Rev. 127, 1233 (1962).

35. D. L. Hill and K. W. Ford, Phys. Rev. 94, 1617 (1954).

36. R. E. Langer, Phys. Rev. 51, 669 (1937).

37. N. Fröman and P. O. Fröman, JWKB Approximation (North-Holland Publishing Co., Amsterdam, 1965).

38. A. Sandulescu and T. Voeroes, "On Barrier Penetrabilities in Alpha Decay" (Academia R.P.R. Institutul de Fizica Atomica, Bucharest, Aug. 1963) NP-13421.

39. M. L. Chaudhury, Phys. Rev. 130, 2339 (1963).

40. A. Sandulescu and F. Stancu, "A Simplified Procedure for Shell Model Calculations of Alpha Decay Rates of Even-even Deformed Nuclei," (Academia R.P.R. Institutul de Fizica Atomica, Bucharest, Ft-54, 1964).

41. E. K. Hyde, I. Perlman, and G. T. Seaborg, Nuclear Properties of the Heavy Elements, vol. I (Prentice-Hall, Inc., Englewood-Cliffs, 1964) pp. 214-237.

42. C. M. Lederer, J. M. Hollander, and I. Perlman, Table of Isotopes (Wiley and Sons, Inc., New York) in preparation.

43. V. G. Soloviev, Phys. Letters 1, 202 (1962).

44. J. Eichler and H. J. Mang, Z. Physik 183, 321 (1965).

45. D. W. Davies and J. M. Hollander, Nucl. Phys. 68, 161 (1965).

46. C. M. Lederer, J. K. Poggenburg, F. Asaro, J. O. Rasmussen, and I. Perlman, (to be published).

47. S. A. Baranov, V. M. Kulakov, and V. M. Shatinsky, Nucl. Phys. 56, 252 (1964).

48. F. C. Chang, Phys. Rev. 137, B1420 (1965).

49. A. Bohr, B. R. Mottelson and D. Pines, Phys. Rev. 110, 936 (1958).

50. B. F. Bayman, Nucl. Phys. 15, 33 (1960).

51. A. K. Kerman, R. D. Lawson, and M. H. Macfarlane, Phys. Rev. 124, 162 (1961).