

25931

AAEC-E 530

AAEC/E530

B

01 MAR 1983



AAEC/E530

15 FEB. 1983
AUSTRALIAN ATOMIC ENERGY COMMISSION
RESEARCH ESTABLISHMENT

LUCAS HEIGHTS RESEARCH LABORATORIES

VALENCY EFFECTS IN COMPOUND NUCLEUS LEVEL SPACINGS

by

J.L. COOK
E.K. ROSE

CERN LIBRARIES, GENEVA



CM-P00067979

March 1982

ISBN 0 642 59730 8

AUSTRALIAN ATOMIC ENERGY COMMISSION
RESEARCH ESTABLISHMENT
LUCAS HEIGHTS RESEARCH LABORATORIES

VALENCY EFFECTS IN COMPOUND NUCLEUS LEVEL SPACINGS

by

J.L. COOK
E.K. ROSE

ABSTRACT

It is shown that nuclides whose proton or neutron numbers lie within three units of a magic number have a level density parameter that is very strongly correlated with the Myers-Swiatecki shell correction to the mass formula. Using this correlation, 93 level densities are calculated from only two adjustable constants, in a semi-empirical fashion.

It is shown that since weaker correlations exist in five regions of the periodic table, intermediate and heavy nuclides which lie between the strong correlation ranges also give satisfactory fits, thus making a twelve-parameter fit overall.

National Library of Australia card number and ISBN 0 642 59730 8

The following descriptors have been selected from the INIS Thesaurus to describe the subject content of this report for information retrieval purposes. For further details please refer to IAEA-INIS-12 (INIS: Manual for Indexing) and IAEA-INIS-13 (INIS: Thesaurus) published in Vienna by the International Atomic Energy Agency.

VALENCE; COMPOUND NUCLEI; ENERGY-LEVEL DENSITY; MAGIC NUCLEI; MASS FORMULAE;
CORRELATIONS; ENERGY LEVELS

CONTENTS

1.	INTRODUCTION	1
2.	GILBERT-CAMERON THEORY	1
3.	THE MYERS-SWIATECKI SHELL CORRECTIONS	2
4.	CONCLUSION	5
5.	REFERENCES	5
Table 1	Coefficients for $a/A = \alpha(Z,N) + \beta$	7
Table 2	χ^2/n Values as a Function of Group Structure	8
Table 3	Deformed Group Structure	9
Figure 1	Scatter of experimental a/A values with compound nucleus mass number A	11
Figure 2	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 1	12
Figure 3	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 2	13
Figure 4	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 3	14
Figure 5	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 4	15
Figure 6	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 5	16
Figure 7	Variation of experimental a/A with $S(Z,N)$ and fitted line $\alpha S(Z,N) + \beta$, Group 6	17
Appendix A	Fitted Values of Density Parameter	19
Appendix B	Fitted a/A Values and Corresponding Recalculated Density Parameters	23

1. INTRODUCTION

Knowledge of the average level spacing between resonances of a compound nucleus has important applications in astrophysics, reactor physics and fission physics. Until now the most suitable formula has come from the evaluation of Gilbert and Cameron [1965] shell and pairing corrections carried out by Cook, Ferguson and Musgrove [1967], and modified by Rose and Cook [1977]. Wapstra and Gove [1971] published a thorough evaluation of neutron binding energies which was used by Rose and Cook, together with experimental values of the level spacing tabulated by Gyulassy and Perkins [1972], Mughabghab and Garber [1973] and Musgrove [1976], to re-evaluate the Gilbert-Cameron parameters.

Unfortunately, the Gilbert-Cameron theory requires many parameters in the form of shell and pairing corrections which, for about 300 values, requires about 200 constants to be fitted. In this report it is shown that there is a strong correlation between the Myers and Swiatecki [1966] shell correction to the semi-empirical mass formula and the level density mass parameter, which permits accurate calculation of level densities for 93 spherical nuclides in terms of only two adjustable parameters. The physical significance of the level density parameters is discussed fully in Lang [1966].

2. GILBERT-CAMERON THEORY

The densities of states of spin J at an energy E above the ground state were derived by Gilbert and Cameron as

$$\rho(E, J) = \frac{\sqrt{\pi} \exp\{2(aU)^{\frac{1}{2}}\} (2J+1) \exp\{-(J+\frac{1}{2})^2/2\sigma^2\}}{24 a^{\frac{1}{2}} U^{\frac{5}{4}} (2\pi)^{\frac{1}{2}} \sigma^3} \quad (1)$$

U is the effective excitation energy, given as

$$U = E - \Delta E \quad ,$$

where ΔE is the nucleon pairing energy which is fixed at the Green and Edwards [1953] value:

$$\left. \begin{aligned} \Delta E \text{ (odd-odd)} &= 0 \\ \Delta E \text{ (even-odd)} &= 11 A^{-\frac{1}{2}} \\ \Delta E \text{ (even-even)} &= 22 A^{-\frac{1}{2}} \end{aligned} \right\} \quad (2)$$

where A is the compound nucleus mass number.

The spin cutoff parameter σ was determined by Gilbert and Cameron to be

$$\sigma^2 = 0.0888(aU)^{\frac{1}{2}} A^{\frac{2}{3}} \quad (3)$$

More recent estimates [Gardner 1980] give the constant coefficient of 0.146. This agrees with the result of Lang [1966]. The quantity a is the level density parameter, which Gilbert and Cameron assumed to be

$$a/A = \alpha S(Z,N) + \beta \quad , \quad (4)$$

where α and β are constant and $S(Z,N)$ is the shell correction to the semi-empirical mass formula. Cameron [1958] used the relationships

$$S(Z,N) = S(Z) + S(N)$$

$$\Delta E = P(Z) + P(N) \quad (5)$$

and worked out tables of $S(Z)$, $S(N)$, $P(Z)$ and $P(N)$ which fitted the measured masses. This treatment gives many adjustable parameters, but interpolation to unmeasured values is hazardous. Figure 1 shows the scatter of experimental a/A values with compound nucleus mass number A .

3. THE MYERS-SWIATECKI SHELL CORRECTIONS

A theoretical derivation of the shell correction was given by Myers and Swiatecki [1966]. They found the expressions

$$(i) \quad S(Z,N) = C \left[\frac{F(N) + F(Z)}{(\frac{1}{2}A)^{\frac{2}{3}}} - cA^{\frac{1}{3}} \right] \quad , \quad (6)$$

with

$$(ii) \quad F(X) = \int_0^X [q(n) - n^{\frac{2}{3}}] dn \quad ,$$

$$(iii) \quad q(n) = \frac{3}{5} \frac{M_i^{\frac{5}{3}} - M_{i-1}^{\frac{5}{3}}}{M_i - M_{i-1}} \quad \text{for } M_{i-1} < n < M_i \quad .$$

The M_i are the magic numbers 14, 28, 50, 82, 126, 184 and 258 for both Z and N. The values of constants C and c are:

$$C = 5.8 \text{ MeV} \quad , \quad c = 0.26 \quad . \quad (7)$$

For deformed nuclides, one replaces S by $S_0[1 + \lambda n S/S_0]$, where S_0 is the Myers-Swiatecki spherical limit.

On examining the data compiled by Rose and Cook [1977] at the neutron binding energy, a correlation was naturally found between the calculated a/A from the experimental values of $\langle D \rangle = 1/\rho$ and the Myers-Swiatecki shell correction for those nuclides with either Z or N within three units of any of the magic numbers M_i . The correlation coefficient was 0.903 between a/A and $S(Z, N)$ for these valency nuclides, 93 of which have been measured. The Myers-Swiatecki shell corrections were then applied to $S(Z, N)$ and a correlation coefficient of 0.365 was calculated for the remaining 107 nuclides. Green's pairing correction for ΔE was used. The relationship (Equation 4) for these others, most of which were deformed nuclei, was therefore rejected.

For the valency nuclides, a linear fit gives

$$a/A = (0.01018 \pm 0.00036)S(Z, N) + (0.12746 \pm 0.00050) \quad . \quad (8)$$

The experimental values for a/A and the fitted values are shown in Appendix A. Errors obtained by including the experimental errors for $\langle D \rangle$ are also presented. Figures 2 to 7 show the variation of experimental a/A with $S(Z, N)$ for each group together with the fitted line $\alpha S(Z, N) + \beta$.

For neutron reactions, the proper excitation energy is given by

$$E = E_n + B \quad , \quad (9)$$

where E_n is the kinetic energy of the neutron and B is the neutron binding energy. The kinetic energy was assumed to be about one half of the last

resolved resonance energy and the binding energies were obtained from Wapstra and Gove [1971]. Since formula (1) applied to both parities, only one parity prevails at low energies, so for s-waves

$$\langle \rho \rangle = \frac{1}{\langle D \rangle} = \frac{1}{2} \sum_{J=I-\frac{1}{2}}^{J=I+\frac{1}{2}} \rho(U, J) \quad , \quad (10)$$

where I = the target nucleus spin. The recalculated values of $\langle D \rangle$ are given in Appendix B together with the experimental value.

One can perceive from the coefficients in Table 1 that for group 5, whose nuclides can be read off the group numbers in Appendix B, a constant value of a/A is quite acceptable as a fit. This happens to be the range for the most strongly deformed nuclei; when $S(Z, N)$ assumes values well away from magic numbers, the correlation is lost.

The overall situation regarding the possibility of using a broader group structure to reduce the number of parameters is presented in Table 2. Here we postulate that in the weaker correlation ranges, a satisfactory fit is achieved by replacing the linear dependence with a constant average value of a/A . The value of χ^2/n is given at each stage and it is apparent from the table that the new scheme is the optimum one for satisfactory predictions of $\langle D \rangle$. The group structures are summarised in Table 3.

With regard to the calcium isotopes, which make up the second group, it was found that these light isotopes departed from the strong correlation expected near the semi-magic number 20; in reality it should be expected that the Fermi gas model would be unreliable in this range.

In the case of fission product data, which is the ultimate purpose of this study, there is no need to be concerned about isotopes in this range, so the fit to group 2 would never be needed. Our rigorous statistical analysis reveals that five semi-empirical constants are required to fit about two hundred for intermediate and heavy nuclides. This is a satisfactory result for the prediction of unmeasured values of the level spacing.

4. CONCLUSION

A satisfactory overall fit to measured values of the level spacing is obtained with twelve adjustable parameters. The 93 nuclides with valency 3 or less are very well fitted with just two adjustable constants. The purpose in carrying out these fits was to reduce the number of degrees of freedom from the large number required for a Gilbert and Cameron type of theory. Extrapolations and interpolations to unmeasured values of \bar{D} , such as are required in astrophysics and reactor physics, can serve as a check on Gilbert and Cameron values and probably provide more reliable results.

5. REFERENCES

- Cameron, A.G.W. [1958] - Can. J. Phys., 36:1040.
- Cook, J.L., Ferguson, H. and Musgrove, A.R. de L. [1967] - Aust. J. Phys., 20:477.
- Gardner, D.G. [1980] - private communication.
- Gilbert, A. and Cameron, A.G.W. [1965] - Can. J. Phys., 43:1446.
- Green, A.E.S. and Edwards, D.F. [1953] - Phys. Rev., 91:46.
- Gyulassy, M. and Perkins, S.T. [1972] - An atlas of unresolved neutron resonance parameters. UCRL-50400, Vol.13.
- Lang, D.W. [1966] - Nucl. Phys., 77:545.
- Mughabghab, S.F. and Garber, D.I. [1973] - Neutron cross sections. Vol.1: Resonance parameters. BNL-325.
- Musgrove, A.R. de L. [1976] - private communication.
- Myers, W.D. and Swiatecki, W.J. [1966] - Nucl. Phys., 81:1-60.
- Rose, E.K. and Cook, J.L. [1977] - An evaluation of the Gilbert-Cameron level density parameters. AAEC/E419.

Wapstra, A.H. and Gove, N.B. [1971] - Atomic mass evaluation. Nucl. Data Tables, Vol.9, Nos.4 and 5.

TABLE 1
 COEFFICIENTS FOR $a/A = \alpha S(Z,N) + \beta$

Group	Number of nuclides (n)	α	$\Delta\alpha$	β	$\Delta\beta$	χ^2/n	C_R
1	93	0.01018	0.00036	0.12746	0.00050	0.92	0.89
2	3	-0.01028	0.02135	0.18438	0.03641	0.04	-0.52
3	9	0.02976	0.01703	0.08391	0.02873	0.09	0.91
4	14	0.05209	0.01513	0.01041	0.02568	0.31	0.78
5	56	0.00631	0.00288	0.11319	0.00496	1.04	0.18
6	22	0.07947	0.04179	-0.03514	0.06008	0.45	0.53

TABLE 2
 χ^2/n VALUES AS A FUNCTION OF GROUP STRUCTURE

Group	Nuclear Range	n	$\alpha S + \beta$ Fit	a/A Fit	5 Groups	4 Groups	3 Groups	2 Groups
1	all spherical 4-181	93	0.92	0.92	0.92	0.92	0.92	0.92
2	1-3	3	0.04	0.12	0.12	0.12		
3	35-46	9	0.08	0.42		0.89	0.89	
4	56-71	14	0.31	1.16	0.95		2.30	
5	111-167	56	1.03	1.12	1.12	1.12		80.0
6	182-204	22	0.45	0.62	0.62	0.62	0.62	
7		197					1.0	∞

7 omitted owing to high χ^2 in a/A fit.

Groups 5 and 6 only marginally worse for a/A fit.

$\alpha S + \beta$ fits to 6 regions still best.

For deformed nuclides 6-group structure is such that each group lies between magic numbers in either Z or N or both.

TABLE 3
DEFORMED GROUP STRUCTURE

Group	Magic Number Range for Z	Magic Number Range for $N' = N+1$
2	$14 < Z \leq 28$	$14 < N' \leq 28$
3	$28 < Z \leq 50$	$28 < N' \leq 50$
4	$28 < Z \leq 50$	$50 < N' \leq 82$
5	$50 < Z \leq 82$	$82 < N' \leq 128$

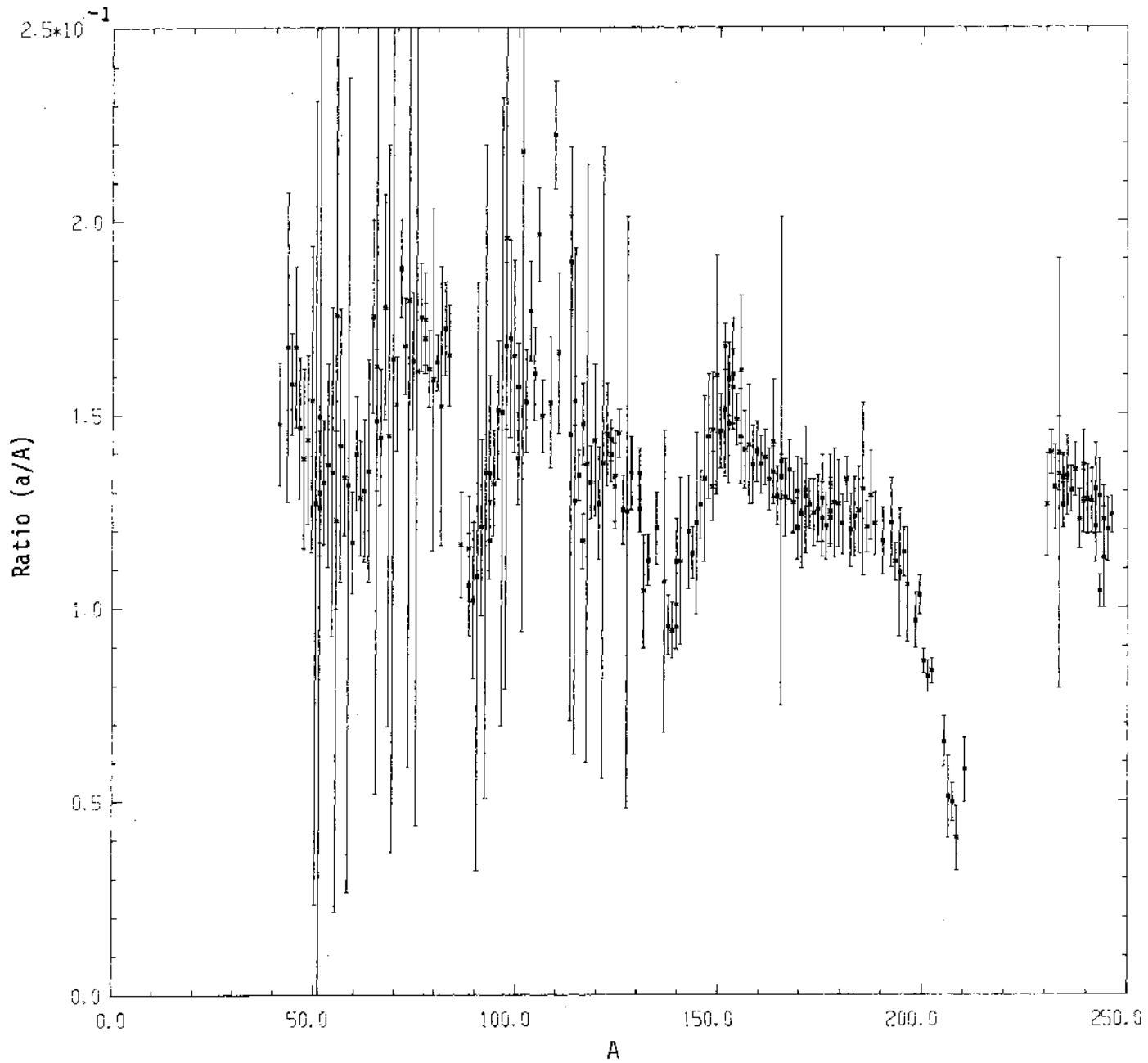


FIGURE 1. SCATTER OF EXPERIMENTAL a/A VALUES WITH COMPOUND NUCLEUS MASS NUMBER A

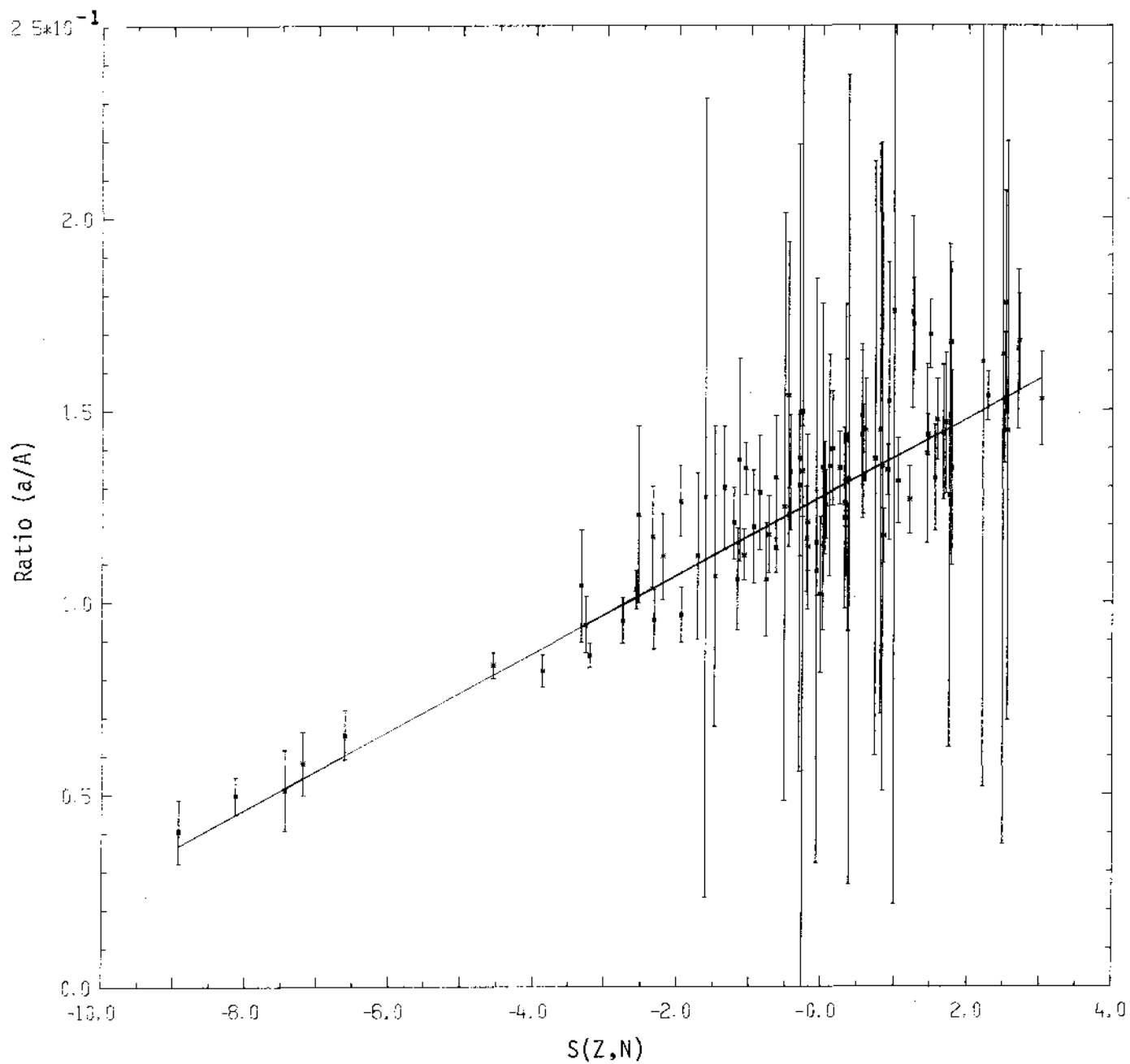


FIGURE 2. VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND
FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 1

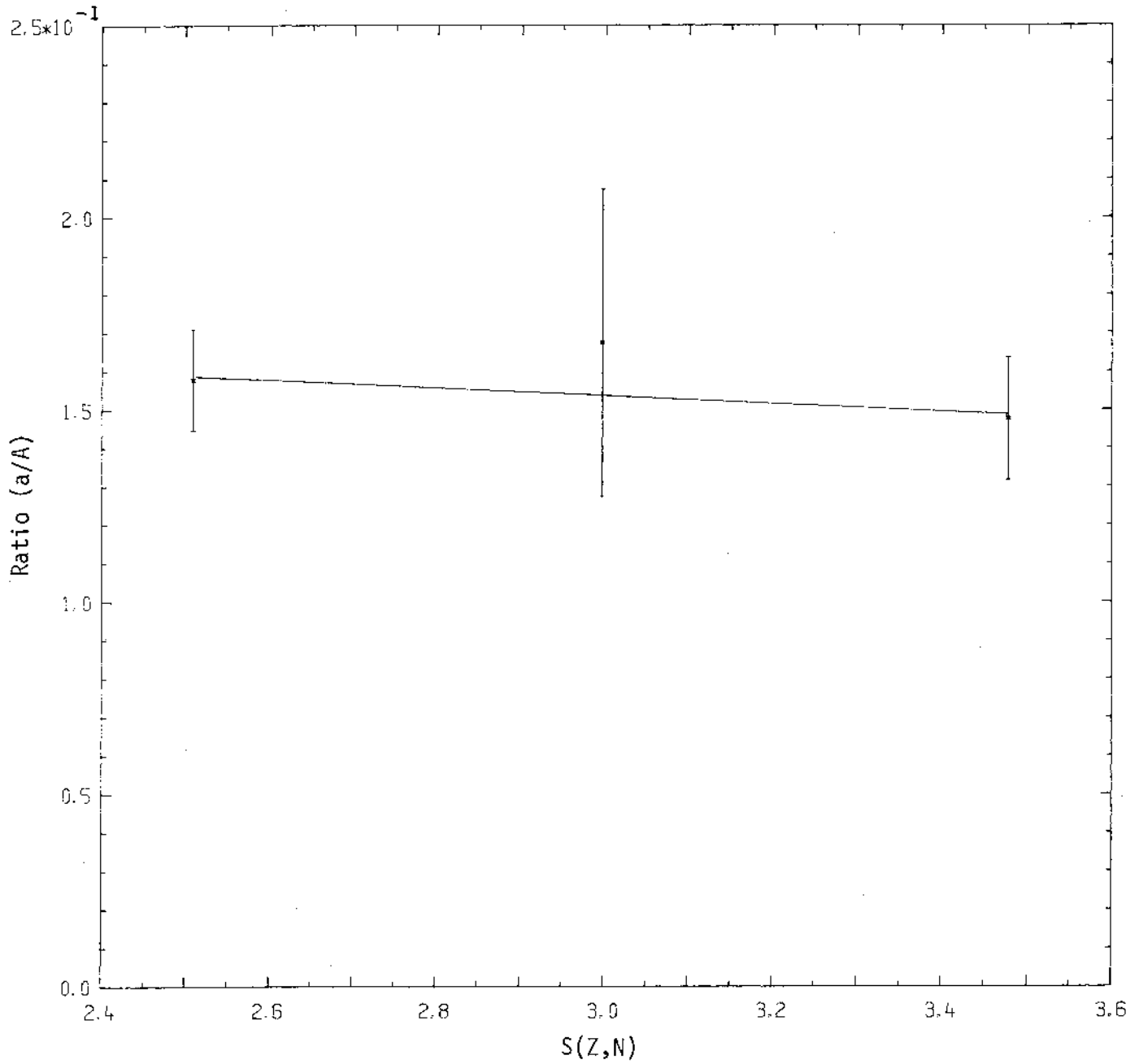


FIGURE 3. VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND
FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 2

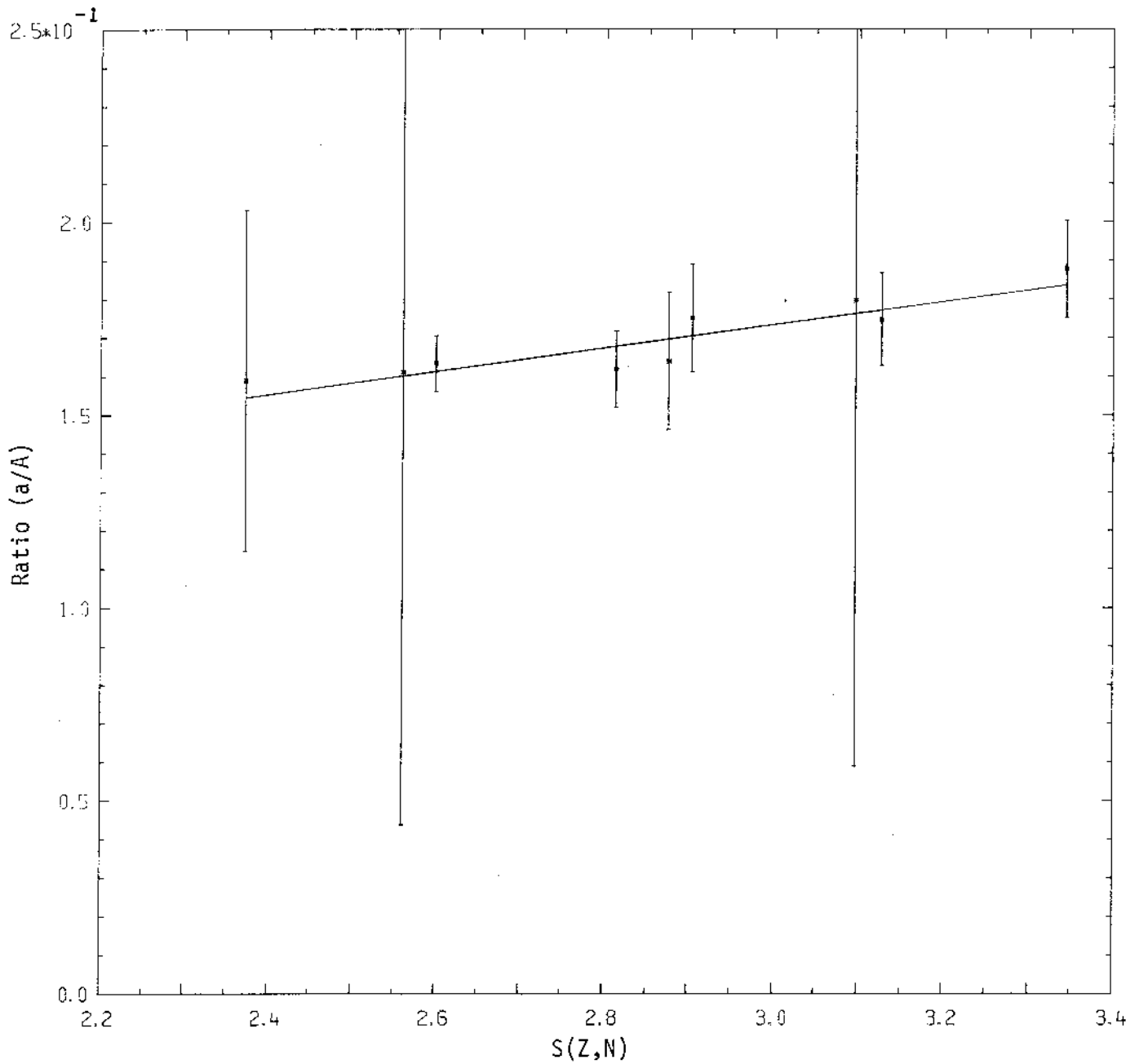


FIGURE 4 . VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND
FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 3

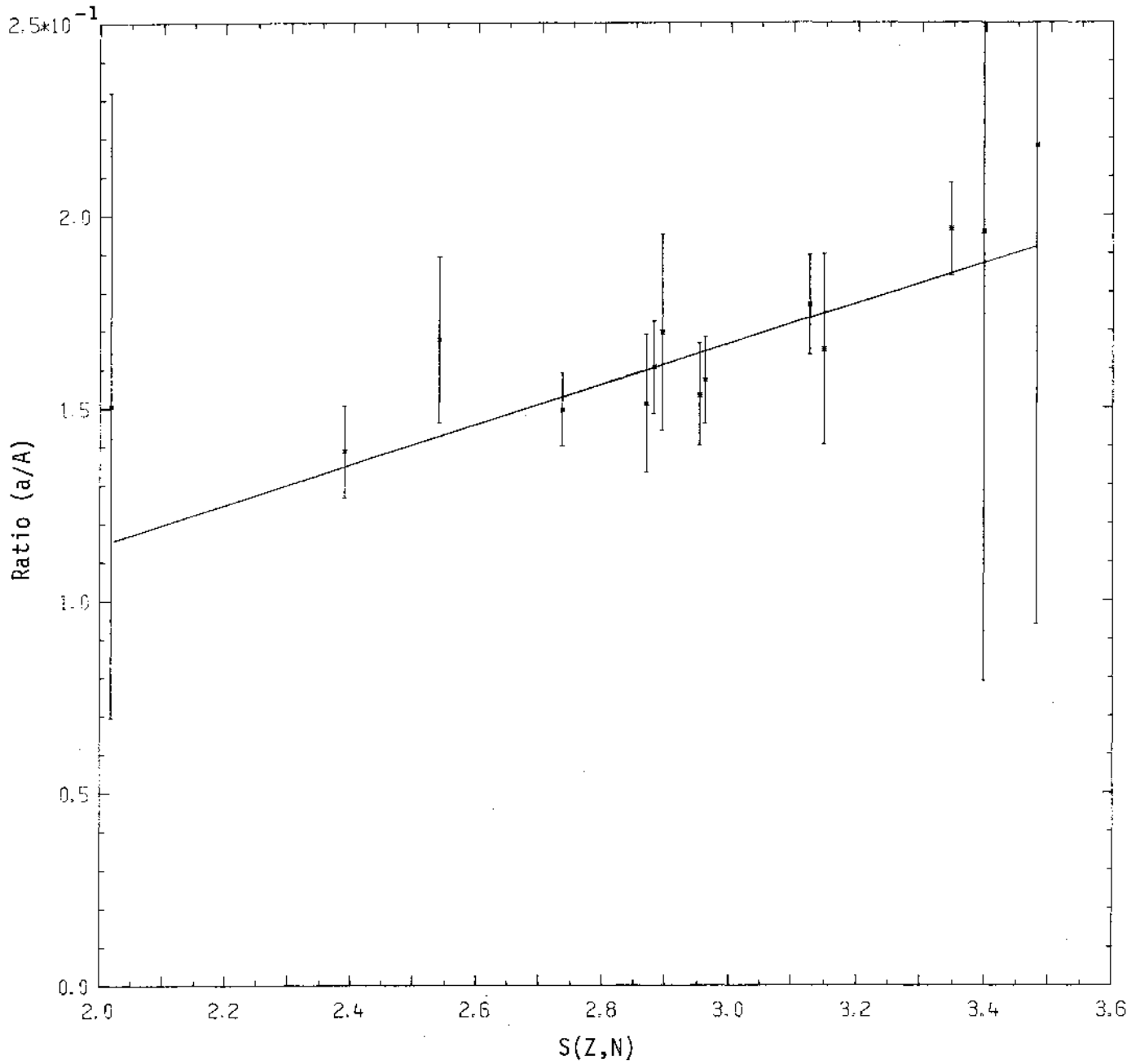


FIGURE 5. VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND
FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 4

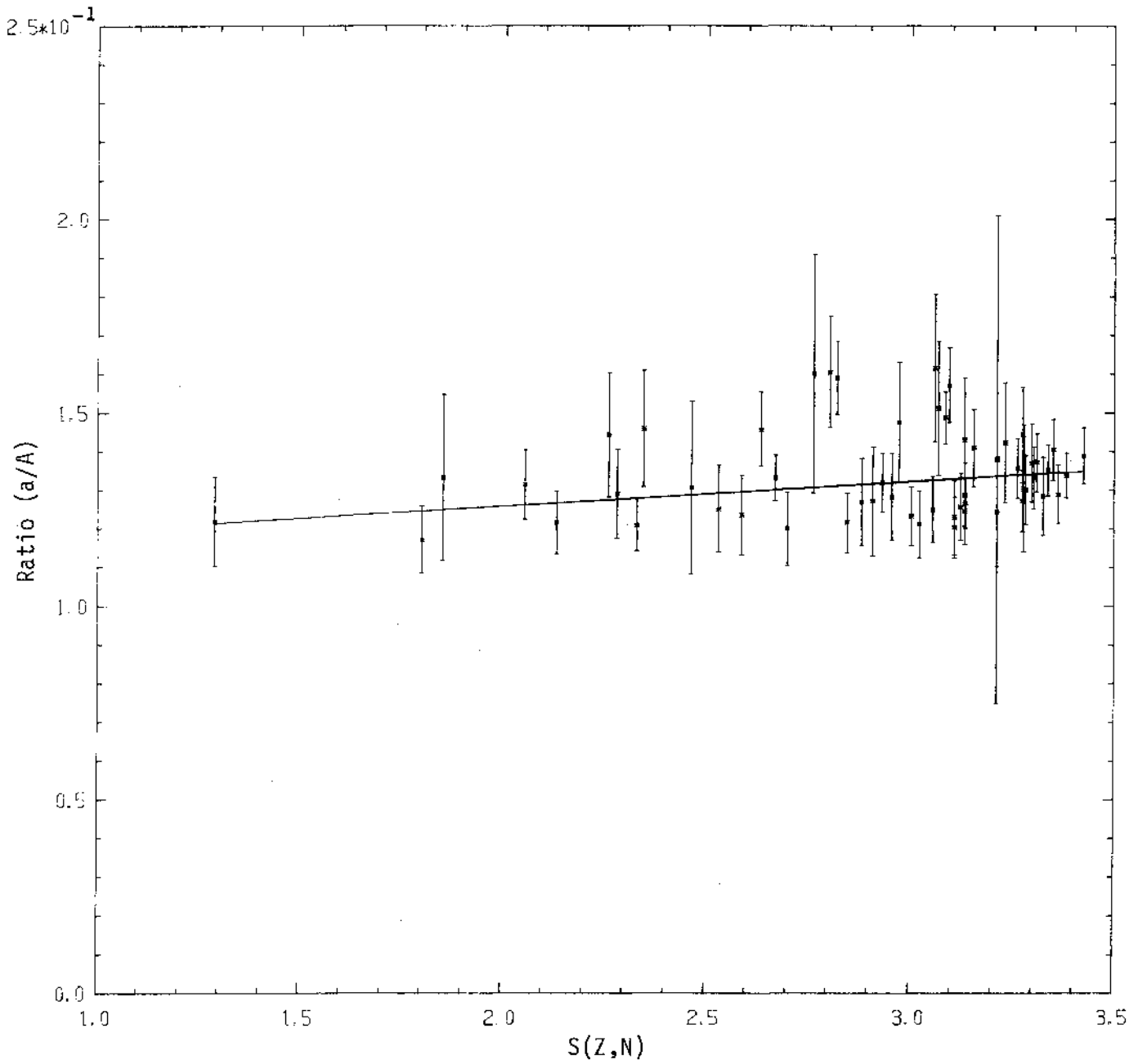


FIGURE 6. VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 5

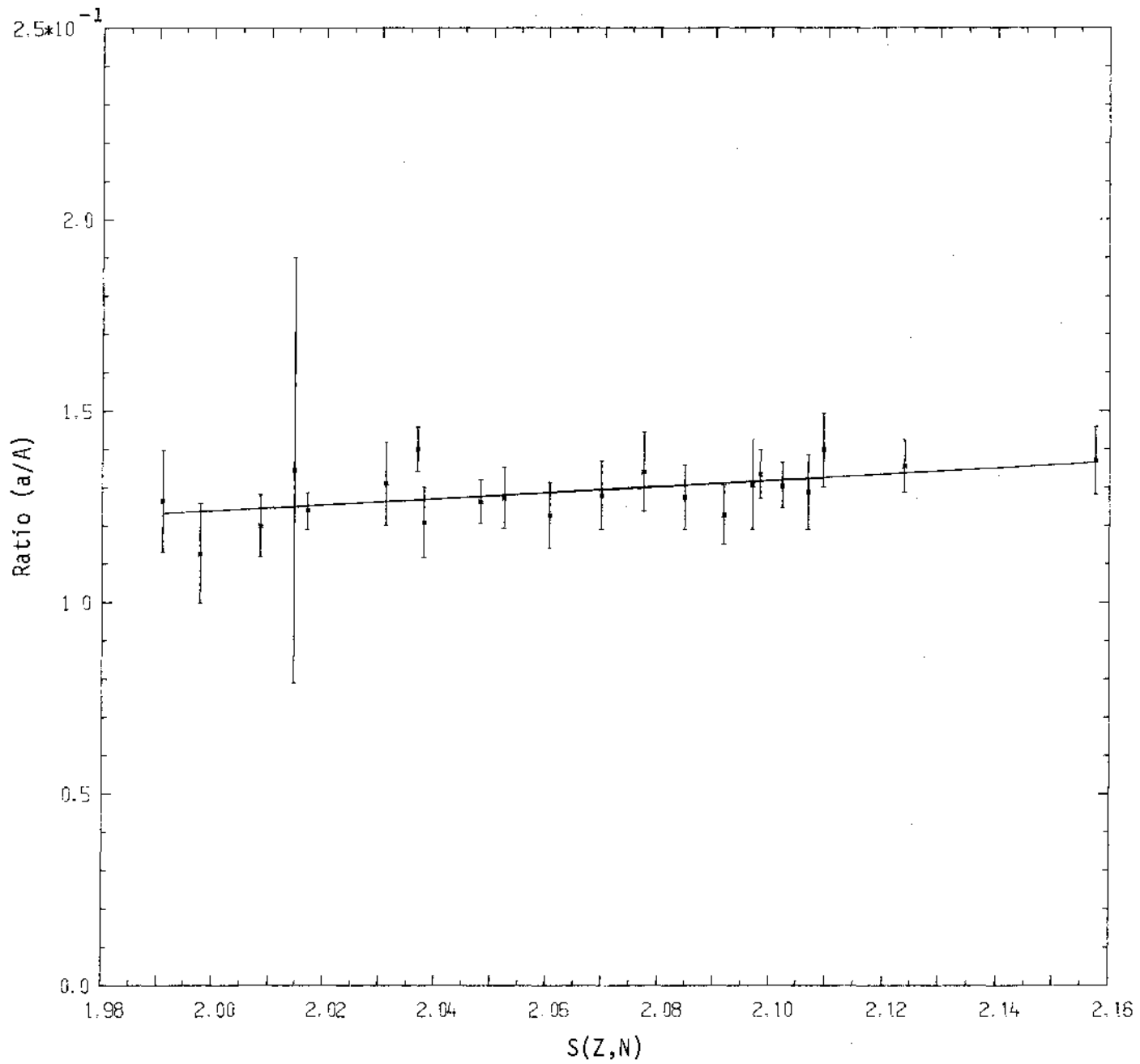


FIGURE 7. VARIATION OF EXPERIMENTAL a/A WITH $S(Z,N)$ AND
FITTED LINE $\alpha S(Z,N) + \beta$, GROUP 6

APPENDIX A
FITTED VALUES OF DENSITY PARAMETER

Nuclide	\bar{D}_{expt}	$\Delta\bar{D}_{\text{expt}}$	\bar{D}_{calc}	a/A	$\Delta(a/A)$	$\chi^2(\bar{D})$
20CA 40	4.450E-02	2.400E-02	4.453E-02	1.476E-01	1.594E-02	1.391E-06
20CA 42	2.870E-02	2.500E-02	2.870E-02	1.673E-01	3.998E-02	3.326E-09
20CA 43	3.180E-03	1.600E-03	3.199E-03	1.579E-01	1.323E-02	1.358E-04
20CA 44	3.300E-02	2.000E-02	3.316E-02	1.674E-01	2.071E-02	6.301E-05
21SC 45	2.020E-03	1.400E-03	2.035E-03	1.465E-01	1.830E-02	1.098E-04
22TI 46	2.930E-02	2.200E-02	2.945E-02	1.386E-01	2.322E-02	4.896E-05
22TI 47	2.360E-03	1.800E-03	2.381E-03	1.434E-01	2.175E-02	1.318E-04
22TI 48	2.100E-02	1.900E-02	2.102E-02	1.538E-01	3.962E-02	6.801E-07
22TI 49	5.650E-03	5.800E-03	5.691E-03	1.271E-01	1.039E-01	5.096E-05
22TI 50	8.380E-02	9.680E-02	8.388E-02	1.495E-01	1.526E-01	6.606E-07
23 V 50	2.610E-03	1.300E-03	2.635E-03	1.261E-01	9.304E-03	3.615E-04
23 V 51	5.140E-03	3.300E-03	5.139E-03	1.323E-01	1.601E-02	3.262E-08
24CR 50	2.010E-02	1.300E-02	2.013E-02	1.297E-01	1.615E-02	5.676E-06
24CR 52	2.590E-02	2.100E-02	2.602E-02	1.369E-01	2.639E-02	3.978E-05
24CR 53	7.380E-03	7.000E-03	7.424E-03	1.351E-01	4.254E-02	3.907E-05
24CR 54	2.460E-02	3.300E-02	2.463E-02	1.755E-01	1.544E-01	9.844E-07
25MN 55	2.280E-03	2.100E-03	2.292E-03	1.420E-01	3.537E-02	3.058E-05
26FE 54	1.830E-02	1.500E-02	1.837E-02	1.227E-01	2.303E-02	1.911E-05
26FE 56	2.000E-02	1.200E-02	2.012E-02	1.338E-01	1.502E-02	9.748E-05
26FE 57	8.360E-03	9.640E-03	8.416E-03	1.319E-01	1.052E-01	3.390E-05
27CO 59	1.310E-03	8.300E-04	1.318E-03	1.398E-01	1.478E-02	9.697E-05
28NI 58	1.970E-02	1.200E-02	1.969E-02	1.169E-01	1.317E-02	1.979E-07
28NI 60	2.120E-02	1.300E-02	2.121E-02	1.284E-01	1.487E-02	1.254E-06
28NI 61	2.010E-03	1.500E-03	2.014E-03	1.303E-01	1.835E-02	6.779E-06
28NI 62	2.850E-02	2.400E-02	2.855E-02	1.354E-01	2.881E-02	4.135E-06
28NI 64	2.750E-02	1.700E-02	2.764E-02	1.485E-01	1.826E-02	6.856E-05
29CU 63	7.200E-04	5.600E-04	7.242E-04	1.754E-01	2.499E-02	5.748E-05
29CU 65	1.230E-03	8.600E-04	1.237E-03	1.441E-01	1.752E-02	5.815E-05
30ZN 64	3.190E-03	3.200E-03	3.200E-03	1.624E-01	1.105E-01	9.442E-06
30ZN 66	3.400E-03	2.780E-03	3.414E-03	1.778E-01	2.904E-02	2.373E-05
30ZN 67	5.060E-04	5.060E-04	5.069E-04	1.445E-01	7.534E-02	2.927E-06
30ZN 68	9.150E-03	1.294E-02	9.166E-03	1.642E-01	1.273E-01	1.607E-06
31GA 69	3.190E-04	1.800E-04	3.191E-04	1.527E-01	1.219E-02	6.124E-07
31GA 71	3.810E-04	2.000E-04	3.808E-04	1.677E-01	1.246E-02	6.248E-07
32GE 70	9.740E-04	4.800E-04	9.773E-04	1.876E-01	1.270E-02	4.773E-05
32GE 72	2.320E-03	3.000E-03	2.322E-03	1.795E-01	1.209E-01	6.937E-07
32GE 73	7.180E-05	5.300E-05	7.205E-05	1.638E-01	1.783E-02	2.251E-05
32GE 74	5.850E-03	6.600E-03	5.869E-03	1.610E-01	1.173E-01	8.147E-06
32GE 76	6.020E-03	2.130E-03	6.037E-03	1.696E-01	9.117E-03	6.419E-05
33AS 75	7.440E-05	4.500E-05	7.441E-05	1.750E-01	1.391E-02	3.878E-08
34SE 76	9.330E-04	4.700E-04	9.352E-04	1.746E-01	1.202E-02	2.219E-05
34SE 77	1.140E-04	5.700E-05	1.147E-04	1.618E-01	9.885E-03	1.612E-04
34SE 78	2.600E-03	2.500E-03	2.608E-03	1.590E-01	4.430E-02	1.071E-05
34SE 80	4.110E-03	3.800E-03	4.130E-03	1.521E-01	3.597E-02	2.882E-05
35BR 79	5.120E-05	1.940E-05	5.133E-05	1.633E-01	7.124E-03	4.620E-05
35BR 81	3.470E-05	2.000E-05	3.470E-05	1.721E-01	1.216E-02	2.825E-08
37RB 85	2.010E-04	1.500E-04	2.009E-04	1.164E-01	1.366E-02	4.168E-07
37RB 87	2.570E-03	1.710E-03	2.581E-03	1.152E-01	1.363E-02	4.191E-05
38SR 87	2.740E-04	2.100E-04	2.747E-04	1.058E-01	1.326E-02	1.010E-05
38SR 88	4.100E-02	3.340E-02	4.124E-02	1.018E-01	2.023E-02	4.995E-05

(Continued)

Nuclide	\bar{D}_{expt}	$\Delta\bar{D}_{\text{expt}}$	\bar{D}_{calc}	a/A	$\Delta(a/A)$	$\chi^2(\bar{D})$
39 Y 89	3.150E-03	3.700E-03	3.166E-03	1.079E-01	7.596E-02	1.848E-05
40Zr 90	5.690E-03	4.900E-03	5.689E-03	1.207E-01	2.265E-02	7.325E-08
40Zr 91	3.360E-04	3.700E-04	3.372E-04	1.351E-01	8.436E-02	1.137E-05
40Zr 92	3.560E-03	3.100E-03	3.577E-03	1.346E-01	2.529E-02	2.969E-05
40Zr 94	1.810E-03	1.300E-03	1.814E-03	1.509E-01	1.788E-02	1.018E-05
40Zr 96	6.870E-04	6.900E-04	6.869E-04	1.956E-01	1.167E-01	3.791E-08
41Nb 93	1.050E-04	7.500E-05	1.053E-04	1.322E-01	1.389E-02	1.918E-05
42Mo 92	2.560E-03	1.480E-03	2.564E-03	1.175E-01	1.015E-02	5.602E-06
42Mo 95	5.090E-05	5.400E-05	5.092E-05	1.506E-01	8.121E-02	1.329E-07
42Mo 96	4.280E-04	3.400E-04	4.289E-04	1.676E-01	2.157E-02	6.658E-06
42Mo 97	2.620E-05	2.300E-05	2.630E-05	1.695E-01	2.553E-02	1.974E-05
42Mo 98	1.430E-03	1.168E-03	1.429E-03	1.650E-01	2.475E-02	1.978E-07
42Mo100	2.800E-04	4.000E-04	2.801E-04	2.180E-01	1.243E-01	1.148E-07
43Tc 99	2.750E-05	1.600E-05	2.757E-05	1.571E-01	1.126E-02	2.095E-05
44Ru 99	4.110E-05	2.700E-05	4.115E-05	1.386E-01	1.195E-02	3.186E-06
44Ru101	2.230E-05	1.500E-05	2.242E-05	1.532E-01	1.327E-02	6.460E-05
44Ru102	3.770E-04	2.100E-04	3.784E-04	1.767E-01	1.291E-02	4.207E-05
44Ru104	2.070E-04	1.040E-04	2.077E-04	1.963E-01	1.215E-02	4.948E-05
45Rh103	3.380E-05	2.100E-05	3.386E-05	1.604E-01	1.202E-02	8.398E-06
46Pd105	1.270E-05	7.000E-06	1.274E-05	1.494E-01	9.420E-03	3.812E-05
47Ag107	2.770E-05	2.200E-05	2.775E-05	1.529E-01	1.699E-02	5.058E-06
47Ag109	1.900E-05	1.600E-05	1.908E-05	1.657E-01	2.061E-02	2.272E-05
48Cd113	2.360E-05	9.200E-06	2.360E-05	1.535E-01	6.314E-03	1.167E-07
49In113	2.650E-05	2.800E-05	2.658E-05	1.275E-01	6.540E-02	9.080E-06
49In115	1.080E-05	6.500E-06	1.081E-05	1.474E-01	1.044E-02	3.240E-06
50Sn112	1.270E-04	1.400E-04	1.274E-04	1.448E-01	7.408E-02	9.783E-06
50Sn114	2.840E-04	1.160E-04	2.848E-04	1.342E-01	6.478E-03	4.944E-05
50Sn115	1.440E-04	7.200E-05	1.443E-04	1.170E-01	7.107E-03	2.306E-05
50Sn116	4.260E-04	4.900E-04	4.262E-04	1.372E-01	7.721E-02	1.982E-07
50Sn117	5.020E-05	3.000E-05	5.033E-05	1.324E-01	9.520E-03	1.845E-05
50Sn118	4.750E-04	3.900E-04	4.764E-04	1.431E-01	1.972E-02	1.294E-05
50Sn119	6.300E-05	6.500E-05	6.304E-05	1.269E-01	1.452E-02	4.801E-07
50Sn120	8.910E-04	9.700E-04	8.935E-04	1.374E-01	8.165E-02	6.616E-06
51Sb121	1.070E-05	7.700E-06	1.070E-05	1.447E-01	1.330E-02	3.610E-07
51Sb123	2.510E-05	1.700E-05	2.509E-05	1.340E-01	1.184E-02	2.508E-07
52Te122	1.890E-04	6.300E-05	1.891E-04	1.434E-01	5.399E-03	3.056E-06
52Te123	2.920E-05	2.700E-05	2.931E-05	1.314E-01	1.115E-02	3.246E-05
52Te124	2.420E-04	9.100E-05	2.420E-04	1.450E-01	6.348E-03	8.452E-08
52Te125	5.750E-05	3.400E-05	5.777E-05	1.254E-01	8.940E-03	6.490E-05
52Te126	1.160E-05	1.640E-05	1.162E-05	1.247E-01	7.644E-02	1.175E-06
52Te130	5.680E-03	4.300E-03	5.677E-03	1.041E-01	1.450E-02	4.625E-07
53 I127	1.370E-05	8.200E-06	1.373E-05	1.348E-01	9.500E-03	1.163E-05
53 I129	1.620E-05	7.250E-06	1.619E-05	1.346E-01	6.693E-03	1.484E-06
54Xe129	3.520E-05	1.570E-05	3.519E-05	1.254E-01	6.088E-03	4.429E-07
54Xe131	6.720E-05	3.360E-05	6.747E-05	1.122E-01	6.731E-03	6.297E-05
55Cs133	2.060E-05	1.300E-05	2.060E-05	1.205E-01	9.388E-03	8.470E-08
56Ba135	6.630E-05	6.600E-05	6.656E-05	1.067E-01	3.905E-02	1.563E-05
56Ba136	2.630E-03	1.470E-03	2.642E-03	9.529E-02	7.770E-03	6.156E-05

(Continued)

Nuclide	\bar{D}_{expt}	$\Delta\bar{D}_{\text{expt}}$	\bar{D}_{calc}	a/A	$\Delta(a/A)$	$\chi^2(\bar{D})$
56Ba137	3.080E-04	1.720E-04	3.085E-04	9.407E-02	7.152E-03	9.145E-06
56Ba138	1.120E-02	6.500E-03	1.122E-02	1.117E-01	1.106E-02	1.248E-05
57La138	4.060E-05	2.100E-05	4.086E-05	9.511E-02	5.852E-03	1.484E-04
57La139	2.650E-04	2.400E-04	2.652E-04	1.118E-01	2.164E-02	4.612E-07
59Pr141	6.530E-05	5.200E-05	6.557E-05	1.195E-01	1.477E-02	2.725E-05
60Nd142	1.190E-03	5.300E-04	1.195E-03	1.141E-01	6.678E-03	8.104E-05
60Nd143	3.300E-05	3.100E-05	3.316E-05	1.218E-01	2.355E-02	3.202E-06
60Nd144	7.630E-04	4.000E-04	7.629E-04	1.266E-01	8.803E-03	4.415E-08
60Nd145	1.770E-05	1.600E-05	1.772E-05	1.332E-01	2.141E-02	2.410E-06
60Nd146	4.740E-04	3.500E-04	4.741E-04	1.442E-01	1.608E-02	4.907E-08
60Nd143	2.580E-04	2.400E-04	2.585E-04	1.600E-01	3.086E-02	3.697E-06
60Nd150	2.470E-04	1.900E-04	2.474E-04	1.510E-01	1.741E-02	4.855E-06
61Pm147	4.990E-06	2.900E-06	5.010E-06	1.457E-01	1.507E-02	2.749E-05
62Sm147	7.580E-06	4.500E-06	7.593E-06	1.313E-01	8.905E-03	8.290E-06
62Sm149	2.800E-06	1.700E-06	2.811E-06	1.456E-01	9.680E-03	4.136E-05
62Sm151	1.350E-06	1.100E-06	1.354E-06	1.475E-01	1.546E-02	1.373E-05
62Sm152	5.550E-05	3.000E-05	5.549E-05	1.569E-01	9.628E-03	3.994E-08
62Sm154	1.230E-04	8.200E-05	1.231E-04	1.441E-01	1.237E-02	5.926E-07
63Eu151	9.550E-07	5.600E-07	9.559E-07	1.591E-01	9.470E-03	2.477E-06
63Eu153	1.450E-06	6.700E-07	1.452E-06	1.486E-01	6.685E-03	1.210E-05
64Gd152	1.490E-05	1.100E-05	1.490E-05	1.603E-01	1.439E-02	2.380E-09
64Gd154	1.300E-05	1.100E-05	1.300E-05	1.614E-01	1.906E-02	7.631E-08
64Gd155	1.980E-06	1.300E-06	1.982E-06	1.409E-01	9.993E-03	2.105E-06
64Gd156	4.930E-05	3.900E-05	4.938E-05	1.420E-01	1.550E-02	3.770E-06
64Gd157	5.850E-06	3.800E-06	5.853E-06	1.369E-01	1.015E-02	5.925E-07
64Gd158	1.010E-04	5.000E-05	1.009E-04	1.402E-01	7.956E-03	1.344E-06
64Gd160	1.700E-04	7.600E-05	1.699E-04	1.388E-01	7.202E-03	1.998E-06
65Tb159	3.750E-06	2.000E-06	3.764E-06	1.370E-01	7.562E-03	4.620E-05
66Dy161	2.800E-06	1.600E-06	2.812E-06	1.231E-01	8.031E-03	5.704E-05
66Dy162	6.670E-05	3.000E-05	6.692E-05	1.350E-01	6.632E-03	5.613E-05
66Dy163	7.970E-06	4.200E-06	7.999E-06	1.288E-01	7.423E-03	4.836E-05
66Dy164	1.670E-04	6.300E-05	1.669E-04	1.337E-01	5.694E-03	2.739E-06
67Ho165	3.690E-06	2.500E-06	3.691E-06	1.283E-01	1.011E-02	2.155E-07
68Er162	1.320E-05	1.100E-05	1.321E-05	1.428E-01	1.615E-02	6.524E-07
68Er164	2.580E-05	2.800E-05	2.582E-05	1.377E-01	6.300E-02	3.443E-07
68Er166	3.850E-05	2.000E-05	3.860E-05	1.355E-01	7.671E-03	2.481E-05
68Er167	4.720E-06	2.700E-06	4.733E-06	1.271E-01	7.970E-03	2.481E-05
68Er168	1.060E-04	6.100E-05	1.064E-04	1.300E-01	8.920E-03	3.853E-05
68Er170	1.590E-04	1.300E-04	1.591E-04	1.304E-01	1.637E-02	1.937E-07
69Tm169	8.390E-06	7.000E-06	8.401E-06	1.243E-01	1.417E-02	2.269E-06
70Yb168	5.870E-05	3.390E-05	5.867E-05	1.203E-01	7.938E-03	1.042E-06
70Yb170	3.860E-05	2.200E-05	3.873E-05	1.287E-01	8.179E-03	3.707E-05
70Yb171	8.890E-06	4.500E-06	8.922E-06	1.266E-01	6.599E-03	5.171E-05
70Yb172	7.190E-05	4.300E-05	7.201E-05	1.244E-01	8.740E-03	6.975E-06
70Yb173	7.430E-06	4.500E-06	7.429E-06	1.255E-01	8.638E-03	8.018E-08
70Yb174	1.780E-04	1.100E-04	1.786E-04	1.228E-01	9.560E-03	2.694E-05
70Yb176	2.160E-04	1.200E-04	2.163E-04	1.248E-01	8.531E-03	6.525E-06
71Lu175	3.610E-06	2.300E-06	3.614E-06	1.210E-01	8.648E-03	3.598E-06
71Lu176	2.370E-06	1.400E-06	2.370E-06	1.231E-01	7.726E-03	1.861E-10
72Hf174	2.190E-05	1.600E-05	2.192E-05	1.281E-01	1.139E-02	1.967E-06

(Continued)

Nuclide	\bar{D}_{expt}	$\Delta\bar{D}_{\text{expt}}$	\bar{D}_{calc}	a/A	$\Delta(a/A)$	$\chi^2(\bar{D})$
72HF176	3.170E-05	1.700E-05	3.171E-05	1.317E-01	7.656E-03	1.444E-07
72HF177	3.170E-06	2.600E-06	3.181E-06	1.270E-01	1.407E-02	1.842E-05
72HF178	6.670E-05	4.700E-05	6.683E-05	1.269E-01	1.135E-02	7.540E-06
72HF179	5.730E-06	3.300E-06	5.730E-06	1.215E-01	7.787E-03	1.097E-08
73TA181	4.090E-06	2.800E-06	4.096E-06	1.200E-01	9.621E-03	4.341E-06
74 W180	1.430E-05	6.400E-06	1.432E-05	1.331E-01	5.931E-03	7.973E-06
74 W182	6.040E-05	4.100E-05	6.059E-05	1.234E-01	1.031E-02	2.105E-05
74 W183	1.270E-05	9.300E-06	1.273E-05	1.251E-01	1.123E-02	1.233E-05
74 W184	6.700E-05	6.200E-05	6.699E-05	1.305E-01	2.227E-02	1.047E-08
74 W186	1.140E-04	7.900E-05	1.141E-04	1.289E-01	1.163E-02	1.116E-06
75RE185	3.170E-06	1.700E-06	3.170E-06	1.209E-01	6.734E-03	1.247E-09
75RE187	4.420E-06	2.700E-06	4.423E-06	1.215E-01	8.202E-03	9.444E-07
76OS189	5.050E-06	3.300E-06	5.062E-06	1.171E-01	8.592E-03	1.250E-05
77IR191	2.960E-06	2.300E-06	2.966E-06	1.218E-01	1.165E-02	7.282E-06
77IR193	1.090E-05	9.900E-06	1.090E-05	1.089E-01	1.661E-02	4.231E-09
78PT194	8.060E-05	4.030E-05	8.057E-05	1.142E-01	6.370E-03	5.739E-07
78PT195	1.690E-05	1.500E-05	1.695E-05	1.058E-01	1.472E-02	1.252E-05
79AU197	1.600E-05	1.000E-05	1.600E-05	9.661E-02	7.031E-03	1.756E-07
80HG198	7.880E-05	3.520E-05	7.879E-05	1.031E-01	4.985E-03	1.019E-07
80HG199	9.400E-05	3.130E-05	9.395E-05	8.608E-02	3.120E-03	2.530E-06
80HG200	1.080E-03	4.400E-04	1.082E-03	8.214E-02	4.204E-03	1.708E-05
80HG201	8.320E-05	2.950E-05	8.325E-05	8.360E-02	3.361E-03	3.030E-06
81TL205	5.680E-03	5.780E-03	5.681E-03	5.110E-02	1.060E-02	7.243E-08
82PB204	3.100E-03	2.000E-03	3.112E-03	6.533E-02	6.386E-03	3.519E-05
82PB206	2.050E-02	1.200E-02	2.056E-02	4.967E-02	4.886E-03	2.236E-05
82PB207	3.450E-02	2.900E-02	3.464E-02	4.051E-02	8.279E-03	2.245E-05
83BI209	4.080E-03	3.000E-03	4.083E-03	5.806E-02	8.340E-03	1.230E-06
90TF229	9.670E-07	8.000E-07	9.685E-07	1.265E-01	1.327E-02	3.626E-06
90TH230	1.180E-05	5.000E-06	1.182E-05	1.400E-01	5.820E-03	1.530E-05
90TH232	2.430E-05	1.500E-05	2.429E-05	1.397E-01	9.678E-03	3.354E-07
91PA231	5.440E-07	4.100E-07	5.451E-07	1.310E-01	1.087E-02	7.222E-06
91PA233	8.340E-07	4.200E-07	8.355E-07	1.334E-01	6.333E-03	1.317E-05
92 U232	4.480E-06	5.500E-06	4.492E-06	1.344E-01	5.550E-02	4.990E-06
92 U233	7.180E-07	3.500E-07	7.182E-07	1.264E-01	5.803E-03	3.508E-07
92 U234	1.070E-05	7.400E-06	1.072E-05	1.341E-01	1.048E-02	6.636E-06
92 U235	6.440E-07	3.100E-07	6.451E-07	1.304E-01	5.928E-03	1.253E-05
92 U236	1.290E-05	6.400E-06	1.292E-05	1.356E-01	6.814E-03	1.116E-05
92 U238	2.200E-05	1.300E-05	2.201E-05	1.370E-01	8.875E-03	5.608E-07
93NP237	7.240E-07	4.500E-07	7.245E-07	1.227E-01	7.710E-03	1.049E-06
94PU238	7.580E-06	4.600E-06	7.589E-06	1.272E-01	8.023E-03	4.069E-06
94PU239	2.410E-06	1.600E-06	2.411E-06	1.279E-01	8.971E-03	2.723E-07
94PU240	1.630E-05	1.000E-05	1.634E-05	1.274E-01	8.508E-03	1.758E-05
94PU241	9.900E-07	7.600E-07	9.899E-07	1.306E-01	1.176E-02	3.137E-08
94PU242	2.110E-05	1.400E-05	2.113E-05	1.287E-01	9.786E-03	3.823E-06
95AM241	6.610E-07	4.700E-07	6.612E-07	1.208E-01	9.265E-03	1.346E-07
95AM243	7.010E-07	4.700E-07	7.010E-07	1.227E-01	8.598E-03	9.129E-09
96CM243	1.760E-06	1.500E-06	1.760E-06	1.127E-01	1.306E-02	1.048E-07
96CM244	1.460E-05	9.100E-06	1.462E-05	1.200E-01	8.112E-03	6.008E-06
96CM245	3.080E-06	1.300E-06	3.087E-06	1.239E-01	4.903E-03	2.549E-05

APPENDIX B
 FITTED a/A VALUES AND CORRESPONDING
 RECALCULATED DENSITY PARAMETERS

Nuclide	N' N+1	S(Z,N')	(a/A) _{expt}	(a/A) _{fitted}	$\chi^2(a/A)$	\bar{D}_{exp}	$\Delta\bar{D}_{exp}$	\bar{D}_{MIN}	\bar{D}_{MAX}	\bar{D}_{calc}	$\chi^2(\bar{D})$
20A	4	3.477E+00	1.476E-01	1.487E-01	4.782E-03	4.450E-02	2.400E-02	2.050E-02	6.850E-02	4.269E-02	5.704E-03
20CA	42	2.997E+00	1.573E-01	1.536E-01	1.181E-01	2.870E-02	2.500E-02	3.793E-03	5.374E-02	4.692E-02	5.312E-01
20CA	43	2.508E+00	1.579E-01	1.586E-01	3.170E-03	3.180E-03	1.600E-03	1.580E-03	4.780E-03	3.100E-03	2.530E-03
20CA	44	1.752E+00	1.674E-01	1.453E-01	1.136E+00	3.300E-02	2.000E-02	1.300E-02	5.300E-02	7.265E-02	3.930E+00
21C	45	1.674E+00	1.465E-01	1.445E-01	1.145E-02	2.020E-03	1.400E-03	6.233E-04	3.420E-03	2.235E-03	2.351E-02
22Ti	46	1.427E+00	1.386E-01	1.420E-01	2.170E-02	2.930E-02	2.200E-02	7.300E-03	5.130E-02	2.542E-02	3.105E-02
22Ti	47	5.271E-01	1.434E-01	1.329E-01	2.333E-01	2.360E-03	1.800E-03	4.160E-03	3.952E-03	3.952E-03	7.827E-01
22Ti	48	1.626E+00	1.538E-01	1.226E-01	6.206E-01	2.100E-02	1.900E-02	2.000E-03	4.000E-02	7.771E-02	8.908E+00
22Ti	49	1.840E+00	1.271E-01	1.246E-01	2.424E-02	5.650E-03	5.800E-03	0.0	1.145E-02	1.319E-02	1.689E+00
23V	50	1.975E+00	1.261E-01	1.74E-01	4.069E+00	2.610E-03	1.300E-03	1.315E-03	1.806E-01	2.054E-01	1.998E+01
23V	51	6.464E-01	1.323E-01	1.205E-01	5.100E-01	5.140E-03	3.300E-03	8.440E-03	3.910E-03	8.421E-03	1.408E+00
24Cr	52	1.368E+00	1.297E-01	1.135E-01	9.967E-01	2.010E-02	1.300E-02	7.100E-03	3.310E-02	4.502E-02	3.675E+00
24Cr	52	1.153E+00	1.369E-01	1.157E-01	6.423E-01	2.590E-02	2.100E-02	4.931E-03	4.690E-02	6.886E-02	4.185E+00
24Cr	53	7.541E-03	1.351E-01	1.274E-01	3.303E-02	7.380E-03	7.000E-03	3.800E-04	1.438E-02	1.060E-02	2.117E-01
24Cr	54	9.734E-01	1.755E-01	1.374E-01	6.117E-02	2.460E-02	3.300E-02	0.0	5.760E-02	9.583E-02	4.660E+00
25Mn	55	3.205E-01	1.423E-01	1.307E-01	1.009E-01	2.280E-03	2.100E-03	1.800E-04	4.380E-03	3.965E-03	6.441E-01
26Fe	54	2.588E+00	1.227E-01	1.613E-01	8.666E-01	1.830E-02	1.500E-02	3.300E-03	3.330E-02	5.863E-02	7.227E+00
26Fe	56	4.586E-01	1.338E-01	1.228E-01	5.326E-01	2.000E-02	1.200E-02	8.000E-03	3.200E-02	3.395E-02	1.352E+00
26Fe	57	3.627E-01	1.319E-01	1.312E-01	5.009E-03	8.360E-03	9.64E-03	0.0	1.800E-02	8.728E-03	1.455E-03
27Co	59	1.410E-01	1.398E-01	1.289E-01	5.463E-01	1.310E-03	8.300E-04	4.800E-04	2.140E-03	2.336E-03	1.528E+00
28Ni	58	3.312E+00	1.169E-01	1.033E-01	1.058E+00	1.970E-02	1.200E-02	7.700E-03	3.170E-02	4.206E-02	3.471E+00
28Ni	60	8.666E-01	1.284E-01	1.186E-01	4.313E-01	2.120E-02	1.300E-02	8.200E-03	3.420E-02	2.443E-02	1.036E+00
28Ni	61	3.222E-01	1.303E-01	1.242E-01	1.118E-01	2.010E-03	1.500E-03	5.100E-04	3.510E-03	2.814E-03	2.870E-01
28Ni	62	9.282E-02	1.354E-01	1.284E-01	5.892E-02	2.950E-02	2.400E-02	4.500E-03	5.250E-02	3.910E-02	1.951E-01
28Ni	64	5.444E-01	1.485E-01	1.330E-01	7.222E-01	2.750E-02	1.700E-02	1.050E-02	4.450E-02	5.237E-02	2.140E+00
29Cu	63	1.235E+00	1.754E-01	1.399E-01	2.013E+00	7.200E-04	5.600E-04	1.600E-03	1.280E-03	3.559E-03	2.554E+01
29Cu	65	1.651E+00	1.441E-01	1.443E-01	1.153E-04	1.230E-03	8.600E-04	3.700E-04	2.090E-03	1.225E-03	3.564E-05
30Zn	66	2.196E+00	1.624E-01	1.498E-01	1.296E-02	3.190E-03	3.200E-03	0.0	6.390E-03	5.720E-03	6.251E-01
30Zn	67	2.542E+00	1.445E-01	1.533E-01	1.369E-02	5.060E-04	5.060E-04	0.0	6.180E-03	9.656E-03	5.064E+00
30Zn	68	3.480E+00	1.642E-01	1.527E-01	7.194E-01	3.400E-03	2.780E-03	0.0	1.012E-03	3.185E-04	1.373E-01
30Zn	69	3.035E+00	1.527E-01	1.580E-01	1.905E-01	3.190E-04	1.800E-04	1.390E-04	4.990E-04	2.412E-04	1.844E-01
31Ga	71	2.704E+00	1.677E-01	1.550E-01	1.036E+00	3.910E-04	2.000E-04	1.810E-04	5.810E-04	7.008E-04	2.557E+00
32Ge	70	3.344E+00	1.876E-01	1.834E-01	1.061E-01	9.740E-04	4.800E-04	4.94E-04	1.454E-03	1.168E-03	1.634E-01
32Ge	72	3.093E+00	1.795E-01	1.760E-01	8.347E-02	2.320E-03	3.000E-03	0.0	5.320E-03	2.690E-03	1.519E-02
32Ge	73	2.873E+00	1.638E-01	1.694E-01	9.908E-02	7.180E-05	5.300E-05	1.248E-04	5.327E-05	3.327E-05	1.222E-01
32Ge	74	2.589E+00	1.615E-01	1.601E-01	6.677E-05	5.850E-03	6.600E-03	0.0	1.245E-02	6.118E-03	1.647E-03
32Ge	75	1.466E+00	1.696E-01	1.424E-01	8.904E+00	6.020E-03	2.130E-03	3.890E-03	8.150E-03	3.769E+01	3.769E+01
33As	76	2.932E+00	1.750E-01	1.703E-01	1.164E-01	7.440E-05	4.500E-05	2.940E-05	1.194E-04	9.492E-05	2.080E-01
34Se	76	3.125E+00	1.746E-01	1.769E-01	3.842E-02	9.300E-04	4.700E-04	4.630E-04	1.403E-04	8.384E-04	4.0349E-02
34Se	77	2.811E+00	1.618E-01	1.676E-01	3.476E-01	1.140E-04	5.700E-05	1.710E-05	1.710E-05	8.297E-05	2.964E-01
34Se	78	2.373E+00	1.501E-01	1.545E-01	1.006E-02	2.600E-03	2.500E-03	1.000E-04	5.100E-03	3.222E-03	6.190E-02
34Se	80	9.039E-01	1.521E-01	1.367E-01	1.840E-03	3.800E-03	3.800E-03	3.100E-04	7.910E-03	8.761E-03	1.498E+00
35Br	79	2.598E+00	1.633E-01	1.612E-01	8.473E-02	5.120E-05	1.940E-05	3.180E-05	7.060E-05	5.771E-05	1.125E-01
35Br	81	1.243E+00	1.721E-01	1.401E-01	6.932E+00	2.010E-04	2.000E-04	5.100E-05	3.510E-04	2.160E-04	8.216E+01
37Br	85	1.243E-01	1.164E-01	1.252E-01	4.208E-01	2.010E-04	1.500E-05	1.400E-05	4.280E-04	1.071E-04	3.917E-01
37Br	87	8.283E-02	1.192E-01	1.266E-01	6.964E-01	2.570E-03	1.710E-03	8.600E-04	4.280E-04	1.323E-03	5.316E-01
38Sr	87	1.186E+00	1.058E-01	1.154E-01	5.187E-01	2.740E-04	2.100E-04	6.400E-05	4.840E-04	1.321E-04	4.564E-01
38Sr	88	3.648E-02	1.018E-01	1.271E-01	1.568E+00	4.100E-02	3.340E-02	7.600E-03	7.440E-02	1.004E-02	8.592E-01

(continued)

Nuclide	N' N+1	S(Z,N')	(a/A) _{expt}	(a/A) _{fitted}	$\chi^2(a/A)$	\bar{D}_{exp}	$\Delta\bar{D}_{exp}$	\bar{D}_{MIN}	\bar{D}_{MAX}	\bar{D}_{calc}	$\chi^2(\bar{D})$
39 Y 89	51	1 -8.194E+02	1.079E-01	1.266E-01	6.051E-02	3.150E-03	3.700E-03	0.0	6.850E-03	9.501E-04	3.535E-01
40Zr 90	51	-2.167E-01	1.207E-01	1.253E-01	4.117E-02	5.690E-03	4.900E-03	7.900E-04	1.059E-02	4.337E-03	7.628E-02
40Zr 91	52	1 8.202E-01	1.351E-01	1.358E-01	7.712E-05	3.360E-04	3.700E-04	0.0	7.060E-04	3.228E-04	1.266E-03
40Zr 92	53	1 1.760E+00	1.346E-01	1.454E-01	1.803E-01	3.560E-03	3.100E-03	4.600E-04	6.560E-03	2.000E-03	2.534E-01
40Zr 94	55	4 2.866E+00	1.509E-01	1.597E-01	2.403E-01	1.810E-03	1.300E-03	5.100E-04	3.110E-03	1.160E-03	2.499E-01
40Zr 96	57	4 3.397E+00	1.956E-01	1.674E-01	4.905E-03	6.870E-04	6.900E-04	0.0	1.377E-03	9.752E-04	1.745E-01
41Nb 93	53	1 1.530E+00	1.322E-01	1.430E-01	6.065E-01	1.050E-04	7.500E-05	3.000E-05	1.800E-04	5.237E-05	4.924E-01
42Mo 95	54	4 2.018E+00	1.506E-01	1.199E-01	5.867E-02	2.560E-03	1.480E-03	1.080E-03	4.040E-03	2.182E-03	6.506E-02
42Mo 96	55	4 2.538E+00	1.676E-01	1.426E-01	1.866E-01	5.090E-05	5.400E-05	0.0	1.049E-04	4.778E-04	6.250E+01
42Mo 97	56	4 2.891E+00	1.695E-01	1.610E-01	1.335E+00	4.280E-04	3.400E-04	8.800E-05	7.680E-04	1.622E-03	1.232E+01
42Mo 98	57	4 3.147E+00	1.650E-01	1.743E-01	1.426E-01	2.620E-05	2.300E-06	3.200E-06	4.920E-05	4.239E-05	4.952E-01
42Mo100	59	4 3.479E+00	2.180E-01	1.916E-01	4.503E-02	2.800E-04	4.000E-04	0.0	2.598E-03	9.198E-04	1.908E-01
43TC 99	57	4 2.958E+00	1.571E-01	1.645E-01	4.334E-01	2.750E-05	1.600E-05	1.150E-05	4.350E-05	1.779E-05	3.680E-01
44Ru 99	56	4 2.388E+00	1.386E-01	1.368E-01	9.911E-02	4.110E-05	2.700E-05	1.410E-05	6.810E-05	5.299E-05	1.938E-01
44Ru101	58	4 2.951E+00	1.532E-01	1.641E-01	6.815E-01	2.230E-05	7.000E-06	7.300E-06	3.730E-05	1.144E-05	5.240E-01
44Ru104	61	4 3.125E+00	1.767E-01	1.732E-01	7.085E-02	3.770E-04	2.100E-04	1.670E-04	5.870E-04	4.483E-04	1.153E-01
44Ru106	63	4 3.366E+00	1.963E-01	1.847E-01	9.078E-01	2.070E-04	1.040E-04	1.030E-04	3.110E-04	3.556E-04	2.041E+00
45Rh103	59	4 2.876E+00	1.604E-01	1.602E-01	2.567E-04	3.380E-05	2.100E-05	1.280E-05	5.480E-05	3.426E-05	4.845E-04
46Pd105	60	4 2.733E+00	1.494E-01	1.528E-01	1.251E-01	1.270E-05	7.000E-06	5.700E-06	1.970E-05	1.023E-05	1.247E-01
47Ag107	61	4 2.508E+00	1.524E-01	1.530E-01	1.878E-05	7.000E-06	2.000E-06	5.700E-06	4.970E-05	2.762E-05	1.441E-05
47Ag109	63	4 2.681E+00	1.657E-01	1.548E-01	2.860E-01	1.900E-05	1.600E-05	3.000E-06	3.500E-05	3.759E-05	1.350E+00
48Cd113	66	1 2.270E+00	1.535E-01	1.506E-01	2.215E-01	2.360E-05	9.200E-06	1.440E-06	3.280E-05	2.870E-05	3.069E-01
49In113	65	1 1.729E+00	1.275E-01	1.451E-01	7.176E-02	2.650E-05	2.800E-05	0.0	5.450E-05	7.566E-06	4.612E-01
49In115	67	1 1.570E+00	1.474E-01	1.434E-01	1.430E-01	1.080E-05	6.500E-06	4.330E-06	1.730E-05	1.413E-05	2.629E-01
50Sn112	63	1 7.937E-01	1.448E-01	1.395E-01	1.549E-02	1.270E-04	1.400E-04	0.0	2.670E-04	2.352E-04	5.969E-01
50Sn114	65	1 8.875E-01	1.342E-01	1.365E-01	1.278E-01	2.840E-04	1.160E-04	1.680E-04	4.000E-04	2.439E-04	1.197E-01
50Sn116	66	1 7.236E-01	1.170E-01	1.360E-01	7.128E+00	1.440E-04	4.900E-04	7.200E-05	2.160E-04	3.459E-04	2.309E+00
50Sn117	68	1 5.492E-01	1.324E-01	1.331E-01	5.185E-03	5.020E-05	3.000E-05	2.020E-05	8.020E-05	4.781E-05	6.046E-03
50Sn118	69	1 3.142E-01	1.431E-01	1.307E-01	3.976E-01	4.750E-04	3.900E-04	8.500E-05	1.860E-04	7.874E-05	2.003E+00
50Sn119	70	1 2.017E-02	1.269E-01	1.277E-01	2.448E-03	8.300E-05	6.500E-05	1.800E-05	1.800E-05	7.874E-05	4.290E-03
50Sn120	71	1 3.317E-01	1.374E-01	1.241E-01	2.665E-02	9.910E-04	9.700E-04	0.0	1.861E-03	2.034E-03	1.388E+00
51Sb121	71	1 5.944E-01	1.447E-01	1.335E-01	7.065E-01	1.070E-05	7.700E-06	3.000E-06	1.860E-05	2.355E-05	2.784E+00
51Sb123	73	1 2.819E-01	1.347E-01	1.246E-01	6.300E-01	2.510E-05	1.700E-05	8.100E-06	4.210E-05	4.947E-05	2.055E+00
52Te122	71	1 1.444E+00	1.434E-01	1.422E-01	5.389E-02	1.890E-04	6.300E-04	1.260E-04	2.520E-04	2.515E-04	6.491E-02
52Te123	72	1 1.631E+00	1.314E-01	1.300E-01	3.473E-01	2.920E-05	2.000E-05	9.200E-06	4.920E-05	1.785E-05	3.221E-01
52Te124	73	1 5.630E-01	1.450E-01	1.392E-01	3.436E+00	2.420E-04	1.510E-04	1.510E-04	3.330E-04	5.128E-04	8.856E+00
52Te125	74	1 4.197E-02	1.254E-01	1.279E-01	7.919E-02	5.750E-05	3.400E-05	2.350E-05	9.150E-05	4.765E-05	8.380E-02
52Te126	75	1 5.314E-01	1.247E-01	1.221E-01	1.220E-03	1.160E-03	1.640E-03	0.0	2.800E-03	1.385E-03	1.890E-02
52Te130	79	1 2.329E+00	1.041E-01	9.358E-02	5.252E-01	5.680E-03	4.300E-03	1.380E-03	9.980E-03	1.234E-02	2.186E+00
53 I127	75	1 2.365E-01	1.346E-01	1.299E-01	2.659E-01	1.370E-05	8.200E-06	5.500E-06	2.190E-05	1.974E-05	5.429E-01
53 I129	77	1 1.065E+00	1.346E-01	1.166E-01	7.231E+00	1.620E-05	7.250E-06	8.950E-06	6.208E-05	6.208E-05	4.004E-01
54Xe129	76	1 3.063E-01	1.254E-01	1.306E-01	7.131E-01	3.520E-05	1.570E-05	1.950E-05	5.090E-05	2.350E-05	5.554E-01
54Xe131	78	1 1.094E+00	1.122E-01	1.103E-01	3.804E-01	6.720E-05	3.360E-05	3.360E-05	1.008E-04	4.808E-05	3.237E-01
55Cs133	79	1 1.239E+00	1.205E-01	1.149E-01	3.555E-01	2.060E-05	1.300E-05	7.600E-06	3.360E-06	3.242E-05	8.271E-01
56Ba135	80	1 1.497E+00	1.067E-01	1.122E-01	2.026E-02	6.630E-05	6.600E-05	3.000E-07	1.323E-04	4.130E-05	1.435E-01
56Ba136	81	1 2.360E+00	9.529E-02	1.034E-01	1.103E+00	2.630E-03	1.470E-03	1.160E-03	4.100E-03	1.367E-03	7.379E-01

(Continued)

Nuclide	N' = N+1	S(Z,N')	(a/A) _{expt}	(a/A) _{fitted}	$\chi^2(a/A)$	\bar{D}_{exp}	$\Delta\bar{D}_{exp}$	\bar{D}_{MIN}	\bar{D}_{MAX}	\bar{D}_{calc}	$\chi^2(\bar{D})$
56Ba137	82	-3.267E+00	9.447E-02	9.421E-02	3.690E-04	3.080E-04	1.720E-04	1.360E-04	4.800E-04	3.048E-04	3.535E-04
56Ba138	83	-2.235E+00	1.117E-01	1.047E-01	3.997E-01	1.120E-02	6.500E-03	4.700E-03	1.770E-02	1.725E-02	8.666E-01
57La138	82	-2.768E+00	9.511E-02	9.929E-02	5.089E-01	4.060E-05	2.100E-05	1.960E-05	6.160E-05	2.718E-05	4.081E-01
57La139	83	-1.743E+00	1.118E-01	1.079E-01	9.537E-02	6.530E-04	2.400E-04	2.500E-05	5.050E-04	3.094E-04	3.415E-02
59Pr141	83	-9.450E-01	1.195E-01	1.178E-01	1.260E-02	6.530E-04	5.200E-05	1.330E-05	1.173E-04	7.435E-04	3.027E-02
62Nd142	83	-6.455E-01	1.141E-01	1.209E-01	1.047E+00	1.190E-03	5.300E-04	6.600E-04	1.720E-03	7.345E-04	7.386E-01
60Nd143	84	-2.993E-01	1.218E-01	1.305E-01	1.366E-01	3.300E-05	3.100E-05	2.000E-06	6.400E-05	1.713E-05	2.621E-01
62Nd144	85	1.185E+00	1.266E-01	1.393E-01	2.166E+00	7.630E-04	4.100E-04	3.630E-04	1.163E-04	3.274E-04	1.186E+00
62Nd145	86	1.851E+00	1.325E-01	1.249E-01	1.519E-01	1.770E-05	1.600E-05	1.700E-06	3.370E-05	3.277E-05	8.871E-01
63Nd146	87	2.259E+00	1.442E-01	1.275E-01	1.085E+00	4.740E-04	3.500E-04	1.240E-04	8.240E-04	1.333E-03	6.021E+00
63Nd148	89	2.762E+00	1.600E-01	1.555E-01	9.525E-01	2.580E-04	2.400E-04	1.800E-05	4.980E-04	1.445E-03	2.445E+01
63Nd150	91	3.365E+00	1.510E-01	1.325E-01	1.127E+00	2.470E-04	1.900E-04	5.700E-05	4.370E-04	7.722E-04	7.641E+00
61Pm147	87	2.340E+00	1.457E-01	1.280E-01	1.392E+00	4.990E-06	3.900E-06	1.090E-06	8.890E-06	1.844E-05	1.189E+01
62Sm147	86	2.632E+00	1.313E-01	1.263E-01	3.349E-01	7.580E-06	4.500E-06	3.380E-06	1.208E-05	1.137E-05	7.078E-01
62Sm149	88	2.971E+00	1.475E-01	1.298E-01	2.667E+00	2.800E-06	1.700E-06	1.100E-06	4.500E-06	9.275E-06	1.451E+01
62Sm151	90	3.092E+00	1.475E-01	1.319E-01	1.010E+00	1.350E-06	1.100E-06	2.500E-07	2.450E-06	4.512E-06	8.261E+00
62Sm152	91	3.273E+00	1.441E-01	1.338E-01	6.874E-01	1.230E-04	3.000E-05	2.550E-05	8.550E-05	2.721E-04	5.213E+01
62Sm154	93	2.820E+00	1.591E-01	1.310E-01	8.784E-01	9.550E-07	5.600E-07	3.950E-07	1.515E-06	7.805E-06	1.496E+02
63Eu153	91	2.082E+00	1.486E-01	1.326E-01	5.699E+00	1.450E-06	6.700E-07	7.800E-07	2.120E-06	4.981E-06	2.777E+01
64Gd152	89	2.802E+00	1.603E-01	1.309E-01	4.196E+00	1.490E-05	1.100E-05	3.900E-06	2.590E-05	4.981E-06	2.777E+01
64Gd154	91	3.057E+00	1.614E-01	1.325E-01	2.301E+00	1.300E-05	1.100E-05	2.000E-06	2.400E-05	1.710E-04	8.616E+01
64Gd155	92	3.152E+00	1.49E-01	1.331E-01	6.860E-01	1.980E-06	1.300E-06	6.800E-07	3.280E-06	3.712E-06	1.776E+00
64Gd156	93	3.230E+00	1.420E-01	1.336E-01	2.986E-01	4.930E-05	3.900E-05	1.030E-05	8.830E-05	9.076E-05	1.130E+00
64Gd157	94	3.294E+00	1.369E-01	1.340E-01	8.512E-02	8.850E-06	3.800E-06	2.050E-06	9.650E-06	7.366E-06	1.593E-01
64Gd158	95	3.346E+00	1.492E-01	1.343E-01	5.512E-01	1.010E-04	5.300E-05	5.100E-04	1.510E-04	1.521E-04	1.045E+00
64Gd160	97	3.422E+00	1.368E-01	1.348E-01	3.060E-01	1.700E-04	7.600E-05	9.400E-05	2.460E-04	2.224E-04	4.759E-01
65Tb159	95	3.307E+00	1.370E-01	1.341E-01	1.545E-01	3.750E-06	2.000E-06	1.750E-06	5.750E-06	4.766E-06	2.591E-01
66Dy161	96	3.307E+00	1.331E-01	1.349E-01	1.383E-01	2.800E-06	1.600E-06	1.230E-06	4.400E-06	2.604E-06	1.502E-02
66Dy162	97	3.335E+00	1.350E-01	1.347E-01	1.298E-02	6.670E-05	3.200E-05	3.670E-05	9.670E-05	7.075E-05	1.821E-02
66Dy163	98	3.379E+00	1.288E-01	1.344E-01	5.765E-01	7.970E-06	4.200E-06	3.770E-06	1.217E-05	5.131E-06	4.571E-01
66Dy164	99	3.379E+00	1.337E-01	1.345E-01	2.010E-02	1.670E-04	6.300E-05	1.040E-04	2.300E-04	1.577E-04	2.162E-02
67Ho165	99	3.323E+00	1.283E-01	1.342E-01	3.341E-01	3.690E-06	2.500E-06	1.190E-06	6.190E-06	2.288E-06	3.146E-01
68Er162	95	3.131E+00	1.428E-01	1.330E-01	3.690E-01	1.320E-05	1.100E-05	2.200E-06	2.420E-05	2.821E-05	1.862E+00
68Er164	97	3.211E+00	1.377E-01	1.335E-01	4.543E-03	2.580E-05	2.800E-05	0.0	5.300E-05	3.575E-05	1.263E-01
68Er166	99	3.259E+00	1.355E-01	1.335E-01	4.830E-02	3.850E-05	2.300E-05	1.850E-05	5.850E-05	4.387E-05	7.201E-02
68Er167	100	3.273E+00	1.271E-01	1.330E-01	7.190E-01	4.720E-06	2.700E-06	2.020E-06	7.420E-06	2.730E-06	5.430E-01
68Er168	101	3.280E+00	1.304E-01	1.339E-01	1.947E-01	1.060E-04	6.100E-05	4.500E-05	1.670E-04	7.956E-05	1.879E-01
68Er170	103	3.275E+00	1.304E-01	1.339E-01	4.559E-02	1.590E-04	1.300E-04	2.900E-05	2.890E-04	1.238E-04	7.333E-02
69Tm169	101	3.229E+00	1.243E-01	1.335E-01	4.184E-01	8.390E-06	7.000E-06	1.390E-06	1.539E-05	3.834E-06	4.236E-01
70Yb168	99	3.131E+00	1.203E-01	1.328E-01	2.495E+00	3.870E-05	3.390E-05	2.480E-05	9.260E-05	2.103E-05	1.235E+00
70Yb170	101	3.131E+00	1.287E-01	1.330E-01	2.750E-01	3.860E-05	2.200E-05	1.660E-05	6.060E-05	2.757E-05	2.515E-01
70Yb171	102	3.134E+00	1.266E-01	1.330E-01	9.320E-01	8.890E-06	4.500E-06	4.390E-06	1.339E-05	5.222E-06	6.643E-01
70Yb172	103	3.130E+00	1.244E-01	1.335E-01	9.543E-01	7.190E-05	4.300E-05	2.890E-05	1.149E-04	3.682E-05	6.654E-01
70Yb173	104	3.120E+00	1.255E-01	1.328E-01	7.358E-01	7.430E-06	4.500E-06	2.930E-06	1.193E-05	4.075E-06	5.557E-01
70Yb174	105	3.134E+00	1.228E-01	1.328E-01	1.086E+00	1.780E-04	1.100E-04	6.800E-04	2.880E-04	8.462E-05	7.207E-01
70Yb176	107	3.053E+00	1.248E-01	1.325E-01	8.143E-01	2.160E-04	1.200E-04	9.600E-05	3.360E-04	1.232E-04	5.977E-01
71Lu175	105	3.021E+00	1.210E-01	1.325E-01	1.692E+00	3.610E-06	2.300E-06	1.310E-06	5.910E-06	1.370E-06	9.488E-01
71Lu176	106	2.999E+00	1.231E-01	1.321E-01	1.358E+00	2.370E-06	1.400E-06	9.700E-06	3.70E-06	1.080E-06	8.485E-01
72Hf174	103	2.952E+00	1.281E-01	1.318E-01	1.652E-01	2.190E-05	1.600E-05	5.900E-05	3.790E-05	1.617E-05	1.284E-01

(Continued)

Nuclide	N ⁺ _{N+1}	S(Z,N)	(a/A) _{expt}	(a/A) _{fitted}	χ ² (a/A)	\bar{D}_{exp}	Δ \bar{D}_{exp}	\bar{D}_{MIN}	\bar{D}_{MAX}	\bar{D}_{calc}	χ ² (\bar{D})
72HF176	155	2.929E+00	1.317E-01	1.317E-01	5.633E-05	3.170E-05	1.700E-05	1.470E-05	4.870E-05	3.185E-05	7.805E-05
72HF177	106	2.978E+00	1.270E-01	1.315E-01	1.647E-01	3.170E-06	2.600E-06	5.700E-07	5.770E-06	2.174E-06	1.466E-01
72HF178	107	2.880E+00	1.314E-01	1.549E-01	1.549E-01	6.670E-05	4.700E-05	1.970E-05	1.137E-04	4.721E-05	1.720E-01
72HF179	108	2.844E+00	1.215E-01	1.311E-01	1.524E+00	5.730E-06	3.300E-06	2.430E-06	9.030E-06	2.567E-06	9.186E-01
72FA181	107	2.698E+00	1.200E-01	1.302E-01	1.140E+00	4.900E-06	2.800E-06	1.290E-06	6.890E-06	1.683E-06	7.387E-01
74 M180	169	2.668E+00	1.331E-01	1.300E-01	2.699E-01	1.430E-05	6.400E-06	7.900E-06	2.070E-05	1.843E-05	4.172E-01
74 M182	169	2.585E+00	1.234E-01	1.295E-01	3.533E-01	6.040E-05	4.100E-05	1.940E-05	2.200E-05	9.044E-06	1.546E-01
74 M183	111	2.528E+00	1.251E-01	1.292E-01	1.321E-01	1.270E-05	6.300E-06	3.400E-06	2.200E-05	9.044E-06	1.546E-01
74 M184	111	2.460E+00	1.305E-01	1.287E-01	6.350E-03	6.700E-05	6.230E-05	5.090E-06	1.290E-04	7.672E-05	2.458E-02
74 M186	113	2.279E+00	1.289E-01	1.276E-01	1.358E-02	1.140E-04	7.900E-05	3.500E-05	1.262E-04	1.262E-04	2.402E-02
75FS185	111	2.326E+00	1.209E-01	1.279E-01	1.072E+00	3.170E-06	1.700E-06	1.470E-06	4.870E-06	1.711E-06	7.367E-01
75RE187	113	2.129E+00	1.215E-01	1.266E-01	3.867E-01	4.420E-06	2.700E-06	1.720E-06	7.120E-06	2.843E-06	3.411E-01
76OS189	114	1.798E+00	1.171E-01	1.245E-01	7.484E-01	5.050E-06	3.300E-06	1.750E-06	8.350E-06	2.581E-06	5.599E-01
77I189	115	1.286E+00	1.218E-01	1.213E-01	1.676E-03	2.960E-06	2.300E-06	6.600E-07	5.260E-06	3.098E-06	3.578E-03
77R193	117	3.439E+01	1.089E-01	1.310E-01	1.759E+00	1.090E-05	9.900E-06	1.000E-06	2.480E-05	1.470E-06	9.273E-01
78P194	117	2.172E-01	1.142E-01	1.253E-01	3.032E+00	8.060E-05	4.030E-05	6.030E-05	1.209E-04	3.140E-05	1.490E+00
78PT195	118	1.782E-01	1.058E-01	1.195E-01	8.630E-01	1.690E-05	1.500E-05	1.900E-05	3.190E-05	4.541E-06	6.788E-01
79AU197	119	1.674E+00	9.661E-02	1.074E-01	2.346E+00	1.600E-05	1.030E-05	6.000E-06	2.600E-05	5.283E-06	1.149E+00
80HG198	119	2.604E+00	1.031E-01	1.010E-01	1.895E-01	7.880E-05	3.520E-05	4.360E-05	1.140E-04	9.730E-05	2.761E-01
80HG199	120	3.227E+00	8.608E-02	9.462E-02	7.484E+00	9.400E-05	3.130E-05	6.270E-05	1.253E-04	3.713E-05	3.301E+00
80HG200	121	3.882E+00	8.214E-02	8.795E-02	1.999E+00	1.080E-03	4.400E-04	6.470E-04	1.520E-03	5.987E-04	1.196E+00
80HT201	122	4.569E+00	8.360E-02	8.096E-02	6.167E-01	8.320E-05	2.950E-05	5.370E-05	1.127E-04	1.118E-04	9.373E-01
81TL205	125	1.745E+00	5.110E-02	1.942E-03	5.680E-03	5.680E-03	5.800E-03	6.000E-04	1.076E-02	5.316E-03	5.145E-03
82Pb204	123	6.624E+00	6.533E-02	6.005E-02	6.852E-01	3.100E-03	2.000E-03	1.100E-03	5.100E-03	5.999E-03	2.102E+00
82Pb206	125	8.135E+00	4.967E-02	4.467E-02	1.648E+00	2.050E-02	8.500E-03	3.250E-02	3.250E-02	4.188E-02	3.176E+00
82Pb207	126	8.935E+00	4.515E-02	3.652E-02	2.323E-01	3.450E-02	2.900E-02	5.500E-03	6.350E-02	6.487E-02	1.091E+00
83Bi209	127	1.205E+00	5.806E-02	5.413E-02	2.225E-01	4.080E-03	3.000E-03	1.080E-03	1.767E-06	1.323E-06	6.404E-01
90Th229	141	1.991E+00	1.265E-01	1.231E-01	6.595E-02	9.670E-07	8.000E-07	1.670E-07	1.767E-06	1.323E-06	1.980E-01
90Th231	141	2.036E+00	1.400E-01	1.267E-01	5.269E+00	1.180E-05	5.000E-06	6.800E-06	1.680E-05	3.438E-05	2.039E+01
91Pa231	141	2.031E+00	1.310E-01	1.263E-01	1.880E-01	2.430E-05	1.500E-05	9.300E-06	3.930E-05	4.199E-05	1.391E+00
91Pa233	143	2.098E+00	1.334E-01	1.316E-01	8.207E-02	8.340E-07	4.100E-07	1.340E-07	9.540E-07	8.433E-07	5.328E-01
92 U232	141	2.014E+00	1.344E-01	1.249E-01	2.969E-02	4.480E-06	4.200E-07	1.254E-06	9.808E-07	1.222E-06	1.222E-01
92 U233	142	2.048E+00	1.264E-01	1.276E-01	4.509E-02	7.180E-07	3.680E-07	3.680E-07	1.068E-06	6.411E-07	4.829E-02
92 U235	144	2.102E+00	1.364E-01	1.319E-01	1.567E-01	1.070E-05	7.400E-06	3.300E-06	1.810E-05	1.512E-05	3.562E-01
92 U236	145	2.124E+00	1.356E-01	1.336E-01	6.596E-02	6.440E-07	3.130E-07	3.340E-07	9.540E-07	5.636E-07	6.734E-02
92 U238	147	2.157E+00	1.370E-01	1.363E-01	5.559E-03	2.290E-05	6.400E-06	6.500E-06	1.930E-05	1.513E-05	1.213E-01
93M237	145	2.092E+00	1.277E-01	1.311E-01	1.177E+00	7.240E-07	4.500E-07	2.740E-07	1.174E-06	3.307E-07	7.640E-01
94Pu238	145	2.052E+00	1.272E-01	1.279E-01	8.309E-03	7.580E-06	4.600E-06	2.980E-06	1.218E-05	7.114E-06	1.026E-02
94Pu239	146	2.073E+00	1.279E-01	1.293E-01	2.343E-02	2.410E-06	1.600E-06	8.100E-07	4.010E-06	2.131E-06	3.046E-02
94Pu240	147	2.084E+00	1.274E-01	1.305E-01	1.300E-01	1.600E-05	1.030E-05	6.300E-06	1.260E-05	1.260E-05	1.366E-01
94Pu241	148	2.097E+00	1.306E-01	1.315E-01	5.200E-03	9.900E-07	7.600E-07	2.300E-07	1.750E-06	9.190E-07	8.738E-03
94Pu242	149	2.107E+00	1.287E-01	1.323E-01	1.352E-01	2.110E-05	1.400E-05	7.100E-06	3.510E-05	1.572E-05	1.478E-01
95Am241	147	2.038E+00	1.208E-01	1.268E-01	4.143E-01	6.610E-07	4.700E-07	1.910E-07	1.131E-06	3.727E-07	3.765E-01
95Am243	149	2.060E+00	1.227E-01	1.286E-01	4.718E-01	7.010E-07	4.700E-07	2.310E-07	1.171E-06	4.015E-07	4.062E-01
96Cm243	148	1.598E+00	1.127E-01	1.236E-01	7.018E-01	1.760E-06	1.500E-06	2.600E-07	3.260E-06	6.069E-07	5.909E-01
96Cm244	149	2.008E+00	1.200E-01	1.244E-01	2.946E-01	1.460E-05	9.100E-06	5.500E-06	2.370E-05	9.833E-06	2.744E-01
96Cm245	150	2.017E+00	1.239E-01	1.251E-01	6.293E-02	3.080E-06	1.300E-06	1.780E-06	4.380E-06	2.757E-06	6.185E-02