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NUCLEAR CHARGE-DENSITY-DISTRIBUTION PARAMETERS FROM ELASTIC ELECTRON SCATTERING

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A compilation of nuclear charge-density-distribution parameters, obtained from elastic electron scattering, is presented in five separate tables. Data on charge distributions obtained on the basis of a phenomenological model—parameters of nuclei and differences therein between isotopes and between other neighboring nuclei like isotones—are given in Tables I, II, and III. Parameters obtained by a model-independent analysis are given in two additional tables: Table IV gives the coefficients of a Fourier–Bessel series expansion, and Table V gives the positions and amplitudes for the expansion in a sum of Gaussians. References through February 1986 have been covered. © 1987 Academic Press, Inc.

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CONTENTS

INTRODUCTION

Since our previous compilation of charge-density-distribution parameters,[1] the analysis of electron scattering experiments has improved greatly. Ambiguities about the root-mean-square (rms) radius of the reference nucleus ^{12}C have been resolved,[2] and the model-independent analysis of data has now generally been adopted. The greater consistency of the present data allows in many cases a combined analysis of experimental data from several electron scattering experiments.

The wealth of new data forced us to change the 1974 policy, where all available data were presented. In the present compilation the number of entries per isotope is limited to at most three. If a selection is necessary, in general the most recent values are given. In those cases where large discrepancies exist between the results of different experiments, we have chosen the values which we judge to be the most reliable. On the other hand we have tried to remain complete in a comprehensive list of all experimental papers.

There were several reasons for producing this compilation. Besides the already mentioned wealth of new and accurate data, large improvements have been made on the theoretical side: shell model calculations in the lower part of the periodic table[3] and density-dependent Hartree–Fock calculations[4] for medium-heavy and heavy nuclei can now predict charge distributions with unprecedented accuracy. Comparison of the theoretical predictions with the new electron scattering results might guide theoreticians to further advances toward a better understanding of nuclear structure. Furthermore, the previous compilation has frequently been used in systematic studies of charge-density distributions.[5–7] For future studies in this area, an updated version of the tables is crucial.

The material is presented in five tables. Table I covers standard charge-density-distribution parameters of nuclei. The next two tables deal with parameter differences between isotopes (Table II) and with differences between other neighboring nuclei (Table III). Results derived from model-independent analyses are presented in the two remaining tables: Table IV gives the coefficients obtained from a Fourier–Bessel analysis (FB), Table V lists the parameters from an analysis with a Sum-of-Gaussians (SOG) method. The extent of these last two tables confirms the expectation we expressed in 1974, namely that model-independent analysis would become more frequently used than analysis with phenomenological models.

In this compilation we no longer include the parameters of magnetization density distributions. The reason for this is twofold: first, Donnelly and Sick published an excellent review on magnetic elastic electron scattering about a year ago;[8] and second, the presentation of the magnetization density is not so unambiguous as the description of the charge density. The latter is due to the fact that charge scattering is determined mainly by the monopole form factor (for $J = 0^+$ nuclei even exclusively), whereas for most nuclei with a magnetic moment, many different magnetic multipole components (which cannot be separated experimentally) contribute to the magnetic form factor.

This compilation was completed in February 1986 and has taken into consideration all data published up to that date.

Charge-Density-Distribution Parameters

For more extensive information the reader should consult monographs[9,10] and the introduction to our 1974 compilation.[1] Here we limit ourselves to the following short notes.

The analysis of electron scattering data is restricted by the fact that the form factor can be studied only over a finite range of momentum transfers $q_{\min}$ to $q_{\max}$. In Plane-Wave Born Approximation, the charge distribution $\rho(r)$ is the Fourier transform of the form factor $F(q)$ and for a spherically symmetric charge distribution is given by

$$\rho(r) = \frac{1}{2\pi^2} \int F(q) \frac{\sin(qr)}{qr} q^2 dq.$$

As a consequence, only the amplitudes of Fourier components of $\rho(r)$ with wavelengths between $2\pi/q_{\max}$ and $2\pi/q_{\min}$ can be extracted from the data. In the past, the limited range of q values made it necessary to describe the data on the basis of a phenomenological model. For experiments which are performed at relatively low q values the data can be described adequately by a two-parameter Fermi distribution. Extension of this model with more parameters showed, however, the limitation of the description: the introduction of a "wine-bottle" parameter w is generally speaking more representative for the behavior of the tail of the charge-density distribution than for that of the inner region.[11] This is illustrated by the fact that analyses of the same data set with a three-parameter Fermi and with a three-parameter Gaussian model often yield w values with opposite signs.[12] Also, the inclusion of oscillatory components in $\rho(r)$, which were introduced to fit the data measured at high q values, are at best only significant for light- and medium-heavy nuclei. Even the error bars quoted for the rms radius of $\rho(r)$ do not necessarily represent the full range of rms radii consistent with the experimental data. These limitations can be removed only through the use of a model-independent analysis (see below).

One of the major advantages of electron scattering as a nuclear probe is the fact that the interaction is purely electromagnetic and hence is well known. This implies that for a given charge distribution, electron scattering cross sections can be calculated accurately by phase-shift analysis. Two theoretical problems remain to be solved in the field of electron scattering: radiative and dispersion corrections. Radiative corrections are in good agreement with experiments involving relative measurements, but deviations have been observed in absolute measurements. This seems to indicate that higher-order diagrams have to be taken into account. Dispersive effects or virtual nuclear excitations might also play a role. No accurate calculations are available as yet, but there is experimental evidence that the minimum of the elastic form factor might be appreciably affected. More will be said about this subject in the paragraph where electron scattering results are compared with muonic x-ray data.

Model-Independent Analysis

The higher accuracy of the experimental data and the larger q range covered have led to the use of more refined models to describe the finer details of the charge-density distribution. However, the interpretation of the results has not always been carried out unambiguously. Several attempts have been made to describe the charge distribution by sets of orthonormal functions. A viable model-independent analysis will have to incorporate some model dependence to account for the fact that data are available only over a finite q range. The limitation should be based on physical arguments. At present the majority of experimental results are analyzed by two different model-independent approaches: Fourier–Bessel analysis or sum of Gaussians.

Fourier–Bessel Analysis

The Fourier–Bessel series expansion was introduced by Dreher et al.[13] For practical reasons $\rho(r)$ is assumed to be zero beyond a certain cutoff radius R. The first N $(=Rq_{\max}/\pi)$ coefficients of this series expansion are determined directly from the experimental data. The behavior of the form factor $F(q)$, at q values beyond the maximum value of q for which data are available, is assumed to be limited by a q^{-4} and an $\exp(-aq^2)$ decrease. These assumptions originate from expectations for the distribution of the nucleons inside the nucleus and for the finite extension of the nucleons, respectively. They yield an upper limit for the contributions of the higher Fourier components of the series expansion. The results depend to a certain degree on the value of the cutoff radius R. An advantage of this method is that the uncertainties in the charge distribution originating from the experimental errors and from lack of knowledge about the large-q behavior can be determined separately.

Unfortunately, several definitions and normalizations have been used in the literature. In this compilation, we use

$$\rho(r) = \begin{cases} \sum_v a_v j_0(v\pi r/R) & \text{for} \quad r \leq R \\ 0 & \text{for} \quad r \geq R, \end{cases}$$

where $j_0(qr)$ denotes the Bessel function of order zero.

For the normalization we have adopted the convention that the integral over the charge distribution equals the nuclear charge Ze. This normalization has the advantage that the difference between different nuclei can be deduced directly from the difference between the Fourier–Bessel coefficients

$$\Delta\rho(r) = \sum_v \delta a_{v,\Delta A} j_0(v\pi r/R) \quad \text{for} \quad r \leq R$$

with

$$\delta a_{v,\Delta A} = a_{v,A1} - a_{v,A2}$$

provided that both sets of coefficients have been determined for the same value of the cutoff radius R.

In Table IV we present the Fourier–Bessel coefficients with the above-mentioned definition and the value of the cutoff radius that has been used. Since the analysis frequently involves several data sets, all of these are also indicated. A final remark should be made about the errors in the coefficients, which are not presented in the tables. Since the errors are strongly correlated, the uncertainties in the charge distribution can be determined only from the full correlation matrix. But since this matrix is never published, it would not make sense to present the errors in the Fourier–Bessel coefficients.

Sum of Gaussians

This parametrization was first introduced by Sick.[11] The width γ of the Gaussians is chosen equal to the smallest width of the peaks in the nuclear radial wave functions calculated by the Hartree–Fock method. Only positive values of the amplitudes of the Gaussians are allowed so that no structures narrower than γ can be created through interference. An advantage of the use of Gaussians is that values of $\rho(r)$ at different values of r are decoupled to a large extent because of the rapid decrease of the Gaussian tail. The results of the analysis are independent of the number of Gaussians, provided this number is sufficiently large to allow a good fit to the data. In this approach, all authors use the same definition,

$$\rho(r) = \sum_i A_i\{\exp(-[(r-R_i)/\gamma]^2) + \exp(-[(r+R_i)/\gamma]^2)\},$$

where the coefficients A_i are given by

$$A_i = ZeQ_i/[2\pi^{3/2}\gamma^3(1+2R_i^2/\gamma^2)].$$

In this definition the values of Q_i indicate the fraction of the charge contained in the ith Gaussian, normalized such that

$$\sum_i Q_i = 1.$$

Table V gives a list of the positions R_i and amplitudes Q_i fitted to the data. The rms radius of the Gaussians and the rms radius of the charge distribution deduced are also given. The data sets used in the analysis are mentioned.

Electron Scattering and Muonic x-Rays

The information on nuclear charge-density distributions can be improved significantly by simultaneous analyses of electron scattering data and muonic x-ray data. Whereas electron scattering maps the Fourier transform of the charge-density distribution, muonic transition energies are sensitive to a special moment of this distribution, the so-called Barrett moment,[14]

$$\langle r^k e^{-\alpha r}\rangle = (4\pi/Ze)\int \rho(r) r^k e^{-\alpha r} r^2 dr.$$

The parameters k and α are discussed in Ref. 15.

The inclusion of these Barrett moments in the electron scattering analysis reduces the uncertainty in the lowest-order Fourier–Bessel coefficients. Effectively, the muonic information is equivalent to an electron scattering experiment at low momentum transfer. Inclusion of the precisely known value of the muonic Barrett moment greatly improves the overall normalization error as well, resulting in a substantial reduction of the uncertainties in the combined analysis.

One would expect that the inclusion of muonic data in an electron scattering analysis would only reduce the errors. However, a comparison of results from only electron scattering and only muonic x-ray data shows that the muonic results yield rms radii up to 0.02 fm larger than those deduced from electron scattering.[16,17] Therefore we have indicated it in the tables when muonic results have been included in the analysis.

There are several possible explanations for this discrepancy. Whereas on the muonic side the calculation of the nuclear polarization correction is supposedly well under control, a remanent discrepancy might be present due to a short-range muon–nucleon interaction described by a scalar or a vector boson.[16] Another explanation might be that the electron scattering results are not corrected for dispersive effects. Rough estimates[18] predict the dispersive corrections to be small. Recent experiments,[19] however, seem to indicate that the dispersive effects might be appreciable. More conclusive experiments are necessary to settle this problem. If these effects are studied in more detail and the cause of the discrepancies mentioned can be resolved, one may expect still further improvement in our knowledge about charge distributions of nuclei, which is already impressively accurate.

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References for Introduction

1. C. W. de Jager, H. de Vries, and C. de Vries, ATOMIC DATA AND NUCLEAR DATA TABLES **14,** 479 (1974)
2. I. Sick, Phys. Lett. B **116,** 212 (1982)
3. P. W. M. Glaudemans, in *Proceedings, Fourth Mini-conference on Nuclear Structure in the 1p-Shell,* edited by L. Lapikás, H. de Vries, and C. de Vries (Amsterdam, 1985), p. 1
4. J. Dechargé and D. Gogny, Phys. Rev. C **21,** 1568 (1980)
5. I. Angeli, M. Beiner, R. J. Lombard, and D. Mas, J. Phys. G **6,** 303 (1980)
6. J. Friedrich and N. Vögler, Nucl. Phys. A **373,** 192 (1982)
7. E. Wesolowski, J. Phys. G **10,** 321 (1984)
8. T. W. Donnelly and I. Sick, Rev. Mod. Phys. **56,** 461 (1984)
9. H. Überall, *Electron Scattering from Complex Nuclei* (Academic Press, New York, 1971)
10. R. C. Barrett, Rep. Progr. Phys. **37,** 1 (1974)
11. I. Sick, Nucl. Phys. A **218,** 509 (1974)
12. H. Averdung, Internal Report KPH 3/74, Mainz, 1974 (unpublished)
13. B. Dreher, J. Friedrich, K. Merle, H. Rothhaas, and G. Lührs, Nucl. Phys. A **235,** 219 (1974)
14. R. C. Barrett, Phys. Lett. B **33,** 388 (1970)
15. R. Engfer, H. Schneuwly, J. L. Vuilleumier, H. K. Walter, and A. Zehnder, ATOMIC DATA AND NUCLEAR DATA TABLES **14,** 509 (1974)
16. W. Ruckstuhl, B. Aas, W. Beer, I. Beltrami, K. Bos, P. F. A. Goudsmit, H. J. Leisi, G. Strassner, A. Vacchi, F. W. N. de Boer, U. Kiebele, and R. Weber, Nucl. Phys. A **430,** 685 (1984)
17. H. D. Wohlfahrt, O. Schwentker, G. Fricke, H. G. Andresen, and E. B. Shera, Phys. Rev. C **22,** 264 (1980)
18. J. L. Friar, in *Proceedings, International School on Electron and Pion Interactions with Nuclei at Intermediate Energies, Ariccia, June 1979,* edited by W. Bertozzi, S. Costa, and C. Schaerf (Harwood, New York, 1980), p. 143
19. E. A. J. M. Offermann, L. S. Cardman, H. J. Emrich, G. Fricke, C. W. de Jager, H. Miska, D. Rychel, and H. de Vries, Phys. Rev. Lett. **57,** 1546 (1986).

POLICIES

Literature coverage All available experimental papers were covered, including preprints, theses, and internal reports. If the same data have been described in several papers, we have given only the most extensive and easiest-to-access reference. No theoretical papers have been included, unless they contain a reanalysis of experimental data.

Tabulated results The maximum number of entries per isotope is limited to three. If more results were available we have in general listed the most recent values. In cases where conflicting results were present we have listed those which we considered to be most reliable. References containing additional information are given in a separate list at the end of the corresponding table.

Models In those cases where the same data have been analyzed with different models, only results obtained with one particular model have been tabulated, following wherever possible the preference given in the original publication. Unless otherwise stated, the results are for the monopole charge distribution (C0) only.

Errors The errors quoted have been taken from the original papers. Generally, they represent the total error: the sum of the statistical (one standard deviation) and the systematic errors. No effort has been made to standardize the various types of error analyses used. The errors are given in parentheses following a tabulated value. For example, 0.3359(36) = 0.3359 ± 0.0036.

References A comprehensive list of all experimental papers is given at the end of the five Tables. Reference keys are in the style Si79, where Si refers to the name of the first author and 79 to the year. In cases where this key is ambiguous a letter is added, as in Ca82a.

Neighboring nuclei By observing the cross-section ratios, differences in charge-distribution parameters between neighboring nuclei can be determined to a higher accuracy than the parameters themselves. Therefore, the results of such analyses have been listed separately in Tables II and III. Not included there are the results of experiments where neighboring nuclei have been measured simultaneously, but not analyzed in terms of cross-section ratios. On the other hand, charge-distribution parameters which have been obtained solely through cross-section ratios of neighboring nuclei are omitted from Table I.

EXPLANATION OF TABLES

TABLE I. Charge-Density-Distribution Parameters

TABLE II. Differences in Charge-Density-Distribution Parameters between Isotopes

TABLE III. Differences in Charge-Density-Distribution Parameters between Neighboring Nuclei (Not Isotopes)

Nucleus The absence of a mass number indicates that the tabulated values are for a natural isotopic admixture. The asterisk after a nucleus indicates that additional information is available in the references given at the end of the tabulation.

model The normalization of the charge distribution is such that

$$4\pi \int \rho(r) r^2 dr = Ze.$$

If no entry is given in this column, the model used is described in the "remarks."

EXPLANATION OF TABLES continued

HO — Harmonic-oscillator model:

$$\rho(r) = \rho_0(1 + \alpha(r/a)^2)\exp(-(r/a)^2)$$

$$\alpha = \alpha_0 a_0^2/(a^2 + \tfrac{3}{2}\alpha_0(a^2 - a_0^2))$$

$$a_0^2 = (a^2 - a_p^2)A/(A-1)$$

$$\alpha_0 = (Z-2)/3; \quad a_p^2 = \tfrac{2}{3}\langle r^2\rangle_{\text{proton}}$$

MHO — Modified harmonic-oscillator model, with the same expression for $\rho(r)$ as in HO but with α as an additional free parameter

MI — Model-independent evaluation of the form factor by the expression

$$F(q^2) = 1 - \tfrac{1}{6}q^2\langle r^2\rangle$$

FB — Model-independent analysis by means of a Fourier–Bessel expansion for the charge distribution

SOG — Model-independent analysis by means of an expansion for the charge distribution as a sum of Gaussians

2pF — Two-parameter Fermi model

$$\rho(r) = \rho_0/(1 + \exp((r - c)/z))$$

3pF — Three-parameter Fermi model

$$\rho(r) = \rho_0(1 + wr^2/c^2)/(1 + \exp((r - c)/z))$$

3pG — Three-parameter Gaussian model

$$\rho(r) = \rho_0(1 + wr^2/c^2)/(1 + \exp((r^2 - c^2)/z^2))$$

UG — Uniform Gaussian model

$$\rho(r) = \rho_0 \int \exp(-(r-x)^2)/g^2)x^2dx$$

$\langle r^2\rangle^{1/2}$ — Root-mean-square radius of the charge distribution

$$\langle r^2\rangle = (4\pi/Ze)\int \rho(r)r^4dr$$

c or a — In this column the values are given for the parameter c if the 2pF, 3pF, or 3pG model has been used and for the parameter a if the HO or MHO model has been used.

z or α — In this column the values are given for the parameter z if the 2pF, 3pF, or 3pG model has been used and for the parameter α if the HO or MHO model has been used.

w — The parameter w of the 3pF and 3pG models

q-range — The momentum transfer range covered by the data used in the analysis

ref. — Source of tabulated data, keyed to the list of references following the tables

remarks — The symbols † and $ denote that additional information can be found in Tables IV (Fourier–Bessel) and V (Sum-of-Gaussians), respectively. The entries indicated by a letter or number are explained at the end of each table.

$\Delta\langle r^2\rangle^{1/2}$ — $\langle r^2\rangle^{1/2}(A_2) - \langle r^2\rangle^{1/2}(A_1)$ with $A_2 > A_1$.

Δc — $c(A_2) - c(A_1)$ with $A_2 > A_1$.

Δz — $z(A_2) - z(A_1)$ with $A_2 > A_1$.

Δw — $w(A_2) - w(A_1)$ with $A_2 > A_1$.

EXPLANATION OF TABLES continued

TABLE IV. Fourier–Bessel Coefficients

rms — Value of the root-mean-square radius $\langle r^2 \rangle^{1/2}$ of the charge distribution

a1 . . . a17 — List of the Fourier–Bessel coefficients a_v, with $v = 1$ to 17. The coefficients are defined by

$$\rho(r) = \sum_v a_v j_0(v\pi r/R) \quad \text{for} \quad r \leqslant R,$$

$$\rho(r) = 0 \quad \text{for} \quad r > R.$$

The normalization is chosen such that $4\pi \int \rho(r) r^2 dr = Ze$. $0.25182e-1$ means 0.25182×10^{-1}.

ref. — Reference for the data analysis

q-range — The momentum-transfer range covered by the data used in the analysis

data-sets — References for the data sets used in the analysis. The symbol μ indicates that muonic x-ray data have been used as a constraint in the analysis.

R — Value of the cutoff radius, beyond which the charge density is assumed to be identical to zero

TABLE V. Sum-of-Gaussians Parameters

rms — Value of the root-mean-square radius $\langle r^2 \rangle^{1/2}$ of the charge distribution

R_i, Q_i — Position and amplitude of the Gaussians. The coefficients are defined by

$$\rho(r) = \sum_i A_i\{\exp(-[(r-R_i)/\gamma]^2) + \exp(-[(r+R_i)/\gamma]^2)\}$$

with

$$A_i = ZeQ_i/[2\pi^{3/2}\gamma^3(1 + 2R_i^2/\gamma^2)].$$

The values of Q_i indicate the fraction of the charge contained in the ith Gaussian, normalized such that $\Sigma_i Q_i = 1$.

ref. — Reference for the data analysis

q-range — The momentum-transfer range covered by the data used in the analysis

data-sets — References for the data sets used in the analysis. The symbol μ indicates that muonic x-ray data have been used as a constraint in the analysis.

RP — The rms radius of the Gaussians: $RP = \gamma\sqrt{\frac{3}{2}}$

TABLE I. Charge-Density-Distribution Parameters

See page 500 for Explanation of Tables

Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
n*		0.3359(36)				0	Kr73	1
		0.3455(26)				0	Ko76	1
^{1}H*	MI	0.85(2)				0.33 - 1.42	Th72	a,2
	MI	0.84(1)				0.36 - 11.50	Ho76	3
	MI	0.862(12)				0.36 - 1.18	Si80	4
^{2}H*	MI	2.095(6)				0.22 - 0.71	Be73a	a,h,5
	MI	2.116(6)				0.21 - 0.77	Si81	h,6
^{3}H*	FB	1.68(3)				0.51 - 2.83	Be84	†,b,7
	SOG	1.76(4)				0.55 - 4.79	Ju85	$,8
^{3}He*	SOG	1.844(45)				0.59 - 4.47	MC77	$
	FB	1.877(19)				0.18 - 10.1	Re84b	†,9
	MI	1.976(15)				0.45 - 1.92	Ot85	a,h,10
^{4}He*	MI	1.696(14)				0.17 - 0.50	Gu82	h
	SOG	1.676(8)				0.14 - 7.70	Si82	$,g,h,11
	MI	1.671(14)				0.51 - 2.00	Ot85	a,h,12
^{6}Li*	MHO	2.54(5)				0.69 - 2.52	Su67	a,h,13
	MHO	2.56(5)				0.56 - 3.66	Li71a	h,14
	MI	2.57(10)				0.09 - 0.90	Bu72	i,15
^{7}Li*	HO	2.39(3)	1.77(2)	0.327		0.69 - 2.62	Su67	a,h,16
	MI	2.41(10)				0.09 - 0.90	Bu72	i,15
^{9}Be*	HO	2.519(12)	1.791(9)	0.611		0.26 - 0.70	Ja72	
	HO	2.50(9)	1.77(6)	0.631		0.15 - 0.53	Fe73a	i,17
^{10}B*	HO	2.45(12)	1.71(8)	0.837		0.69 - 2.81	St66b	b
^{11}B*	HO	2.42(12)	1.69(8)	0.811		0.69 - 2.81	St66b	b
		2.37				0.61 - 1.76	Ri71	b,18
^{12}C*	FB	2.472(15)				0.10 - 4.01	Ca80a	†,19
	SOG	2.471(6)				0.13 - 3.70	Si82	$,g,h,20
	FB	2.464(12)				0.25 - 2.75	Re82	†
^{13}C	MHO	2.440(25)	1.635(9)	1.403(16)		0.3 - 3.4	He70a	h,21
^{14}C	MHO	2.56(5)	1.73(4)	1.38(12)		1.04 - 2.16	Kl73	h
^{14}N*	HO	2.58	1.76	1.234		0.86 - 1.62	Da70	a,22
	HO	2.540(20)	1.729(14)	1.291		0.29 - 0.48	Sc75	h
	3pF	2.524(23)	2.570(8)	0.5052(2)	-0.180(7)	0.38 - 2.91	La82	i,23
^{15}N*	MHO	2.65	1.81	1.250		0.86 - 1.62	Da70	a,h,22
	3pF	2.70(3)	2.334(35)	0.498(5)	0.139(30)	0.87 - 2.61	Ge72	24
	FB	2.611(9)				0.22 - 3.17	Vr86	†,h,25
^{16}O*	3pF	2.730(25)	2.608(36)	0.513(5)	-0.051(20)	1.05 - 3.97	Si70b	$,h,26
	HO	2.718(21)	1.833(14)	1.544		0.29 - 0.48	Sc75	h
	FB	2.737(8)				0.38 - 2.85	La82	†,i

TABLE I. Charge-Density-Distribution Parameters

See page 500 for Explanation of Tables

Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
^{17}O	HO	2.662(26)	1.798(18)	1.498		0.58 - 0.99	Si70a	27
^{18}O	HO	2.727(20)	1.841(14)	1.513		0.58 - 0.99	Si70a	27
^{19}F*	2pF	2.900(15)	2.59(4)	0.564(14)		0.55 - 1.01	Ha73b	28
	2pF	2.90(2)	2.58(4)	0.567(13)		0.46 - 1.79	Oy75	
^{20}Ne*	2pF	3.040(25)	2.805(15)	0.571(5)		0.22 - 1.04	Mo71	27
	2pF	3.004(25)	2.740(46)	0.572(17)		0.21 - 1.12	Kn81	i
	3pF	2.992(8)	2.791(9)	0.698(5)	-0.168(8)	0.49 1.80	Be85	d
^{22}Ne	2pF	2.969(21)	2.782(12)	0.549(4)		0.2 - 1.1	Mo71	27
^{23}Na	UG	2.94(6)				0.4 - 2.02	Sa69a	b,29
^{24}Mg*	3pF	3.075(15)	3.108(33)	0.607(9)	-0.163(30)	0.58 - 1.99	Av74	i
	3pF	2.985(30)	3.192(34)	0.604(6)	-0.249(20)	0.74 - 3.46	Li74	$,h,30
	2pF	3.08(5)	2.98(5)	0.551(32)		0.20 - 1.15	Le76	i
^{25}Mg	2pF	3.11(5)	2.76(5)	0.608(32)		0.20 - 1.15	Le76	i
	3pF	3.003(11)	3.22(5)	0.58(4)	-0.236(34)	0.19 - 2.07	Eu77a	i,31
^{26}Mg	2pF	3.06(5)	3.05(5)	0.523(32)		0.20 - 1.15	Le76	i
^{27}Al*	2pF	3.06(9)	3.07(9)	0.519(26)		0.51 - 1.59	Lo67	
	2pF	3.05(5)	2.84(5)	0.569		0.23 - 0.59	Fe73a	b,e,i,32
	FB	3.035(2)				0.47 - 2.70	Ro86	
^{28}Si*	3pG	3.106(30)	1.95(9)	2.076(10)	0.286(12)	0.74 - 3.71	Li74	$,h
	2pF	3.15(4)	3.14(6)	0.537(32)		0.16 - 1.1	Br77	i
	3pF	3.086(18)	3.340(9)	0.580(3)	-0.233(9)	0.25 - 1.49	Mi82	†,i,33
^{29}Si	2pF	3.13(5)	3.17(8)	0.52(4)		0.16 - 1.1	Br77	i
	3pF	3.079(21)	3.338(12)	0.547(2)	-0.203(12)	0.25 - 1.49	Mi82	†,i,33
^{30}Si	3pF	3.176(22)	3.252(21)	0.553(2)	-0.078(22)	0.25 - 1.49	Mi82	†,i,33
^{31}P*	3pF	3.19(3)	3.369(25)	0.582(6)	-0.173(24)	0.73 - 2.85	Si72	h,34
	FB	3.187(11)				0.30 - 2.85	Me76	i,35
	FB	3.187				0.25 - 2.64	Mi82	†,i,36
^{32}S*	3pG	3.239(30)	2.54(9)	2.191(10)	0.160(12)	0.74 - 3.71	Li74	$,f,h,30
	FB	3.240(11)				0.30 - 3.71	Me76	f,i,37
	FB	3.248(11)				0.47 - 2.56	Ry83a	†
^{34}S*	FB	3.281(13)				0.47 - 2.56	Ry83a	†
^{36}S*	FB	3.278(11)				0.47 - 2.56	Ry83a	†
^{35}Cl	3pF	3.388(17)	3.476(32)	0.599(5)	-0.10(2)	0.60 - 1.70	Br80	38
^{37}Cl	3pF	3.384(17)	3.554(27)	0.588(5)	-0.13(2)	0.60 - 1.70	Br80	39

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Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
^{36}Ar	2pF	3.327(15)	3.54(4)	0.507(15)		0.54 - 0.96	Fi76	d,i
^{40}Ar*	3pF	3.48(4)	3.73(5)	0.62(1)	-0.19(4)	0.8 - 1.81	We74	i
	2pF	3.393(15)	3.53(4)	0.542(15)		0.54 - 0.96	Fi76	d,i
	FB	3.423(14)				0.29 - 1.81	Ot82	†,h,40
^{39}K*	UG	3.40(7)				0.4 - 1.92	Sa69a	b,f,41
	3pF	3.408(27)	3.743(25)	0.585(6)	-0.201(22)	0.64 - 3.43	Si73a	$,f,h,42
^{40}Ca*	3pF	3.482(25)	3.766(23)	0.586(5)	-0.161(23)	0.53 - 3.24	Si73a	h,43
	SOG	3.479(3)				0.53 - 3.69	Si79	$,g,44
	FB	3.450(10)				0.35 - 3.69	Em83b	†,45
^{48}Ca*	3pF	3.470	3.7369	0.5245	-0.030	0.49 - 3.37	Be67d	$,h,46
	FB	3.451(9)				0.35 - 3.55	Em83b	†
^{48}Ti*	2pF	3.713(15)	3.843(15)	0.588(5)		1.03 - 1.62	Sh78c	i
	FB	3.597(1)				0.61 - 2.20	Se85	†,i
^{50}Ti*	FB	3.573(2)				0.61 - 2.20	Se85	†,i
^{51}V*	2pF	3.58(4)	3.94(3)	0.505(14)		0.56 - 1.79	Pe73	i
	2pF	3.615(31)	3.91(4)	0.532(29)		0.23 - 0.78	Go74	i
^{50}Cr*	2pF	3.638(13)	3.979(30)	0.520(13)		0.15 - 0.79	La76	i
	2pF	3.707(15)	3.941(15)	0.566(5)		0.97 - 1.62	Sh78b	i
	FB	3.662(4)				0.15 - 2.59	Li83	†,g
^{52}Cr*	2pF	3.613(17)	4.01(4)	0.497(19)		0.15 - 0.79	La76	i
	2pF	3.684(15)	3.984(15)	0.542(5)		0.97 - 1.62	Sh78b	i
	FB	3.643(3)				0.15 - 2.59	Li83	†,g
^{53}Cr	2pF	3.726(15)	4.000(15)	0.557(5)		0.97 - 1.62	Sh78b	i
^{54}Cr	2pF	3.673(14)	4.021(31)	0.524(13)		0.15 - 0.79	La76	i
	2pF	3.776(15)	4.010(15)	0.578(5)		0.97 - 1.62	Sh78b	i
	FB	3.689(4)				0.15 - 2.59	Li83	†,g
^{55}Mn	2pF	3.68(11)	3.89(12)	0.567		0.23 - 0.50	Th69	e,47
^{54}Fe*	3pG	3.680(13)	3.518(17)	2.270(12)	0.403(15)	0.51 - 2.22	Wo76	i
	2pF	3.675(17)	4.075(38)	0.506(18)		0.15 - 0.79	La76	i
	2pF	3.732(15)	4.074(14)	0.536(6)		0.97 - 1.62	Sh78b	i
^{56}Fe*	3pG	3.729(13)	3.505(17)	2.325(12)	0.380(15)	0.51 - 2.22	Wo76	i
	2pF	3.721(20)	4.106(45)	0.519(21)		0.15 - 0.79	La76	i
	2pF	3.801(15)	4.111(13)	0.558(6)		0.97 - 1.62	Sh78b	i
^{58}Fe	2pF	3.783(19)	4.027(19)	0.576(7)		1.02 - 1.77	Li71b	c
	3pG	3.767(13)	3.585(18)	2.354(12)	0.328(15)	0.51 - 2.22	Wo76	i
^{59}Co*	2pF	3.80(5)	4.08(5)	0.569		0.23 - 0.56	Fe73a	e,48
	3pG	3.775(37)	3.656(18)	2.339(12)	0.0331(16)	0.51 - 2.22	Sc77	†,g,i
	2pF	3.864(15)	4.158(20)	0.575(5)		0.96 - 1.61	Sh78a	

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Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
^{58}Ni*	3pF	3.764(10)	4.3092	0.5169	-0.1308	0.58 - 2.64	Fi70	g,h,49
	SOG	3.772(2)				0.58 - 3.80	Ca80b	$,g,50
	FB	3.769(13)				0.25 - 2.65	Be83	†
^{60}Ni*	3pF	3.796(10)	4.4891	0.5369	-0.2668	0.52 - 2.28	Fi70	g,h,49
	3pG	3.793(13)	3.691(16)	2.337(12)	0.352(15)	0.51 - 2.22	Wo76	†,i
	FB	3.797(13)				0.25 - 2.65	Be83	†
^{61}Ni	3pF	3.806(10)	4.4024	0.5401	-0.1983	0.52 - 2.28	Fi70	g,h,49
^{62}Ni*	3pF	3.822(10)	4.4425	0.5386	-0.2090	0.52 - 2.28	Fi70	g,h,49
	3pG	3.830(13)	3.742(17)	2.360(12)	0.338(16)	0.51 - 2.22	Wo76	i
	2pF	3.827(13)	4.262(26)	0.521(12)		0.15 - 0.79	Ke77	i
^{64}Ni*	2pF	3.907(26)	4.212(28)	0.578(7)		0.68 - 1.61	Kh70b	c
	3pF	3.845(10)	4.5211	0.5278	-0.2284	0.52 - 2.64	Fi70	g,h,49
	3pG	3.850(13)	3.842(16)	2.346(12)	0.333(16)	0.51 - 2.22	Wo76	i
^{63}Cu*	3pG	3.876(36)	3.707(19)	2.412(12)	0.339(16)	0.51 - 2.22	Sc77	†,g,i
	2pF	3.933(15)	4.163(27)	0.606(11)		0.15 - 0.79	Ke77	i
	2pF	3.947(13)	4.218(14)	0.596(5)		0.96 - 1.61	Sh78a	
^{65}Cu*	3pG	3.892(36)	3.807(19)	2.405(12)	0.315(16)	0.51 - 2.22	Sc77	†,g,i
	2pF	3.986(19)	4.158(35)	0.632(8)		0.15 - 0.79	Ke77	i
	2pF	3.954(13)	4.252(15)	0.589(5)		0.96 - 1.61	Sh78a	
^{64}Zn*	2pF	3.965(17)	4.285(9)	0.584(9)		0.30 - 1.09	Ne72	i,51
	3pG	3.923(13)	3.664(18)	2.465(12)	0.342(15)	0.51 - 2.22	Wo76	i
	2pF	3.923(13)	4.297(25)	0.556(10)		0.15 - 0.79	Ke77	i
^{66}Zn*	2pF	3.991(27)	4.286(29)	0.595(11)		0.96 - 1.63	Li73	c,i
	3pG	3.931(13)	3.757(18)	2.463(12)	0.299(15)	0.51 - 2.22	Wo76	i
	2pF	3.952(15)	4.340(28)	0.559(6)		0.15 - 0.79	Ke77	i
^{68}Zn*	2pF	3.979(31)	4.353(32)	0.567(14)		0.96 - 1.63	Li73	c,i
	3pG	3.963(13)	3.870(18)	2.459(12)	0.293(16)	0.51 - 2.22	Wo76	i
	2pF	3.958(17)	4.393(32)	0.544(15)		0.15 - 0.79	Ke77	i
^{70}Zn	2pF	4.044(18)	4.409(10)	0.583(9)		0.30 - 1.09	Ne72	i,51
	3pG	3.986(13)	3.878(20)	2.460(12)	0.342(18)	0.51 - 2.22	Wo76	i
	2pF	3.993(20)	4.426(37)	0.551(8)		0.15 - 0.79	Ke77	i
^{70}Ge	2pF	4.07(2)	4.44(2)	0.585(7)		0.65 - 1.14	Kl75	i
	FB	4.043(2)				0.35 - 2.90	Ma84	†,g
^{72}Ge	2pF	4.05(3)	4.45(2)	0.573(7)		0.65 - 1.14	Kl75	i
	FB	4.060(2)				0.35 - 2.90	Ma84	†,g
^{74}Ge	FB	4.075(2)				0.35 - 2.90	Ma84	†,g
^{76}Ge	FB	4.081(2)				0.35 - 2.90	Ma84	†,g

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Nucleus	model	<r²>^1/2 [fm]	c or a [fm]	z or α [fm]	w	q-range [fm⁻¹]	ref.	remarks
^{88}Sr*	3pG	4.26(1)	4.254(10)	2.548(6)	0.47(3)	0.71 - 2.65	Al73	h
	2pF	4.17(2)	4.83(1)	0.496(11)		0.41 - 1.01	Fi74	i
	FB	4.188(5)				0.50 - 2.50	St76	†,52
^{89}Y*	2pF	4.24	4.76(5)	0.571(29)		0.49 - 1.81	Sh67a	c
	3pG	4.24(2)	4.45(3)	2.526(23)	0.25	0.41 - 1.15	Si73c	d,i,53
	2pF	4.27(2)	4.86(1)	0.542(11)		0.41 - 1.01	Fi74	i
^{90}Zr*	3pG	4.274(22)	4.434(20)	2.528(3)	0.350(25)	0.53 - 2.80	Fa71	h
	3pG	4.28(2)	4.46(5)	2.569(32)	0.25	0.40 - 1.15	Si73c	d,i,53
	FB	4.258(8)				0.50 - 2.50	Ro76	†,i
^{91}Zr	3pG	4.309(22)	4.325(20)	2.581(3)	0.433(25)	0.53 - 2.43	Fa71	h
^{92}Zr	3pG	4.300(22)	4.455(20)	2.550(3)	0.334(25)	0.53 - 2.43	Fa71	h
	FB	4.294(11)				0.50 - 2.50	Ro76	†,i
^{94}Zr	3pG	4.332(22)	4.494(20)	2.585(3)	0.296(25)	0.53 - 2.43	Fa71	h
	FB	4.315(10)				0.50 - 2.50	Ro76	†,i
^{96}Zr	3pG	4.396(22)	4.503(20)	2.602(3)	0.341(25)	0.89 - 2.80	Fa71	h
^{93}Nb	2pF	4.31	4.87(5)	0.573(29)		0.49 - 1.81	Sh67a	c
	2pF	4.331(10)	4.953(6)	0.541(5)		0.15 - 0.79	Ja76	54
^{92}Mo	3pG	4.28(7)	4.61(10)	2.52(7)	0.19(11)	0.64 - 1.86	Ph72	i
	3pG	4.34(2)	4.56(4)	2.606(23)	0.21	0.40 - 1.15	Si73c	d,i,53
	FB	4.294(16)				0.56 - 1.96	Dr75	†,i
^{94}Mo	FB	4.334(16)				0.56 - 1.96	Dr75	†,i
^{96}Mo	FB	4.364(16)				0.56 - 1.96	Dr75	†,i
^{98}Mo	FB	4.388(16)				0.56 - 1.96	Dr75	†,i
^{100}Mo	FB	4.430(16)				0.56 - 1.96	Dr75	†,i
^{104}Pd	FB	4.437(10)				0.29 - 2.38	La86	†,i
^{106}Pd	FB	4.467(11)				0.29 - 2.38	La86	†,i
^{108}Pd	FB	4.524(10)				0.29 - 2.38	La86	†,i
^{110}Pd	2pF	4.639(19)	5.301(23)	0.581(9)		0.36 - 1.00	Li76	i
	FB	4.541(10)				0.29 - 2.40	La86	†,i
^{110}Cd	2pF	4.578(7)	5.33(2)	0.535(7)		0.25 - 1.07	Gi75	i,55
^{112}Cd	2pF	4.608(7)	5.38(2)	0.532(9)		0.25 - 1.07	Gi75	i,55
^{114}Cd	2pF	4.629(8)	5.40(2)	0.537(9)		0.25 - 1.07	Gi75	i,55
	2pF	4.632(17)	5.314(23)	0.571(9)		0.36 - 1.00	Li76	i
^{116}Cd	2pF	4.639(8)	5.42(2)	0.532(9)		0.25 - 1.07	Gi75	i,55

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Nucleus	model	$\langle r^2\rangle^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
In*	2pF	4.646(12)	5.357(7)	0.563(4)		0.15 - 0.79	Ja76	56
^{112}Sn	2pF	4.655(23)	5.375(26)	0.560(10)		0.49 - 1.40	Kh70b	c
	3pG	4.586(5)	4.962(7)	2.638(3)	0.285(12)	0.64 - 2.37	Fi72	h,57
^{114}Sn	3pG	4.602(5)	4.971(7)	2.636(3)	0.320(12)	0.64 - 2.37	Fi72	h,57
^{116}Sn*	3pG	4.619(5)	5.062(7)	2.625(3)	0.272(12)	0.64 - 2.65	Fi72	h,57
	2pF	4.626(15)	5.358(22)	0.550(9)		0.36 - 1.00	Li76	i
	SOG	4.627				0.36 - 3.60	Ca82a	$,g,i,58
^{117}Sn	3pG	4.625(5)	5.058(7)	2.625(3)	0.295(12)	0.64 - 2.37	Fi72	h,57
^{118}Sn*	2pF	4.679(16)	5.412(18)	0.560(5)		0.49 - 1.40	Kh70b	c
	2pF	4.676(17)	5.442(21)	0.543(7)		0.84 - 1.75	Li72b	c
	3pG	4.634(5)	5.072(7)	2.623(3)	0.304(12)	0.64 - 2.37	Fi72	h,57
119Sn	3pG	4.639(5)	5.100(7)	2.618(7)	0.290(12)	0.64 - 2.37	Fi72	h,57
^{120}Sn*	2pF	4.640	5.315(25)	0.576(11)		0.46 - 1.08	Ba67b	
	3pG	4.646(5)	5.110(7)	2.619(3)	0.292(12)	0.64 - 2.37	Fi72	h,57
^{122}Sn	3pG	4.658(5)	5.088(7)	2.611(3)	0.378(12)	0.64 - 2.37	Fi72	h,57
^{124}Sn*	2pF	4.695(17)	5.490(21)	0.534(7)		0.84 - 1.75	Li72b	c
	3pG	4.670(5)	5.150(7)	2.615(3)	0.311(12)	0.64 - 2.65	Fi72	h,57
	SOG	4.677				0.36 - 3.60	Ca82a	$,g,i,58
Sb*	2pF	4.63(9)	5.32(11)	0.57(6)		0.56 - 1.31	Ha56	f
^{138}Ba	3pG	4.836	5.3376	2.6776	0.3749	0.56 - 2.84	He70b	h,59
^{139}La	2pF	4.85	5.71(6)	0.535(27)		0.74 - 1.87	Sh67b	c,f
^{142}Nd*	3pF	4.920	5.6135	0.5868(24)	0.096(14)	0.55 - 2.97	He71a	h,60
	2pF	4.863(34)	5.774(26)	0.513(16)		0.23 - 0.59	Ca73	i,61
	2pF	4.993(35)	5.839(33)	0.569(18)		0.22 - 0.73	Ma74	i
^{144}Nd	2pF	4.926	5.6256	0.6178(30)		0.55 - 2.97	He71a	h,62
^{146}Nd*	2pF	4.970	5.6541	0.6321(30)		0.55 - 2.97	He71a	h,62
	2pF	4.993(37)	5.867(32)	0.556(20)		0.22 - 0.73	Ma74	i
^{148}Nd	2pF	5.002	5.6703	0.644(5)		0.55 - 2.97	He71a	h,62
^{150}Nd*	2pF	5.048	5.7185	0.651(7)		0.55 - 2.97	He71a	g,h,62
	2pF	5.015(37)	5.865(35)	0.571(18)		0.22 - 0.73	Ma74	i
	2pF	4.948	5.895	0.513		0.37 - 2.29	Hi77	i,63
^{144}Sm	FB	4.947(9)				0.60 - 2.50	Mo81	†,g,i
^{148}Sm	2pF	4.989(37)	5.771(31)	0.596(15)		0.25 - 0.59	Ca73	i
	FB	4.976(8)				0.33 - 2.18	Ho80	†,i
	FB	5.002(6)				0.60 - 2.50	Mo81	†,g,i

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Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
^{150}Sm	FB	5.045(6)				0.60 - 2.50	Mo81	†,g,i
^{152}Sm*	2pF	5.0922	5.8044	0.581(15)		0.37 - 1.02	Co76	i,64
	FB	5.099(8)				0.33 - 2.18	Ho80	†,i
	FB	5.093(6)				0.60 - 2.50	Mo81	†,g,i
^{154}Sm	2pF	5.1257	5.9387	0.522(15)		0.37 - 0.97	Co76	i,64
	FB	5.126(8)				0.33 - 2.18	Ho80	†,i
^{154}Gd	FB	5.124				0.58 - 2.17	He82	†
^{156}Gd	FB	5.068	5.930	0.576		0.37 - 2.07	Hi77	i,63
^{158}Gd	2pF	5.172(6)				0.36 - 2.17	Mu84	†,i
^{165}Ho	2pF	5.23	6.18	0.57		0.54 - 1.43	Sa67	h,65
	2pF	5.19	6.12	0.57		0.50 - 1.45	Uh71	h,65
^{166}Er	2pF	5.2380	6.1610	0.4872		0.29 - 1.07	Co76	i,66
	2pF	5.303	6.186	0.269		0.37 - 2.28	Cr77	i,67
	3pF	5.237(16)	5.98(6)	0.446(31)	0.19(7)	0.29 - 2.28	Ca78	†,68
^{174}Yb	FB	5.41(3)				0.32 - 2.33	Sa79	†,i
^{176}Yb	2pF	5.3150	6.3306	0.4868		0.29 - 1.07	Co76	i,66
	2pF	5.443	6.127	0.363		0.37 - 2.28	Cr77	i,68
^{175}Lu	FB	5.37(3)				0.32 - 2.33	Sa79	†,i
^{181}Ta*	2pF	5.48	6.38	0.64		0.56 - 1.42	Do57	69
^{184}W	2pF	5.42(7)	6.51(7)	0.535(36)		0.25 - 0.60	Ka73	70
^{186}W	2pF	5.40(4)	6.58(3)	0.480(23)		0.25 - 0.60	Ka73	70
^{192}Os	FB	5.413(4)				0.60 - 2.90	Re84a	†,i
^{196}Pt	FB	5.38(2)				0.34 - 2.28	Bo83	i
^{197}Au	2pF	5.33(5)	6.38(6)	0.535(27)		0.56 - 1.42	Ha56	
		5.27(9)				0.08 - 0.27	Be60	71
^{203}Tl	FB	5.463(5)				0.51 - 2.24	Eu78	†,g,i
^{205}Tl*	FB	5.470(5)				0.51 - 2.24	Eu78	†,g,i
	SOG	5.479				0.51 - 2.99	Fr83	$,g,72
^{204}Pb	FB	5.479(2)				0.51 - 2.24	Eu78	†,g,i
^{206}Pb*	2pF	5.509(29)	6.61(5)	0.545(8)		0.22 - 0.88	Ja73	i
	FB	5.490(2)				0.51 - 2.24	Eu78	†,g,i
	SOG	5.490				0.51 - 2.99	Fr83	$,g,72

TABLE I. Charge-Density-Distribution Parameters
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Nucleus	model	$<r^2>^{1/2}$ [fm]	c or a [fm]	z or α [fm]	w	q-range [fm^{-1}]	ref.	remarks
^{207}Pb*	2pF	5.513(32)	6.62(6)	0.546(10)		0.22 - 0.88	Ja73	i
	FB	5.497(2)				0.51 - 2.24	Eu78	†,g,i
^{208}Pb*	SOG	5.503				1.7 - 3.7	Fr77a	$,g,i,73
	FB	5.4989(7)				0.44 - 3.7	Fr77b	†,g,74
	FB	5.503(2)				0.51 - 2.24	Eu78	†,g,i,75
^{209}Bi*	2pF	5.51(5)	6.75(7)	0.468(39)		0.07 - 0.53	Ni69	i,76
	3pG	5.521(2)	6.315(10)	2.881(8)	0.39(6)	0.7 - 2.8	Si73b	g,h,60
	FB	5.519(4)				0.51 - 2.24	Eu78	†,g,i,77
^{232}Th*	2pF	5.7723	6.7915	0.571(15)		0.33 - 0.97	Co76	i,64
	2pF	5.645	6.851	0.518		0.46 - 2.08	Hi77	i,63
^{238}U*	2pF	5.84	6.8054	0.605(16)		0.37 - 0.97	Co76	i,64
	2pF	5.854	6.874	0.556		0.46 - 2.08	Cr77	i,67

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*) **Additional information can be found in the following references:**

n : Vr64, Du65, Du66, Hu66a, Hu66b, Ch66a, Gr66a, Gr66b, St66a, Al68, Bu68, Bu69, El69, Ga71, Ba72, Be73a, Ha73a

^{1}H : Bu61, Li61, Ol61, Dr62, Le62, Be63, Ch63, Du63, Du64, Du65, Al66, Ba66, Ch66a, Ch66b, Fr66, Gr66b, Ja66, Al67, Ba67a, Be67a, Go67, Be68, Ba70, Go70, Li70, Be71a, Bi71, Ha71, Ja71, Pr71, Ak72, Ga72, Ba73, Be73a, Bo73, Ki73, Bo74, Mu74, Th74, Bo75a, Bo75b

^{2}H : MI57a, MI58, Be64a, Gr66a, El69, Sk73, Bu70, Ar75

^{3}H : Co65, Be82

^{3}He : Co65, Be72, Sz77, Ar78, Gu82, Du83

^{4}He : Bl56, Ho56, MA56, Bu60, Re65, Fr67, Er68, St69, Si76, MC77, Ar78

^{6}Li : Bu58, Be65

^{7}Li : Be65

^{9}Be : Ho57, Me59, Ng64, Be67b, Be67c, Be69, Be73b

^{10}B : Me59

^{11}B : Me59

^{12}C : Fr56, Eh59, Cr66, Af67, En67, Si70b, Be71b, Ja72, Fe73a, Fe73b, Kl73, Si74a, Me76, Do79

^{14}N : Me59, Bi64, Be65, Be71b, Vo78

^{15}N : Pa68

^{16}O : Eh59, Me59, Cr66, Be71b, Si70a, No82

^{19}F : Wi78

^{20}Ne : Fe73a

^{24}Mg : He56, Sa69b, Ju70, Na72

^{27}Al : Be70a, Li74, Do83

^{28}Si : He56, Sa69c, Be70a, Mu70, Na72, Fe73a, Av74, Wh79

^{31}P : Ko65

^{32}S : He56, Lo64, Hu70, Si72, Av74, Si74a, Ry83b

^{34}S : Ry83b

^{36}S : Ry83b

^{39}K : Si74b

^{40}Ar : He56, Gr71, Sc71, Fe73a

^{40}Ca : Ha56, Cr61, Cr65, Be67d, Fr68, Ei69, He71b, Si74b, Ca80b, Em83a

^{42}Ca : He71b

^{44}Ca : He71b

^{48}Ca : Si74b, Em83a

Ti : En66, Fe73a

^{46}Ti : He71b

^{48}Ti : He71b

^{50}Ti : He71b

^{51}V : Ha56, Cr61, Na74

^{50}Cr : Sh78c

^{52}Cr : Be64b, Li76

Fe : Fe73a, Th70

^{54}Fe : Be62, Li71b

^{56}Fe : Be62, He71b, Li71b

^{59}Co : Ha56, Cr61, Go63, Br66

Ni : Fe73a, Th70

^{58}Ni : Af70, Kh70b, Li71b, Si75, Ke77, Ca80b, Wo76

^{60}Ni : Af70, Kh70b, Li72a, Ke77, Sh78a, Wo80

^{62}Ni : Li71b, Go74

^{64}Ni : Af70

Cu : Fe73a

^{63}Cu : Go74

^{65}Cu : Go74

Zn : Th70, Fe73a

^{64}Zn : Af71, Li72a

^{66}Zn : Af71, Li72a, Ne72

^{68}Zn : Ne72

^{88}Sr : He56, Sc74

^{89}Y : Pe68

^{90}Zr : Be70b, Ph72, Dr74

Mo : Ja76

Cd : Ja76

In : Ha56, Cr61, Ke63

^{116}Sn : Ba67b, Cu69, Li72b, Ca80b

^{118}Sn : Cu69

^{120}Sn : Cu69

^{124}Sn : Ba67a, Cu69, Ca80b

Sb : Cr61

^{142}Nd : He70b

^{146}Nd : Ma71

^{150}Nd : Ma71

Hf : Ha56, Do57

^{152}Sm : Ca78

^{181}Ta : Ke63, Ra78

W : Pi55, Ha56, Do57

^{205}Tl : Ca82b

Pb : Mi57b, Fi64, Ni69, Fe73a

^{206}Pb : Pa79, Ca82b

^{207}Pb : Pe65, Pa79

^{208}Pb : Pe65, Be67e, He69, Fr72b, Ja73, Eu76a, Na71, Si73b, Be77, Eu77b, Be80, Ca80b

^{209}Bi : Ha56, Be60, Cr61, Go63, He63, Br66

^{232}Th : Ha56, Do57

^{238}U : Ha56, Do57

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General remarks

†) Additional information can be found in Table IV (Fourier-Bessel coefficients).
$) Additional information can be found in Table V (Sum-of-Gaussians).

a) Analysis performed in the Plane Wave Born Approximation.
b) Analysis performed in the Modified Born Approximation, using an effective q-value.
c) Analysis performed in the High Energy Approximation (Pe66).
d) Only statistical errors are quoted, corresponding to one standard deviation.
e) The value of z was fixed in the analysis.
f) A target of natural isotopic composition has been used.
g) Muonic X-ray data have been included in the analysis.
h) Measurement relative to ^{1}H.
i) Measurement relative to ^{12}C.

Specific remarks

1) The tabulated value for the rms radius is formally obtained from the slope of the neutron charge form factor at $q^2 = 0$ as determined from the scattering of slow neutrons by atomic electrons. Further information on the neutron form factor, obtained from electron scattering of ^{2}H and ^{3}H, is given in the list of additional references. In ref. Ho76 a combined analysis is presented of data from scattering of slow neutrons by atomic electrons (refs. Kr73 and Ko76), from elastic deuteron scattering (refs. Dr62, Be64a, Bu70, Ga71 and Be73a) and from quasi-elastic e-D scattering (refs. Ak64, St66a, Al68, Bu68, Ba73 and Ha73a).
2) Result of an analysis of all available data below $q^2 = 2$ fm^{-2} (Bu61, Dr62, Le62, Du65, Fr66, Ja71).
3) Result of the analysis of the data from refs. Dr62, Du65, Fr66, Ja66, Be67a, Go70, Li70, Be71a, Pr71, Ga72, Ba73, Kl73, Bo74, Mu74, At75, Bo75a, Bo75b, St75.
4) Model-independent fourth order polynomial fit (ref. Bo75a) with free normalization. The analysis includes the data from refs. Du65, Be71a, Ba73, Ki73, Bo74 and Mu74.
5) In the analysis values of 0.336 and 0.805 fm have been used for the rms radius of the neutron and of the proton, respectively. The rms charge radius is related to the rms structure radius through $r_c^2 = r_d^2 + r_p^2 - r_n^2$.
6) Although the complete data set covers a momentum transfer range up to 1.99 fm^{-1}, only the low q-data were used for the determination of the rms radius via a third-order polynomial fit. The analysis included data from refs. Bu70 and Be73a. In contrast to the procedure followed in refs. Bu70 and Be73a, no additional assumption has been made about the coefficient of q^4.
7) In this experiment the form factor has been determined for momentum transfer values between 0.51 and 1.72 fm^{-1}. The data points from refs. Co65 and Be82 have been included in the data analysis.
8) The data from refs. Co65 and Be84 have been included in the analysis.
9) In this experiment the recoil ^{3}He has been detected. A momentum transfer range of 0.94 to 1.79 fm^{-1} was covered. The data from refs. Co65, MC77, Sz77, Ar78 and Du83 were included in the analysis. The charge density was defined to be positive.
10) A fifth-order polynomial was fitted to the form factor.
11) The analysis included the data presented in ref. Fr67, Er68, MC77 and Ar78.
12) A fourth-order polynomial was fitted to the form factor.
13) The data could be described excellently by a charge distribution which is the Fourier transform of $F(q^2) = \exp(-a^2q^2) - c^2q^2\exp(-b^2q^2)$, with parameter values a = 0.933(3) fm, b = 1.30(6) fm and c = 0.45(3).
14) The data could be described out to $q^2 = 6$ fm^{-2} by a charge distribution as given in remark 13. A fit to the complete data set was obtained after adding an oscillatory modification: the Fourier transform of a form factor modification $\Delta F = d\exp(-(q-q_o)^2/p^2)$. The best fit results are: a = 0.928(3) fm, b = 1.26(9) fm, c = 0.48(4), and d = -0.00124(28), p = 0.70(29) fm^{-1} and q_o = 3.11(20) fm^{-1}.
15) In the analysis the value for the rms radius of ^{12}C of ref. Si70b was used.
16) The form factor has been interpreted in terms of a harmonic-oscillator shell model with a quadrupole contribution based on an undeformed p-shell model. The absolute value obtained for the quadrupole moment (4.20±0.25 e fm^2) is in excellent agreement with spectroscopic measurements.
17) The normalization of the data of ref. Be67c has been adjusted with the value of the ^{12}C radius of ref. Si70b.
18) The data were analyzed with nuclear wave functions obtained by extending the Nilsson model to include single-particle orbital admixtures from higher major shells.
19) Combined analysis with the data from refs. Si70b and Ja72 with a free normalization for each data set. The data of this experiment cover a momentum transfer range from 0.1 to 1.0 fm^{-1}. In ref. Ca80 the 10th Fourier-Bessel coefficient is a factor 10 too high due to a typing error.

TABLE I. Charge-Density-Distribution Parameters

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20) Combined analysis with the data from refs. Si70b, Ja72, Fe73b and Ca80.
21) An exponential tail modification of a Gaussian form was added to the MHO charge distribution in order to approximate the 3pF density in the tail region. Only the amplitude of the tail modification was fitted as a free parameter, the other two parameters were taken from the ^{12}C results of ref. Si70b.
22) Results of a fit to the data up till the first diffraction minimum without applying corrections for elastic scattering from the M1 and C2 moments.
23) A Gaussian shape has been assumed for the static quadrupole moment distribution. The analysis yielded a value of $Q_2 = 3.22$ e fm^2.
24) Reanalysis of the data presented in ref. Da70.
25) Analysis with the data presented in ref. Sc75. The present data covered a momentum transfer range from 0.35 to 3.17 fm^{-1}.
26) In the analysis an oscillatory modification corresponding to the Fourier transform of a damped sine wave, was added to the MHO charge distribution.
27) Measurement relative to the ^{16}O parameters from ref. Si70a.
28) Measurement relative to the ^{40}Ca parameters from refs. Fr68, Ei69 and He71b.
29) The data were analyzed with the uniform Gaussian model, which yielded parameter values r = 3.13(6) fm and g = 0.96(5) fm.
30) The oscillatory modification defined in remark 14, was included in the analysis of the ^{24}Mg and the ^{32}S data. The best fit results were: d = -0.076, p = 0.51 fm^{-1} and q_o = 2.49 fm^{-1} for ^{24}Mg and d = 0.021, p = 0.50 fm^{-1} and q_o = 2.83 fm^{-1} for ^{32}S.
31) The analysis yielded the following values for the C2 and C4-moments: 24.4(+0.8,-4.0) e fm^2 and 15.3(+2.3, -10.0) e fm^4, respectively.
32 Reanalysis of the data from ref. Be70a.
33) In the 3pF analysis only the data up till 1.49 fm^{-1} were used. Data were taken up to 2.64 fm^{-1}.
34) In this analysis an oscillatory modification as defined in remark 14 was used, which yielded parameter values d = -0.034(8), p = 0.51(11) fm^{-1} and q_o = 2.48(7) fm^{-1}.
35) Combined analysis with the data from ref. Si72. The present data cover a momentum transfer range from 0.3 to 2.3 fm^{-1}.
36) The data from ref. Me76 were included in the analysis.
37) Combined analysis with the data from ref. Li74b. The present data cover a momentum transfer range from 0.3 to 2.3 fm^{-1}.
38) For the subtraction of the C2-contribution a value for the quadrupole moment of -8.25 e fm^2 was used.
39) For the subtraction of the C2-contribution a value for the quadrupole moment of -6.2 e fm^2 was used.
40) The present experiment covered a momentum range from 0.54 to 1.26 fm^{-1}. In the analysis the data from refs. Gr71, Sc71, We74 and Fi76 were also included.
41) The data were analyzed with the uniform Gaussian model, which yielded parameter values r = 3.83(8) fm and g = 0.96(5) fm.
42) The analysis included an oscillatory modification as defined in remark 14, which yielded d = 0.086(7), p = 0.43(4) fm^{-1} and q_o = 3.14(6) fm^{-1}.
43) The analysis included an oscillatory modification as defined in remark 14, which yielded d = 0.0814(8), p = 0.43(4) fm^{-1} and q_o = 3.14(5) fm^{-1}. The data of ref. Be67d and unpublished data taken by J. Heisenberg, J. McCarthy and I. Sick, were included in the analysis.
44) The present experiment covered a momentum range from 2.14 to 3.56 fm^{-1}. In the analysis the data from refs. Be67d, Fr68 and Si73a were also included.
45) The present experiment covered a momentum range from 0.35 to 2.38 fm^{-1}. In the analysis the high-q data from ref. Si79 were also included.
46) The analysis included an oscillatory modification as defined in remark 14, which yielded d = 0.08, p = 0.5 fm^{-1} and q_o = 3 fm^{-1}.
47) The rms radius for ^{12}C was taken from ref. En67 to be 2.42(4) fm.
48) The normalization of the data presented in ref. Th70 has been adjusted with the value of the ^{12}C radius of ref. Si70b.
49) The data were analyzed simultaneously with the results of optical isotope shift experiments. An oscillatory modification corresponding to the Fourier transform of a damped sine wave, was also included in the analysis. The entries presented here are a reanalysis of the original data (I. Sick, private communication, 1973)
50) Combined analysis with the data from refs. Cu69 and Fi72.
51) The normalization of the data has been adjusted with the value of the ^{12}C radius of ref. Si70b by the authors of the compilation.
52) Combined analysis with the data from ref. Sc74.

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53) In a private communication the authors gave preference to the results obtained with the 3pG model for ease of comparison with the other tabulated results. The value of w was fixed in the analysis. The errors were obtained by assuming the same percentage errors as yielded by the analysis with the 2pF model. The entries presented in ref. Si73c have been calculated with a faulty version of the phase shift code. The entries listed in this table have been recalculated by the original authors.
54) Measurements relative to the Zr parameters from ref. Fa71.
55) The entries presented in ref. Gi75 have been calculated with a faulty version of the phase shift code. The entries listed in this table have been recalculated by the original authors.
56) Measurements relative to the Sn parameters from ref. Fi72.
57) The data were analyzed simultaneously with the results of optical isotope shift experiments. An oscillatory modification corresponding to the Fourier transform of a damped sine wave, was included in the analysis.
58) The present data cover a momentum transfer range between 1.4 and 3.6 fm^{-1}. The data were analyzed simultaneously with the data from refs. Cu69 and Fi72.
59) In the analysis an oscillatory modification as defined in remark 14, was included, which yielded d = 0.13, p = 0.25 fm^{-1} and q_0 = 2.55 fm^{-1} .
60) The analysis included an oscillatory modification.
61) Reanalysis of the data presented in ref. Ma71, omitting the 15 MeV points. The normalization of the data has been adjusted with the value of the ^{12}C radius of ref. Si70b.
62) In the analysis for $^{144,146,148}Nd$ K_α X-ray data relative to ^{150}Nd were used as constraints.
63) The elastic electron scattering data were analyzed with a deformed Fermi distribution for the ground state. The values found for the deformation parameters β_2, β_4 and β_6 are 0.2693, 0.0795 and 0.0161(^{150}Nd); 0.3147, 0.0648 and 0.0020(^{156}Gd) and 0.2122, 0.0607 and -0.2490(^{232}Th), respectively.
64) The elastic electron scattering data were analyzed simultaneously with data for electro-excitation of the ground-state rotational band with a deformed Fermi distribution. The values for the rms radius and for the deformation parameters β_2 and β_6 were taken from other types of experiments, which left β_4 and z as free parameters. The values for β_2, β_4 and β_6 either used in or yielded by the analysis, are 0.287(3), 0.070(3) and -0.012(^{152}Sm); 0.311(3), 0.087(2) and -0.018(^{154}Sm); 0.238(2), 0.101(3) and 0.0(^{232}Th) and 0.261(2), 0.087(3) and 0.0(^{238}U), respectively.
65) Cross sections were measured for electron scattering from randomly oriented and from aligned ^{165}Ho nuclei. The tabulated values present the results of an analysis of the data for randomly oriented nuclei with the 2pF distribution, after subtraction of the scattering from the quadrupole moment.
66) The elastic electron scattering data were analyzed with a deformed Fermi distribution for the ground state. The values for the deformation parameters β_2, β_4 and β_6 were kept fixed at 0.3266, 0.0 and -0.018(^{166}Er) and 0.3100, -0.054 and -0.006(^{176}Yb), respectively.
67) The elastic electron scattering data were analyzed with a deformed Fermi distribution for the ground state. The values for the deformation parameters β_2, β_4 and β_6 found are 0.4874, -0.0259 and 0.0423(^{166}Er); 0.4987, -0.0525 and 0.1451(^{176}Yb) and 0.2802, -0.0035 and -0.1107(^{238}U), respectively.
68) Combined analysis with the data from refs. Co76 and Cr77. No good fit could be obtained with either a deformed Fermi distribution or a modified Gaussian distribution.
69) Analysis of the data presented in ref. Ha56, with a deformed 2pF distribution. The tabulated values are for a 2pF distribution which gives a good approximation to the monopole term of the deformed distribution.
70) Measurements relative to ^{6}Li, for which the parameters of ref. Li71a have been used.
71) Analysis with a uniform charge distribution.
72) The low-q data from ref. Eu78 were included in the analysis. The data from ref. Eu78 taken at 289 MeV were excluded due to inconsistencies with the present data set.
73) The data covered a momentum range from 1.7 to 3.7 fm^{-1}. The data were analyzed simultaneously with those from refs. He69, Eu76a, Ni69 and muonic X-ray experiments. The data from ref. Eu78 in the momentum range from 1.8 to 2.3 fm^{-1} were excluded because they were incompatible with the other data.
74) Reanalysis of the data from refs. He69, Ni69, Na71, Fr72b, Eu76 and Fr77a.
75) The high-q (2.35 to 2.73 fm^{-1}) data from ref. He69 were also included in the analysis.
76) Also ^{9}Be has been used as a comparison nucleus.The normalization of the data has been adjusted with the values of the ^{9}Be radius of ref. Fe73a and the ^{12}C radius of ref. Si70b by the authors of the compilation.
77) The high-q (2.11 to 2.62 fm^{-1}) data from ref. Si73b were also included in the analysis.

TABLE II. Differences in Charge-Density-Distribution Parameters between Isotopes

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Isotope pair	model	$\Delta\langle r^2\rangle^{1/2}$ [fm]	Δc [fm]	Δz [fm]	Δw	q-range [fm^{-1}]	ref.	remarks
4- ^{3}He	MI	-0.271(15)				0.12 - 0.53	Gu82	
7- ^{6}Li	MI	-0.08(2)				0.51 - 1.27	Be65	1,2
	MI	-0.13(2)				0.35 - 0.71	Su67	1,2
	MI	-0.003(20)				0.36 - 0.78	Ni71	1
13- ^{12}C*	MHO	-0.023(10)				0.30 - 1.50	He70a	
	HO	-0.06(5)				0.26 - 1.23	Ya71	1,3
	HO	-0.012(19)				0.26 - 0.55	Be71b	
14- ^{12}C	MHO	0.12(5)				1.04 - 2.16	Kl73	
15- ^{14}N	HO	0.040(12)				0.22 - 0.48	Sc75	
17- ^{16}O*	HO	-0.013(15)				0.39 - 0.99	Si70a	3
	HO	0.004(15)				0.46 - 1.21	Ki78	
	FB	-0.008(7)				0.50 - 2.60	Mi79	
18- ^{16}O*	HO	0.053(12)				0.47 - 0.99	Si70a	
	HO	0.070(11)				0.22 - 0.48	Sc75	
	FB	0.074(5)				0.50 - 2.60	Mi79	
22- ^{20}Ne	2pF	-0.073(27)				0.22 - 1.04	Mo71	
	2pF	-0.053(9)	0.098(10)	-0.042(6)		0.21 - 1.30	Kn81	
25- ^{24}Mg	2pF	0.016(32)	-0.063(36)	0.021(23)		0.20 - 1.15	Le76	4
26- ^{24}Mg	UG	-0.05(4)				0.69 - 1.40	Kh70a	5
	2pF	-0.019(32)	0.055(36)	-0.021(23)		0.20 - 1.15	Le76	
29- ^{28}Si	2pF	-0.052(25)	0.03(3)	-0.030(20)		0.16 - 1.1	Br77	
30- ^{28}Si	2pF	0.03(+15,-7)	0.04(37)	0.(+.18,-.08)		0.16 - 1.1	Br77	
34- ^{32}S	FB	0.032(10)				0.50 - 2.60	Ry83a	
36- ^{34}S	FB	-0.007(12)				0.50 - 2.60	Ry83a	
36- ^{32}S	FB	0.034(10)				0.50 - 2.60	Ry83a	
42- ^{40}Ca	3pF	0.030	0.052	0.006	-0.014	0.55 - 1.70	Fr68	
44- ^{40}Ca	3pF	0.028	0.072	-0.014	0.007	0.70 - 1.79	Fr68	
48- ^{40}Ca*	3pF	-0.0107	0.069(17)	-0.060(18)	0.072(13)	0.49 - 2.53	Fr68	
	2pF	-0.04(7)	0.16(11)	-0.065		0.13 - 0.59	Ei69	6
	FB	-0.0014(26)				0.35 - 3.35	Em83b	
48- ^{46}Ti	2pF	-0.005(27)	-0.01(4)	0.0		0.22 - 0.57	Th67	6
	2pF	-0.015(10)	0.055(20)	-0.025(10)		0.55 - 1.11	Ro71	
	3pF	0.003(15)	-0.0076	-0.0293	0.0624	0.55 - 2.42	He72	
50- ^{46}Ti	2pF	0.003(21)	0.005(33)	0.0		0.22 - 0.57	Th67	6
	2pF	-0.030(15)	0.090(25)	-0.045(15)		0.55 - 1.11	Ro71	
	3pF	-0.013(15)	-0.0137	-0.0509	0.1004		He72	
50- ^{48}Ti	2pF	-0.020(10)	0.045(15)	-0.025(10)		0.55 - 1.11	Ro71	
	3pF	-0.016(15)	-0.0061	-0.0216	0.0380	0.55 - 2.49	He72	
52- ^{50}Cr	2pF	-0.037(11)	0.064(28)	-0.042(15)		0.15 - 0.74	La76	
	2pF	-0.028(12)	0.047(8)	-0.0289(27)		0.97 - 1.62	Sh78b	7
53- ^{50}Cr	2pF	0.027(12)	0.051(8)	-0.0034(27)		0.97 - 1.62	Sh78b	7

TABLE II. Differences in Charge-Density-Distribution Parameters between Isotopes
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Isotope pair	model	$\Delta\langle r^2\rangle^{1/2}$ [fm]	Δc [fm]	Δz [fm]	Δw	q-range [fm^{-1}]	ref.	remarks
$^{54-50}Cr$	2pF	0.033(6)	0.044(15)	0.002(8)		0.15 - 0.74	La76	
	2pF	0.068(12)	0.078(9)	0.0082(27)		0.97 - 1.62	Sh78b	7
$^{54-52}Cr$	2pF	0.048(9)	0.015(25)	0.035(13)		0.15 - 0.74	La76	
$^{56-54}Fe$*	2pF	0.048(9)	0.015(25)	0.020(13)		0.15 - 0.74	La76	
	FB	0.0445(8)				0.51 - 2.22	Wo80	8
	2pF	0.070(9)	0.031(6)	0.0241(20)		0.97 - 1.62	Sh78b	7
$^{58-56}Fe$	2pF	0.004(18)	0.092(20)	-0.026(6)		1.02 - 1.77	Li71b	7
	FB	0.0382(10)				0.51 - 2.22	Wo80	8
$^{60-58}Ni$*	2pF	0.040	0.062(18)	0.000(5)		1.05 - 1.61	Kh70b	7
	FB	0.0373(11)				0.51 - 2.22	Wo80	8
	FB	0.027(7)				0.25 - 2.65	Be83	
$^{62-58}Ni$	2pF	0.061(8)	0.081(9)	0.006(3)		1.02 - 1.93	Li71b	7
	2pF	0.079(6)	0.065(13)	0.018(8)		0.15 - 0.79	Ke77	
$^{62-60}Ni$	2pF	0.034(6)	0.033(13)	0.006(8)		0.15 - 0.79	Ke77	
	FB	0.0286(8)				0.51 - 2.22	Wo80	8
$^{64-58}Ni$	2pF	0.082	0.095(18)	0.010(5)		1.05 - 1.61	Kh70b	7
$^{64-60}Ni$	2pF	0.043	0.044(16)	0.006(5)		1.05 - 1.61	Kh70b	7
$^{64-62}Ni$	FB	0.0181(6)				0.51 - 2.22	Wo80	8
$^{65-63}Cu$*	2pF	0.024(9)	0.055(14)	-0.006(8)		0.29 - 0.88	Go74	
	FB	0.0202(6)				0.51 - 2.22	Sc77	8
	2pF	0.022(7)	0.047(8)	-0.0041(23)		0.96 - 1.61	Sh78a	7
$^{66-64}Zn$*	2pF	0.025(13)	0.048(13)	-0.003(3)		0.98 - 1.61	Li72a	7
	2pF	0.018(11)	0.030(21)	-0.001(12)		0.15 - 0.79	Ke77	
	FB	0.0225(30)				0.51 - 2.22	Wo80	8
$^{68-66}Zn$*	2pF	-0.016(9)	0.059(5)	-0.029(5)		0.30 - 1.09	Ne72	
	2pF	0.007(13)	0.054(24)	0.015(15)		0.15 - 0.79	Ke77	
	FB	0.0144(30)				0.51 - 2.22	Wo80	8
$^{70-68}Zn$	2pF	0.047(15)	0.032(10)	0.014(8)		0.30 - 1.09	Ne72	
	2pF	0.026(16)	0.049(31)	0.006(4)		0.15 - 0.79	Ke77	
	FB	0.0173(25)				0.51 - 2.22	Wo80	8
$^{72-70}Ge$	FB	0.0168(24)				0.35 - 2.90	Ma84	
$^{74-72}Ge$	FB	0.0151(24)				0.35 - 2.90	Ma84	
$^{76-74}Ge$	FB	0.0064(24)				0.35 - 2.90	Ma84	
$^{76-70}Ge$	FB	0.0383(24)				0.35 - 2.90	Ma84	
$^{94-92}Mo$	FB	0.040(5)				0.56 - 1.96	Dr75	
$^{96-94}Mo$	FB	0.028(5)				0.56 - 1.96	Dr75	
$^{98-96}Mo$	FB	0.028(5)				0.56 - 1.96	Dr75	
$^{100-98}Mo$	FB	0.039(5)				0.56 - 1.96	Dr75	
$^{112-110}Cd$	2pF	0.030(10)				0.25 - 1.07	Gi75	
$^{114-112}Cd$	2pF	0.021(11)				0.25 - 1.07	Gi75	
$^{116-114}Cd$	2pF	0.010(11)				0.25 - 1.07	Gi75	
$^{116-110}Cd$	2pF	0.061(12)				0.25 - 1.07	Gi75	
$^{118-112}Sn$	2pF	0.019	0.021(20)	0.000(7)		0.82 - 1.40	Kh70b	7
$^{118-116}Sn$	2pF	-0.004(6)	0.025(6)	-0.013(2)		0.84 - 1.75	Li72b	7

TABLE II. Differences in Charge-Density-Distribution Parameters between Isotopes

See page 500 for Explanation of Tables

Isotope pair	model	$\Delta\langle r^2\rangle^{1/2}$ [fm]	Δc [fm]	Δz [fm]	Δw	q-range [fm^{-1}]	ref.	remarks
$^{124-116}Sn$	2pF	0.015(7)	0.069(7)	-0.020(7)		0.84 - 1.75	Li72b	7
$^{124-118}Sn$	2pF	0.019(8)	0.045(9)	-0.007(3)		0.84 - 1.75	Li72b	7
$^{146-142}Nd$	2pF	-0.10				0.24 - 0.59	Ca73	9
	2pF	0.0527(36)	0.018(26)	0.025(11)		0.22 - 0.73	Ma74	10
$^{150-142}Nd$	2pF	0.08				0.24 - 0.59	Ca73	9
	2pF	0.115(5)	0.078(27)	0.041(14)		0.22 - 0.73	Ma74	10
$^{150-146}Nd$	2pF	0.067(4)	0.046(27)	0.023(14)		0.22 - 0.73	Ma74	10
$^{150-148}Sm$	2pF	0.03(7)				0.25 - 0.59	Ca73	
$^{152-148}Sm$	2pF	0.17(7)				0.25 - 0.59	Ca73	
	FB	0.12(2)				0.33 - 2.18	Ho80	
$^{154-152}Sm$	FB	0.03(2)				0.33 - 2.18	Ho80	
$^{207-206}Pb$*	2pF	0.005(7)	0.008(16)	0.001(4)		0.22 - 0.88	Ja73	
$^{208-206}Pb$*	2pF	0.013(4)	0.010(9)	0.0039(25)		0.22 - 0.88	Ja73	
$^{208-207}Pb$*	2pF	0.008(7)	0.001(15)	0.005(4)		0.22 - 0.88	Ja73	

***) Additional information can be found in the following references:**

13 - ^{12}C : Cr67
17 - ^{16}O : No82
18 - ^{16}O : La61, No82
48 - ^{40}Ca : Em83a
56 - ^{54}Fe : Li71b
60 - ^{58}Ni : Ha57, Ke77
65 - ^{63}Cu : Ke77
66 - ^{64}Zn : Ne72
68 - ^{66}Zn : Li73
205 - ^{203}Tl : Eu78
208 - ^{206}Pb : Eu78
208 - ^{207}Pb : Eu78
207 - ^{206}Pb : Pe65, Eu78

Remarks

1) Analysis performed in Plane Wave Born Approximation.
2) No correction applied for scattering from the C2 or higher charge multipole moments.
3) No correction applied for the magnetic contribution to the elastic scattering.
4) The scattering from the C2 and the C4 distribution has been subtracted.
5) Analysis performed in the Modified Born Approximation. The parameters obtained for the Uniform Gaussian model were $\Delta r = 0.03(2)$ fm and $\Delta g = -0.07(4)$ fm.
6) The value of Δz was fixed in the analysis.
7) Analysis performed in the High Energy Approximation (Pe66).
8) Data analyzed simultaneously with muonic X-ray data.
9) Reanalysis of the data presented in ref. Ma71.
10) Data analyzed simultaneously with K_α X-ray data.

TABLE III. Differences in Charge-Density-Distribution Parameters between Neighboring Nuclei (Not Isotopes)

See page 500 for Explanation of Tables

Nucleus pair	model	$\Delta\langle r^2\rangle^{1/2}$ [fm]	Δc [fm]	Δz [fm]	Δw	q-range [fm^{-1}]	ref.	remarks
^{14}N - ^{12}C	FB	0.098(19)				0.26 - 0.55	Be71b	
^{16}O - ^{12}C	FB	0.271(22)				0.26 - 0.55	Be71b	
^{16}O - ^{14}N	HO	0.166(19)				0.29 - 0.48	Sc75	
^{20}Ne- ^{16}O	2pF	0.279(20)				0.22 - 0.48	Fr72a	
^{46}Ti- ^{45}Sc	2pF	0.04(5)	0.06(8)	0.0		0.29 - 0.59	Th70	1
^{48}Ti- ^{40}Ca	3pF	0.097	0.179	-0.022	0.026	0.42 - 1.79	Fr68	
^{50}Cr- ^{48}Ti	2pF	-0.009(12)	0.104(10)	-0.0357(32)		1.03 - 1.62	Sh78c	
^{51}V - ^{50}Ti	2pF	0.06(5)	0.10(8)	0.0		0.29 - 0.59	Th70	1
^{54}Fe- ^{54}Cr	2pF	-0.002(12)	0.069(28)	-0.025(16)		0.15 - 0.74	La76	
	2pF	-0.058(12)	0.051(8)	-0.0448(27)		0.97 - 1.62	Sh78b	
^{56}Fe- ^{50}Cr	2pF	0.081(12)	0.153(8)	-0.0093(27)		0.97 - 1.62	Sh78b	2
^{56}Fe- ^{54}Cr	2pF	0.014(12)	0.085(9)	-0.0200(27)		0.97 - 1.62	Sh78b	2
^{59}Co- ^{58}Fe	FB	0.0120(23)				0.51 - 2.22	Sc77	3
^{58}Ni- ^{54}Fe	2pF	0.050(8)	0.064(8)	0.002(3)		1.02 - 1.77	Li71b	2
^{58}Ni- ^{56}Fe*	2pF	-0.022(13)	0.107(14)	-0.046(4)		1.02 - 1.98	Li71b	2
	FB	0.0386(10)				0.51 - 2.22	Wo80	3
^{58}Ni- ^{58}Fe	2pF	-0.026(12)	0.005(14)	-0.016(4)		1.02 - 1.77	Li71b	2
^{60}Ni- ^{58}Fe	FB	0.0382(23)				0.51 - 2.22	Wo80	3
^{60}Ni- ^{59}Co	2pF	0.019(7)	0.042(6)	0.0009(23)		0.96 - 1.61	Sh78a	
	FB	0.0252(23)				0.51 - 2.22	Sc77	3
^{63}Cu- ^{62}Ni	FB	0.0419(7)				0.51 - 2.22	Sc77	3
^{65}Cu- ^{60}Ni	2pF	0.097(15)	0.093(11)	0.016(4)		0.96 - 1.61	Sh78a	2
^{65}Cu- ^{64}Ni	FB	0.0440(20)				0.51 - 2.22	Sc77	3
^{64}Zn- ^{60}Ni	2pF	0.132(20)	0.033(20)	0.052(5)		0.98 - 1.61	Li72a	2
	FB	0.0893(12)				0.51 - 2.22	Wo80	3
^{64}Zn- ^{62}Ni	2pF	0.094(7)	0.024(14)	0.041(8)		0.15 - 0.79	Ke77	
	FB	0.0893(12)				0.51 - 2.22	Wo80	3
^{64}Zn- ^{63}Cu	2pF	-0.024(11)	0.168(22)	-0.063(11)		0.15 - 0.79	Ke77	
	FB	0.0473(7)				0.51 - 2.22	Sc77	3
^{66}Zn- ^{60}Ni	2pF	0.157(20)	0.082(19)	0.049(4)		0.98 - 1.61	Li72a	2
^{66}Zn- ^{64}Ni	FB	0.0938(50)				0.51 - 2.22	Wo80	3
^{66}Zn- ^{65}Cu	FB	0.0497(20)				0.51 - 2.22	Sc77	3
^{90}Zr- ^{88}Sr	2pF	0.046(12)	0.030(23)	0.014(7)		0.24 - 1.08	Si73c	4
	3pG	0.050(4)	0.091(18)	0.043(4)	-0.074(27)	0.51 - 2.05	Sc74	
	FB	0.055(7)				0.51 - 2.05	Sc74	

TABLE III. Differences in Charge-Density-Distribution Parameters between Neighboring Nuclei (Not Isotopes)
See page 500 for Explanation of Tables

Nucleus pair	model	$\Delta\langle r^2\rangle^{1/2}$ [fm]	Δc [fm]	Δz [fm]	Δw	q-range [fm^{-1}]	ref.	remarks
^{92}Mo- ^{90}Zr	3pG	0.054(22)	0.04(5)	0.01(3)	0.07(5)	0.64 - 1.86	Ph72	
	FB	0.050(5)				0.56 - 1.96	Dr75	
^{204}Pb-^{203}Tl*	FB	0.015(12)				0.51 - 1.49	Eu78	
^{206}Pb-^{205}Tl*	FB	0.029(12)				0.51 - 1.49	Eu78	
^{209}Bi-^{208}Pb*	3pG	0.021(2)	0.029	-0.007	0.026	0.7 - 2.8	Si73b	3,5
	FB	0.021(12)				0.51 - 1.49	Eu78	

*) **Additional information can be found in the following references:**

^{40}Ca - ^{40}Ar : We74
^{40}Ca - ^{39}K : Si73a
^{58}Ni - ^{56}Fe : Ha57
^{204}Pb - ^{203}Tl : Eu76a
^{206}Pb - ^{205}Tl : Eu76a
^{209}Bi - ^{208}Pb : Eu77b

Remarks

1) The value of Δz was fixed in the analysis.
2) Analysis performed in the High Energy Approximation (Pe66).
3) Data analyzed simultaneously with muonic X-ray data.
4) Only statistical errors are quoted.
5) The difference in the 0.8th moment of the charge distributions from muonic X-ray data was used as a constraint. A slightly better fit to the data was obtained by adding a $1h_{9/2}$ shell-model wave function to the 3pG distribution for ^{209}Bi.

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{3}H	^{3}He	^{12}C	^{12}C	^{15}N
rms [fm]	1.68(3)	1.877(19)	2.472(15)	2.464(12)	2.611(9)
a1	0.25182e-1	0.20020e-1	0.15721e-1	0.15737e-1	0.25491e-1
a2	0.34215e-1	0.41934e-1	0.38732e-1	0.38897e-1	0.50618e-1
a3	0.15257e-1	0.36254e-1	0.36808e-1	0.37085e-1	0.29822e-1
a4		0.17941e-1	0.14671e-1	0.14795e-1	-0.55196e-2
a5		0.46608e-2	-0.43277e-2	-0.44831e-2	-0.15913e-1
a6		0.46834e-2	-0.97752e-2	-0.10057e-1	-0.76184e-2
a7		0.52042e-2	-0.68908e-2	-0.68696e-2	-0.23992e-2
a8		0.38280e-2	-0.27631e-2	-0.28813e-2	-0.47940e-3
a9		0.25661e-2	-0.63568e-3	-0.77229e-3	
a10		0.14182e-2	0.71809e-4	0.66908e-4	
a11		0.61390e-3	0.18441e-3	0.10636e-3	
a12		0.22929e-3	0.75066e-4	-0.36864e-4	
a13			0.51069e-4	-0.50135e-5	
a14			0.14308e-4	0.94550e-5	
a15			0.23170e-5	-0.47687e-5	
a16			0.68465e-6		
a17					
ref.	Be84	Re84b	Ca80	Re82	Vr86
q-range [fm^{-1}]	0.51- 2.83	0.18-10.10	0.10- 4.01	0.25- 2.75	0.22- 3.17
data-sets	Co65,Be82,Be84	Co65,MC77,Sz77, Ar78,Du83,Re84b	Si70b,Ja71,Ca80	Re82	Sc75,Vr86
R [fm]	3.5	5.0	8.0	8.0	7.0

nucleus	^{16}O	^{27}Al	^{28}Si	^{29}Si	^{30}Si
rms [fm]	2.737(8)	3.035(2)	3.085(17)	3.080(17)	3.173(25)
a1	0.20238e-1	0.43418e-1	0.33495e-1	0.33521e-1	0.28397e-1
a2	0.44793e-1	0.60298e-1	0.59533e-1	0.59679e-1	0.54163e-1
a3	0.33533e-1	0.28950e-2	0.20979e-1	0.20593e-1	0.25167e-1
a4	0.35030e-2	-0.23522e-1	-0.16900e-1	-0.18646e-1	-0.12858e-1
a5	-0.12293e-1	-0.79791e-2	-0.14998e-1	-0.16550e-1	-0.17592e-1
a6	-0.10329e-1	0.23010e-2	-0.93248e-3	-0.11922e-2	-0.46722e-2
a7	-0.34036e-2	0.10794e-2	0.33266e-2	0.28025e-2	0.24804e-2
a8	-0.41627e-3	0.12574e-3	0.59244e-3	-0.67353e-4	0.14760e-2
a9	-0.94435e-3	-0.13021e-3	-0.40013e-3	-0.34619e-3	-0.30168e-3
a10	-0.25771e-3	0.56563e-4	0.12242e-3	0.17611e-3	0.48346e-4
a11	0.23759e-3	-0.18011e-4	-0.12994e-4	-0.57173e-5	0.00000e0
a12	-0.10603e-3	0.42869e-5	-0.92784e-5	0.12371e-4	-0.51570e-5
a13	0.41480e-4		0.72595e-5		0.30261e-5
a14			-0.42096e-5		
a15					
a16					
a17					
ref.	La82	Ro86	Mi82	Mi82	Mi82
q-range [fm^{-1}]	0.29- 2.77	0.47-2.70	0.25- 2.64	0.25- 2.64	0.25- 2.64
data-sets	La82	Ro86	Mi82	Mi82	Mi82
R [fm]	8.0	7.0	8.0	8.0	8.5

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{31}P	^{32}S	^{34}S	^{36}S	^{40}Ar
rms [fm]	3.187(10)	3.248(4)	3.281(4)	3.278(6)	3.423(14)
a1	0.35305e-1	0.37251e-1	0.37036e-1	0.37032e-1	0.30451e-1
a2	0.59642e-1	0.60248e-1	0.58506e-1	0.57939e-1	0.55337e-1
a3	0.17274e-1	0.14748e-1	0.12082e-1	0.10049e-1	0.20203e-1
a4	-0.19303e-1	-0.18352e-1	-0.19022e-1	-0.19852e-1	-0.16765e-1
a5	-0.13545e-1	-0.10347e-1	-0.83421e-2	-0.67176e-2	-0.13578e-1
a6	0.63209e-3	0.30461e-2	0.45434e-2	0.61882e-2	-0.43204e-4
a7	0.35462e-2	0.35277e-2	0.28346e-2	0.37795e-2	0.91988e-3
a8	0.83653e-3	-0.39834e-4	-0.52304e-3	-0.55272e-3	-0.41205e-3
a9	-0.47904e-3	-0.97177e-4	0.27754e-4	-0.12904e-3	0.11971e-3
a10	0.19099e-3	0.92279e-4	0.59403e-4	0.15845e-3	-0.19801e-4
a11	-0.69611e-4	-0.51931e-4	-0.42794e-4	-0.84063e-4	-0.43204e-5
a12	0.23196e-4	0.22958e-4	0.20407e-4	0.34010e-4	0.61205e-5
a13	-0.77780e-5	-0.86609e-5	-0.79934e-5	-0.11663e-4	-0.37803e-5
a14		0.28879e-5	0.27354e-5	0.35204e-5	0.18001e-5
a15		-0.86632e-6	-0.83914e-6	-0.95135e-6	-0.77407e-6
a16					
a17					
ref.	Mi82	Ry83b	Ry83b	Ry83b	Ot82
q-range [fm^{-1}]	0.25- 2.64	0.47- 2.56	0.47- 2.56	0.47- 2.56	0.29- 1.81
data-sets	Me76,Mi82	Ry83b	Ry83b	Ry83b	Ot82
R [fm]	8.0	8.0	8.0	8.0	9.0

nucleus	^{40}Ca	^{48}Ca	^{48}Ti	^{50}Ti	^{50}Cr
rms [fm]	3.450(10)	3.451(9)	3.597(1)	3.572(2)	3.662(4)
a1	0.44846e-1	0.44782e-1	0.27850e-1	0.31818e-1	0.39174e-1
a2	0.61326e-1	0.59523e-1	0.55432e-1	0.58556e-1	0.61822e-1
a3	-0.16818e-2	-0.74148e-2	0.26369e-1	0.19637e-1	0.68550e-2
a4	-0.26217e-1	-0.29466e-1	-0.17091e-1	-0.24309e-1	-0.30170e-1
a5	-0.29725e-2	-0.28350e-3	-0.21798e-1	-0.18748e-1	-0.98745e-2
a6	0.85534e-2	0.10829e-1	-0.24889e-2	0.33741e-2	0.87944e-2
a7	0.35322e-2	0.30465e-2	0.76631e-2	0.89961e-2	0.68502e-2
a8	-0.48258e-3	-0.10237e-2	0.34554e-2	0.37954e-2	-0.93609e-3
a9	-0.39346e-3	-0.17830e-3	-0.67477e-3	-0.41238e-3	-0.24962e-2
a10	0.20338e-3	0.55391e-4	0.10764e-3	0.12540e-3	-0.15361e-2
a11	0.25461e-4	-0.22644e-4	-0.16564e-5		-0.73687e-3
a12	-0.17794e-4	0.82671e-5	-0.55566e-5		
a13	0.67394e-5	-0.27343e-5			
a14	-0.21033e-5	0.82461e-6			
a15		-0.22780e-6			
a16					
a17					
ref.	Em83b	Em83b	Se85	Se85	Li83c
q-range [fm^{-1}]	0.35- 3.55	0.35- 3.55	0.61- 2.20	0.61- 2.20	0.15- 2.59
data-sets	Si79,Em83b	Em83b	Se85	Se85	La76,Li83c μ
R [fm]	8.0	8.0	10.0	9.5	9.0

TABLE IV. Fourier–Bessel Coefficients
See page 500 for Explanation of Tables

nucleus	^{52}Cr	^{54}Cr	^{54}Fe	^{56}Fe	^{58}Fe
rms [fm]	3.643(3)	3.689(4)	3.663(25)	3.714(24)	3.746(25)
a1	0.39287e-1	0.39002e-1	0.42339e-1	0.42018e-1	0.41791e-1
a2	0.62477e-1	0.60305e-1	0.64428e-1	0.62337e-1	0.60524e-1
a3	0.62482e-2	0.45845e-2	0.15840e-2	0.23995e-3	-0.14978e-2
a4	-0.32885e-1	-0.30723e-1	-0.35171e-1	-0.32776e-1	-0.31183e-1
a5	-0.10648e-1	-0.91355e-2	-0.10116e-1	-0.79941e-2	-0.58013e-2
a6	0.10520e-1	0.93251e-2	0.12069e-1	0.10844e-1	0.10611e-1
a7	0.85478e-2	0.60583e-2	0.62230e-2	0.49123e-2	0.41629e-2
a8	-0.24003e-3	-0.15602e-2	-0.12045e-2	-0.22144e-2	-0.29045e-5
a9	-0.20499e-2	-0.76809e-3	0.13561e-3	-0.18146e-3	0.54106e-3
a10	-0.12001e-2	0.76809e-3	0.10428e-4	0.37261e-3	-0.38689e-3
a11	-0.56649e-3	-0.34804e-3	-0.16980e-4	-0.23296e-3	0.20514e-3
a12			0.91817e-5	0.11494e-3	-0.95237e-4
a13			-0.39988e-5	-0.50596e-4	0.40707e-4
a14			0.15731e-5	0.20652e-4	-0.16346e-4
a15			-0.57862e-6	-0.79428e-5	0.62233e-5
a16			0.20186e-6	0.28986e-5	-0.22568e-5
a17			-0.67892e-7	-0.10075e-5	0.78077e-6
ref.	Li83c	Li83c	Wo76	Wo76	Wo76
q-range [fm^{-1}]	0.15- 2.59	0.15- 2.59	0.51- 2.22	0.51- 2.22	0.51- 2.22
data-sets	La76,Li83c μ	La76,Li83c μ	Wo76	Wo76	Wo76
R [fm]	9.0	9.0	9.0	9.0	9.0

nucleus	^{59}Co	^{58}Ni	^{58}Ni	^{60}Ni	^{60}Ni
rms [fm]	3.788(5)	3.769(13)	3.742(24)	3.797(13)	3.764(24)
a1	0.43133e-1	0.44880e-1	0.45030e-1	0.44668e-1	0.44855e-1
a2	0.61249e-1	0.64756e-1	0.65044e-1	0.63072e-1	0.63476e-1
a3	-0.32523e-2	-0.27899e-2	-0.32843e-2	-0.42797e-2	-0.51001e-2
a4	-0.32681e-1	-0.37016e-1	-0.36241e-1	-0.34806e-1	-0.34496e-1
a5	-0.49583e-2	-0.71915e-2	-0.67442e-2	-0.48625e-2	-0.43132e-2
a6	0.11494e-1	0.13594e-1	0.13146e-1	0.12794e-1	0.12767e-1
a7	0.55428e-2	0.66331e-2	0.50903e-2	0.54401e-2	0.49935e-2
a8	0.31398e-3	-0.14095e-2	-0.20787e-2	-0.14075e-2	-0.92940e-3
a9	-0.70578e-4	-0.10141e-2	0.12901e-3	-0.76976e-3	0.28281e-3
a10	0.53725e-5	0.38616e-3	0.14828e-3	0.33487e-3	-0.76557e-4
a11	-0.74650e-6	-0.13871e-3	-0.11530e-3	-0.13141e-3	0.18677e-4
a12	0.19793e-5	0.47788e-4	0.60881e-4	0.52132e-4	0.36855e-5
a13	-0.28059e-5	-0.15295e-4	-0.27676e-4	-0.20394e-4	-0.32276e-6
a14	0.27183e-5	0.59131e-5	0.11506e-4	0.59131e-5	0.19843e-6
a15	-0.19454e-5	-0.67880e-5	0.44764e-5	-0.67880e-5	0.16275e-6
a16	0.10963e-5		0.16468e-5		-0.82891e-7
a17	-0.51114e-6		-0.57496e-6		-0.34896e-7
ref.	Sc77	Be83	Wo76	Be83	Wo76
q-range [fm^{-1}]	0.51- 2.22	0.25- 2.65	0.51- 2.22	0.25- 2.65	0.51- 2.22
data-sets	Sc77 μ	Be83	Wo76	Be83	Wo76
R [fm]	9.0	9.0	9.0	9.0	9.0

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{60}Ni	^{62}Ni	^{64}Ni	^{63}Cu	^{65}Cu
rms [fm]	3.782(24)	3.802(24)	3.821(24)	3.885(5)	3.905(5)
a1	0.44742e-1	0.44581e-1	0.44429e-1	0.45598e-1	0.45444e-1
a2	0.62987e-1	0.61478e-1	0.60116e-1	0.60706e-1	0.59544e-1
a3	-0.49864e-2	-0.69425e-2	-0.92003e-2	-0.78616e-2	-0.94968e-2
a4	-0.34306e-1	-0.33126e-1	-0.33452e-1	-0.31638e-1	-0.31561e-1
a5	-0.44060e-2	-0.24964e-2	-0.52856e-3	-0.14447e-2	0.22898e-3
a6	0.12810e-1	0.12674e-1	0.13156e-1	0.10953e-1	0.11189e-1
a7	0.46914e-2	0.37148e-2	0.35152e-2	0.42578e-2	0.37360e-2
a8	-0.84373e-3	-0.20881e-2	-0.21671e-2	-0.24224e-3	-0.64873e-3
a9	0.36928e-3	0.30193e-3	0.46497e-4	-0.30067e-3	-0.51133e-3
a10	-0.15003e-3	0.57573e-4	0.25366e-3	0.23903e-3	0.43765e-3
a11	0.59665e-4	-0.77965e-4	-0.18438e-2	-0.12910e-3	-0.24276e-3
a12	-0.23215e-4	0.46906e-4	0.96874e-4	0.60195e-4	0.11507e-3
a13	0.88005e-5	-0.22724e-4	-0.44224e-4	-0.25755e-4	-0.49761e-4
a14	-0.32305e-5	0.98243e-5	0.18493e-4	0.10332e-4	0.20140e-4
a15	0.11496e-5	-0.39250e-5	-0.72361e-5	-0.39330e-5	-0.76945e-5
a16	-0.39658e-6	0.14732e-5	0.26740e-5	0.14254e-5	0.28055e-5
a17	0.13145e-6	0.52344e-6	-0.93929e-6	-0.49221e-6	-0.97411e-6
ref.	Wo80	Wo76	Wo76	Sc77	Sc77
q-range [fm^{-1}]	0.51- 2.22	0.51- 2.22	0.51- 2.22	0.51- 2.22	0.51- 2.22
data-sets	Wo80	Wo76	Wo76	Sc77 μ	Sc77 μ
R [fm]	9.0	9.0	9.0	9.0	9.0

nucleus	^{64}Zn	^{66}Zn	^{68}Zn	^{70}Zn	^{70}Ge
rms [fm]	3.899(23)	3.903(25)	3.948(24)	3.987(31)	4.043(2)
a1	0.47038e-1	0.46991e-1	0.46654e-1	0.46362e-1	0.38182e-1
a2	0.61536e-1	0.60995e-1	0.58827e-1	0.57130e-1	0.60306e-1
a3	-0.90045e-2	-0.96693e-2	-0.12283e-1	-0.13877e-1	0.64346e-2
a4	-0.30669e-1	-0.30457e-1	-0.29865e-1	-0.30030e-1	-0.29427e-1
a5	-0.78705e-3	-0.53435e-3	0.25669e-2	0.35341e-2	-0.95888e-2
a6	0.10034e-1	0.97083e-2	0.10235e-1	0.10113e-1	0.87849e-2
a7	0.14053e-2	0.14091e-2	0.31861e-2	0.41029e-2	0.49187e-2
a8	-0.20640e-2	-0.70813e-3	-0.17351e-3	0.76469e-3	-0.15189e-2
a9	0.35105e-3	0.20809e-3	-0.42979e-3	-0.10138e-2	-0.17385e-2
a10	0.27303e-4	-0.48275e-4	0.33700e-3	0.60837e-3	-0.16794e-3
a11	-0.63811e-4	0.72680e-5	-0.18435e-3	-0.29929e-3	-0.11746e-3
a12	0.40893e-4	0.91369e-6	0.87043e-4	0.13329e-3	0.65768e-4
a13	-0.20311e-4	-0.14874e-5	-0.37612e-4	-0.55502e-4	-0.30691e-4
a14	0.88986e-5	0.88831e-6	0.15220e-4	0.21893e-4	0.13051e-5
a15	-0.35849e-5	-0.41689e-6	-0.58282e-5	-0.82286e-5	-0.52251e-5
a16	0.13522e-5	0.17283e-6	0.21230e-5	0.29559e-5	
a17	-0.38635e-6	-0.65968e-7	-0.73709e-6	-0.10148e-5	
ref.	Wo76	Wo76	Wo76	Wo76	Ma84
q-range [fm^{-1}]	0.51- 2.22	0.51- 2.22	0.51- 2.22	0.51- 2.22	0.35- 2.90
data-sets	Wo76	Wo76	Wo76	Wo76	Ma84 μ
R [fm]	9.0	9.0	9.0	9.0	10.0

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{72}Ge	^{74}Ge	^{76}Ge	^{88}Sr	^{90}Zr
rms [fm]	4.060(2)	4.075(2)	4.081(2)	4.197(6)	4.258(8)
a1	0.38083e-1	0.37989e-1	0.37951e-1	0.56435e-1	0.46188e-1
a2	0.59342e-1	0.58298e-1	0.57876e-1	0.55072e-1	0.61795e-1
a3	0.47718e-2	0.27406e-2	0.15303e-2	-0.33363e-1	-0.12315e-1
a4	-0.29953e-1	-0.30666e-1	-0.31822e-1	-0.26061e-1	-0.36915e-1
a5	-0.88476e-2	-0.81505e-2	-0.76875e-2	0.15749e-1	0.25175e-2
a6	0.96205e-2	0.10231e-1	0.11237e-1	0.75233e-2	0.15234e-1
a7	0.47901e-2	0.49382e-2	0.50780e-2	-0.55044e-2	-0.55146e-3
a8	-0.16869e-2	-0.16270e-2	-0.17293e-2	-0.23643e-2	-0.60631e-2
a9	-0.15406e-2	-0.13937e-2	-0.15523e-2	0.39362e-3	-0.12198e-2
a10	-0.97230e-4	0.15476e-3	0.72439e-4	-0.22733e-3	0.36200e-3
a11	-0.47640e-4	0.14396e-3	0.16560e-3	0.12519e-3	-0.16466e-3
a12	-0.15669e-5	-0.73075e-4	-0.86631e-4	-0.61176e-4	0.53305e-4
a13	0.67076e-5	0.31998e-4	0.39159e-4	0.27243e-4	-0.50873e-5
a14	-0.44500e-5	-0.12822e-4	-0.16259e-4	-0.11285e-4	-0.85658e-5
a15	0.22158e-5	0.48406e-5	0.63681e-5	0.43997e-5	0.86095e-5
a16				-0.16248e-5	
a17				0.57053e-6	
ref.	Ma84	Ma84	Ma84	St76	Ro76
q-range [fm^{-1}]	0.35- 2.90	0.35- 2.90	0.35- 2.90	0.50- 2.50	0.50- 2.50
data-sets	Ma84 μ	Ma84 μ	Ma84 μ	Sc74,Sr76	Ro76
R [fm]	10.0	10.0	10.0	9.0	10.0

nucleus	^{92}Zr	^{94}Zr	^{92}Mo	^{94}Mo	^{96}Mo
rms [fm]	4.295(11)	4.315(10)	4.294(16)	4.333(16)	4.364(16)
a1	0.45939e-1	0.45798e-1	0.30782e-1	0.30661e-1	0.30564e-1
a2	0.60104e-1	0.59245e-1	0.59896e-1	0.58828e-1	0.58013e-1
a3	-0.13341e-1	-0.13389e-1	0.22016e-1	0.20396e-1	0.19255e-1
a4	-0.35106e-1	-0.33252e-1	-0.28945e-1	-0.28830e-1	-0.28372e-1
a5	0.31760e-2	0.39888e-2	-0.26707e-1	-0.25077e-1	-0.23304e-1
a6	0.13753e-1	0.12750e-1	0.40426e-2	0.44768e-2	0.49894e-2
a7	-0.82682e-3	-0.15793e-2	0.14429e-1	0.13127e-1	0.12126e-1
a8	-0.53001e-2	-0.56692e-2	0.31696e-2	0.19548e-2	0.10496e-2
a9	-0.97579e-3	-0.15698e-2	-0.63061e-2	-0.61403e-2	-0.62592e-2
a10	0.26489e-3	0.54394e-4	-0.45119e-2	-0.35825e-2	-0.32814e-2
a11	-0.15873e-3	-0.24032e-4	0.46236e-3	0.73790e-3	0.89668e-3
a12	0.69301e-4	0.38401e-4	0.94909e-3	0.61882e-3	0.50636e-3
a13	-0.22278e-4	-0.31690e-4	-0.38930e-3	-0.40556e-3	-0.43412e-3
a14	0.39533e-5	0.18481e-4	-0.14808e-3	-0.55748e-5	0.71531e-4
a15	0.10609e-5	-0.85367e-5	0.19622e-3	-0.12453e-3	0.76745e-4
a16			-0.40197e-4	-0.57812e-4	-0.54316e-4
a17			-0.71949e-4	-0.21657e-4	0.23386e-6
ref.	Ro76	Ro76	Dr75	Dr75	Dr75
q-range [fm^{-1}]	0.50- 2.50	0.50- 2.50	0.56- 1.96	0.56- 1.96	0.56- 1.96
data-sets	Ro76	Ro76	Dr75	Dr75	Dr75
R [fm]	10.0	10.0	12.0	12.0	12.0

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{98}Mo	^{100}Mo	^{104}Pd	^{106}Pd	^{108}Pd
rms [fm]	4.388(16)	4.430(16)	4.437(10)	4.467(11)	4.524(10)
a1	0.30483e-1	0.30353e-1	0.41210e-1	0.41056e-1	0.40754e-1
a2	0.57207e-1	0.56087e-1	0.62846e-1	0.61757e-1	0.59460e-1
a3	0.17888e-1	0.16057e-1	-0.21202e-2	-0.29891e-2	-0.54077e-2
a4	-0.28388e-1	-0.28767e-1	-0.38359e-1	-0.37356e-1	-0.36305e-1
a5	-0.21778e-1	-0.20683e-1	-0.44693e-2	-0.35348e-2	-0.21987e-2
a6	0.56780e-2	0.62429e-2	0.16656e-1	0.16085e-1	0.15418e-1
a7	0.11236e-1	0.11058e-1	0.36873e-2	0.28502e-2	0.25927e-2
a8	0.82176e-3	0.11502e-2	-0.57534e-2	-0.55764e-2	-0.52781e-2
a9	-0.50390e-2	-0.39395e-2	-0.32499e-2	-0.15433e-2	-0.19757e-2
a10	-0.23877e-2	-0.14978e-2	0.69844e-3	0.22281e-2	0.10339e-2
a11	0.71492e-3	0.76350e-3	0.16304e-2	0.13160e-2	0.22891e-3
a12	0.29839e-3	0.10554e-3	0.59882e-3	0.16508e-4	-0.33464e-3
a13	-0.31408e-3	-0.25658e-3			
a14	0.80177e-3	0.10964e-3			
a15	0.43682e-4	0.10015e-4			
a16	-0.51394e-4	-0.40341e-4			
a17	0.22293e-4	0.25744e-4			
ref.	Dr75	Dr75	La86	La86	La86
q-range [fm^{-1}]	0.56- 1.96	0.56- 1.96	0.29- 2.38	0.29- 2.38	0.29- 2.38
data-sets	Dr75	Dr75	La86	La86	La86
R [fm]	12.0	12.0	11.0	11.0	11.0

nucleus	^{110}Pd	^{144}Sm	^{148}Sm	^{148}Sm	^{150}Sm
rms [fm]	4.540(10)	4.943(9)	4.977(8)	5.002(6)	5.042(6)
a1	0.40668e-1	0.74734e-1	0.70491e-1	0.73859e-1	0.73338e-1
a2	0.58793e-1	0.26145e-1	0.32601e-1	0.24023e-1	0.24626e-1
a3	-0.61375e-2	-0.63832e-1	-0.55421e-1	-0.59437e-1	-0.52773e-1
a4	-0.35983e-1	0.10432e-1	0.50111e-2	0.10761e-1	0.10582e-1
a5	-0.17447e-2	0.19183e-1	0.20216e-1	0.17022e-1	0.15353e-1
a6	0.14998e-1	-0.12572e-1	-0.85944e-2	-0.11401e-1	-0.95624e-2
a7	0.19994e-2	-0.39707e-2	-0.40106e-2	-0.18102e-2	-0.18804e-2
a8	-0.53170e-2	-0.18703e-2	0.19303e-2	0.93011e-3	-0.79019e-3
a9	-0.14289e-2	0.12602e-2	-0.49689e-3	0.98012e-3	0.10102e-2
a10	0.16033e-2	-0.11902e-2	-0.17040e-3	-0.12601e-2	-0.26606e-2
a11	0.31574e-3	-0.15703e-2		-0.17402e-2	-0.18304e-2
a12	-0.42195e-3				
a13					
a14					
a15					
a16					
a17					
ref.	La86	Mo81	Ho80	Mo81	Mo81
q-range [fm^{-1}]	0.29- 2.40	0.60- 2.50	0.33- 2.18	0.60- 2.50	0.60- 2.50
data-sets	La86	Mo81 μ	Ho80	Mo81 μ	Mo81 μ
R [fm]	11.0	9.25	9.5	9.25	9.25

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{152}Sm	^{152}Sm	^{154}Sm	^{154}Gd	^{158}Gd
rms [fm]	5.099(8)	5.087(6)	5.126(8)	5.124	5.172(6)
a1	0.56097e-1	0.72646e-1	0.55859e-1	0.63832e-1	0.57217e-1
a2	0.45123e-1	0.21824e-1	0.44002e-1	0.36983e-1	0.43061e-1
a3	-0.40310e-1	-0.54112e-1	-0.40342e-1	-0.48193e-1	-0.41996e-1
a4	-0.18171e-1	0.98321e-2	-0.17989e-1	-0.51046e-2	-0.17203e-1
a5	0.20515e-1	0.16213e-1	0.19817e-1	0.19805e-1	0.19933e-1
a6	0.49023e-2	-0.65614e-2	0.51643e-2	-0.82574e-3	0.51060e-2
a7	-0.67674e-2	0.53611e-2	-0.60212e-2	-0.46942e-2	-0.73665e-2
a8	-0.18927e-2	-0.14103e-2	-0.23127e-2		-0.20926e-2
a9	0.15333e-2	-0.99022e-3	0.47024e-3		0.21883e-2
a10		-0.23005e-2			
a11					
a12					
a13					
a14					
a15					
a16					
a17					
ref.	Ho80	Mo81	Ho80	He82	Mu84
q-range [fm^{-1}]	0.33- 2.18	0.60- 2.50	0.33- 2.18	0.58- 2.17	0.36- 2.17
data-sets	Ho80	Mo81 μ	Ho80	He82	Mu84
R [fm]	10.5	9.25	10.5	10.0	10.5

nucleus	^{166}Er	^{174}Yb	^{175}Lu	^{192}Os	^{196}Pt
rms [fm]	5.227(20)	5.415(30)	5.366(30)	5.412(4)	5.383(20)
a1	0.54426e-1	0.54440e-1	0.55609e-1	0.59041e-1	0.50218e-1
a2	0.47165e-1	0.40034e-1	0.42243e-1	0.41498e-1	0.53722e-1
a3	-0.38654e-1	-0.45606e-1	-0.45028e-1	-0.49900e-1	-0.35015e-1
a4	-0.19672e-1	-0.20932e-1	-0.19491e-1	-0.10183e-1	-0.34588e-1
a5	0.22092e-1	0.20455e-1	0.22514e-1	0.29067e-1	0.23564e-1
a6	0.78708e-2	0.27061e-2	0.38982e-2	-0.57382e-2	0.14340e-1
a7	-0.53005e-2	-0.60489e-2	-0.72395e-2	-0.92348e-2	-0.13270e-1
a8	0.50005e-3	-0.15918e-3	0.31822e-3	0.36170e-2	-0.51212e-2
a9	0.52005e-3	0.11938e-2	-0.23866e-3	0.28736e-2	0.56088e-2
a10	-0.35003e-3			0.24194e-3	0.14890e-2
a11	0.12001e-3			-0.16766e-2	-0.10928e-2
a12				0.73610e-3	0.55662e-3
a13					-0.50557e-4
a14					-0.19708e-3
a15					0.24016e-3
a16					
a17					
ref.	Ca78	Sa79	Sa79	Re84	Bo83
q-range [fm^{-1}]	0.29- 2.28	0.32- 2.33	0.32- 2.33	0.60- 2.90	0.34- 2.28
data-sets	Co76,Cr77	Sa79	Sa79	Re84	Bo83
R [fm]	11.0	11.0	11.0	11.0	12.0

TABLE IV. Fourier–Bessel Coefficients

See page 500 for Explanation of Tables

nucleus	^{203}Tl	^{205}Tl	^{204}Pb	^{206}Pb	^{207}Pb
rms [fm]	5.463(5)	5.470(5)	5.479(2)	5.490(2)	5.497(2)
a1	0.51568e-1	0.51518e-1	0.52102e-1	0.52019e-1	0.51981e-1
a2	0.51562e-1	0.51165e-1	0.51786e-1	0.51190e-1	0.51059e-1
a3	-0.39299e-1	-0.39559e-1	-0.39188e-1	-0.39459e-1	-0.39447e-1
a4	-0.30826e-1	-0.30118e-1	-0.29242e-1	-0.28405e-1	-0.28428e-1
a5	0.27491e-1	0.27600e-1	0.28992e-1	0.28862e-1	0.28988e-1
a6	0.10795e-1	0.10412e-1	0.11040e-1	0.10685e-1	0.10329e-1
a7	-0.15922e-1	-0.15725e-1	-0.14591e-1	-0.14550e-1	-0.14029e-1
a8	-0.25527e-2	-0.26546e-2	-0.94917e-3	-0.13519e-2	-0.46728e-3
a9	0.58548e-2	0.70184e-2	0.71349e-2	0.77624e-2	0.67984e-2
a10	0.19324e-3	0.82116e-3	0.24780e-3	-0.41882e-4	0.56905e-3
a11	-0.17925e-3	-0.51805e-3	-0.61656e-3	-0.97010e-3	-0.50430e-3
a12	0.14307e-3	0.32560e-3	0.42335e-3	0.69611e-3	0.32796e-3
a13	-0.91669e-4	-0.18670e-3	-0.25250e-3	-0.42410e-3	-0.19157e-3
a14	0.53497e-4	0.10202e-3	0.14106e-3	0.23857e-3	0.10565e-3
a15	-0.29492e-4	-0.53857e-4	-0.75446e-4	-0.12828e-3	-0.56200e-4
a16	0.15625e-4	0.27672e-4	0.39143e-4	0.66663e-4	0.29020e-4
a17	-0.80141e-5	-0.13873e-4	-0.19760e-4	-0.33718e-4	-0.14621e-4
ref.	Eu78	Eu78	Eu78	Eu78	Eu78
q-range [fm^{-1}]	0.51- 2.24	0.51- 2.24	0.51- 2.24	0.51- 2.24	0.51- 2.24
data-sets	Eu78 μ	Eu78 μ	Eu78 μ	Eu78 μ	Eu78 μ
R [fm]	12.0	12.0	12.0	12.0	12.0

nucleus	^{208}Pb	^{208}Pb	^{209}Bi
rms [fm]	5.503(2)	5.499(1)	5.518(4)
a1	0.51936e-1	0.62732e-1	0.52448e-1
a2	0.50768e-1	0.38542e-1	0.50400e-1
a3	-0.39646e-1	-0.55105e-1	-0.41014e-1
a4	-0.28218e-1	-0.26990e-2	-0.27927e-1
a5	0.28916e-1	0.31016e-1	0.29587e-1
a6	0.98910e-2	-0.99486e-2	0.98017e-2
a7	-0.14388e-1	-0.93012e-2	-0.14930e-1
a8	-0.98262e-3	0.76653e-2	-0.31967e-3
a9	0.72578e-2	0.20885e-2	0.77252e-2
a10	0.82318e-3	-0.17840e-2	0.57533e-3
a11	-0.14823e-2	0.74876e-4	-0.82529e-3
a12	0.13245e-3	0.32278e-3	0.25728e-3
a13	-0.84345e-4	-0.11353e-3	-0.11043e-3
a14	0.48417e-4		0.51930e-4
a15	-0.26562e-4		-0.24767e-4
a16	0.14035e-4		0.11863e-4
a17	-0.71863e-5		-0.56554e-5
ref.	Eu78	Fr77b	Eu78
q-range [fm^{-1}]	0.51- 2.24	0.44- 3.70	0.51- 2.24
data-sets	Eu78 μ	He69,Ni69,Na71, Fr72b,Eu76a,Fr77a μ	Eu78 μ
R [fm]	12.0	11.0	12.0

TABLE V. Sum-of-Gaussians Parameters

See page 500 for Explanation of Tables

nucleus	^{3}H		^{3}He		^{4}He		^{12}C		^{16}O	
rms [fm]	1.76(4)		1.83(5)		1.676(8)		2.469(6)		2.711	
i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i
1	0.0	0.035952	0.0	0.000029	0.2	0.034724	0.0	0.016690	0.4	0.057056
2	0.2	0.027778	0.6	0.606482	0.6	0.430761	0.4	0.050325	1.1	0.195701
3	0.5	0.131291	1.0	0.066077	0.9	0.203166	1.0	0.128621	1.9	0.311188
4	0.8	0.221551	1.3	0.000023	1.4	0.192986	1.3	0.180515	2.2	0.224321
5	1.2	0.253691	1.8	0.204417	1.9	0.083866	1.7	0.219097	2.7	0.059946
6	1.6	0.072905	2.3	0.115236	2.3	0.033007	2.3	0.278416	3.3	0.135714
7	2.0	0.152243	2.7	0.000001	2.6	0.014201	2.7	0.058779	4.1	0.000024
8	2.5	0.051564	3.2	0.006974	3.1	0.000000	3.5	0.057817	4.6	0.013961
9	3.0	0.053023	4.1	0.000765	3.5	0.006860	4.3	0.007739	5.3	0.000007
10					4.2	0.000000	5.4	0.002001	5.6	0.000002
11					4.9	0.000438	6.7	0.000007	5.9	0.002096
12					5.2	0.000000			6.4	0.000002
ref.	Ju85		MC77		Si82		Si82		Si70b	
q-range [fm^{-1}]	0.55- 4.79		0.59- 4.47		0.14- 7.70		0.13-3.70		0.29- 3.97	
data-sets	Co65,Be84, Ju85		MC77		Fr67,Er68, MC77,Ar78 μ		Si70b,Ja72, Fe73b,Ca80 μ		Si70b,Sc75	
RP [fm]	0.80		1.10		1.00		1.20		1.30	

nucleus	^{24}Mg		^{28}Si		^{32}S		^{39}K		^{40}Ca	
rms [fm]	3.027		3.121		3.258		3.427		3.480(3)	
i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i
1	0.1	0.007372	0.4	0.033149	0.4	0.045356	0.4	0.043308	0.4	0.042870
2	0.6	0.061552	1.0	0.106452	1.1	0.067478	0.9	0.036283	1.2	0.056020
3	1.1	0.056984	1.9	0.206866	1.7	0.172560	1.7	0.110517	1.8	0.167853
4	1.5	0.035187	2.4	0.286391	2.5	0.324870	2.1	0.147676	2.7	0.317962
5	1.9	0.291692	3.2	0.250448	3.2	0.254889	2.6	0.189541	3.2	0.155450
6	2.6	0.228920	3.6	0.056944	4.0	0.101799	3.2	0.274173	3.6	0.161897
7	3.2	0.233532	4.1	0.016829	4.6	0.022166	3.7	0.117691	4.3	0.053763
8	4.1	0.074086	4.6	0.039630	5.0	0.002081	4.2	0.058273	4.6	0.032612
9	4.7	0.000002	5.1	0.000002	5.5	0.005616	4.7	0.000006	5.4	0.004803
10	5.2	0.010876	5.5	0.000938	6.3	0.000020	5.5	0.021380	6.3	0.004541
11	6.1	0.000002	6.0	0.000002	7.3	0.000020	5.9	0.000002	6.6	0.000015
12	7.0	0.000002	6.9	0.002366	7.7	0.003219	6.9	0.001145	8.1	0.002218
ref.	Li74		Li74		Li74		Si74		Si79	
q-range [fm^{-1}]	0.74- 3.64		0.74- 3.71		0.74- 3.71		0.64- 3.43		0.53- 3.56	
data-sets	Li74,Le76 μ		Li74 μ		Li74 μ		Si73a μ		Be67d,Fr68, Si73a,Si79 μ	
RP [fm]	1.25		1.30		1.35		1.45		1.45	

TABLE V. Sum-of-Gaussians Parameters

See page 500 for Explanation of Tables

nucleus	^{48}Ca		^{58}Ni		^{116}Sn		^{124}Sn		^{205}Tl	
rms [fm]	3.460		3.772(4)		4.627(1)		4.677(1)		5.479	
i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i	R_i	Q_i
1	0.6	0.063035	0.5	0.035228	0.1	0.005727	0.1	0.004877	0.6	0.007818
2	1.1	0.011672	1.4	0.065586	0.7	0.009643	0.7	0.010685	1.1	0.022853
3	1.7	0.064201	2.2	0.174552	1.3	0.038209	1.3	0.030309	2.1	0.000084
4	2.1	0.203813	3.0	0.199916	1.8	0.009466	1.8	0.015857	2.6	0.105635
5	2.9	0.259070	3.4	0.232360	2.3	0.096665	2.3	0.088927	3.1	0.022340
6	3.4	0.307899	3.9	0.118496	3.1	0.097840	3.1	0.091917	3.8	0.059933
7	4.3	0.080585	4.2	0.099325	3.8	0.269373	3.8	0.257379	4.4	0.235874
8	5.2	0.008498	4.6	0.029860	4.8	0.396671	4.8	0.401877	5.0	0.000004
9	5.7	0.000025	5.2	0.044912	5.5	0.026390	5.5	0.053646	5.7	0.460292
10	6.2	0.000005	5.9	0.000232	6.1	0.048157	6.1	0.043193	6.8	0.081621
11	6.5	0.000004	6.6	0.000002	7.1	0.001367	7.1	0.001319	7.2	0.002761
12	7.4	0.001210	7.9	0.000010	8.1	0.000509	8.1	0.000036	8.6	0.000803
ref.	Si74		Ca80b		Ca82a		Ca82a		Fr83	
q-range [fm^{-1}]	0.49- 3.37		0.58- 3.80		0.36- 3.60		0.36- 3.60		0.51- 2.99	
data-sets	Be67d,Fr68, Si73a μ		Fi70,Si75 μ		Fi72,Ca82a μ		Fi72,Ca82a μ		Eu78,Fr83 μ	
RP [fm]	1.45		1.45		1.60		1.60		1.70	

nucleus	^{206}Pb		^{208}Pb	
rms [fm]	5.490		5.503(2)	
i	R_i	Q_i	R_i	Q_i
1	0.6	0.010615	0.1	0.003845
2	1.1	0.021108	0.7	0.009724
3	2.1	0.000060	1.6	0.033093
4	2.6	0.102206	2.1	0.000120
5	3.1	0.023476	2.7	0.083107
6	3.8	0.065884	3.5	0.080869
7	4.4	0.226032	4.2	0.139957
8	5.0	0.000005	5.1	0.260892
9	5.7	0.459690	6.0	0.336013
10	6.8	0.086351	6.6	0.033637
11	7.2	0.004589	7.6	0.018729
12	8.6	0.000011	8.7	0.000020
ref.	Fr83		Fr77a	
q-range [fm^{-1}]	0.51- 2.99		0.44- 3.70	
data-sets	Eu78,Fr83 μ		He69,Ni69, Eu76a,Fr77a μ	
RP [fm]	1.70		1.70	

REFERENCES FOR TABLES

Af67 N.G. Afanas'ev, V.D. Kovalev, A.S. Omelaenko, G.A. Savitskii, V.M. Khvastunov and N.G. Shevchenko, Yad. Fiz. **5**, 318 (1967) (transl.: Sov. J. Nucl. Phys. **5**, 223 (1967))

Af70 V.D. Afanas'ev, N.G. Afanas'ev, I.S. Gul'karov, G.A. Savitskii, V.M. Khvastunov, N.G. Shevchenko and A.A. Khomich, Yad. Fiz. **10**, 33 (1969) (transl.: Sov. J. Nucl. Phys. **10**, 18 (1970))

Af71 V.D. Afanas'ev, N.G. Afanas'ev, V.M. Medyanik, G.A. Savitskii, V.M. Khvastunov and N.G. Shevchenko, Yad. Fiz. **12**, 673 (1970) (transl.: Sov. J. Nucl. Phys. **12**, 365 (1971))

Ak64 C.W. Akerlof, K. Berkelman, G. Rouse and M. Tigner, Phys. Rev. **135B**, 810 (1964)

Ak72 Yu.K. Akimov, K. Andert, Yu.M. Kazarinov, A.I. Kalinin, V.S. Kiselev, L.I. Lapidus, B.P. Osipenko, M.M. Petrov, V.N. Shuravin, A.N. Arvanov, G.U. Badalyan, Dzh.M. Beglaryan, V.I. Kovalenko, A.A. Markaryan, G.I. Melikov, Zh.V. Petrosyan, V.S. Pogosov, A.M. Chatrchyan, K. Borchea, A. Buce, D. Dorchoman and M. Petrascu, Zh. Eksp. Teor. Fiz. **62**, 1231 (1972) (transl.: Sov. Phys.-JETP **35**, 651 (1972))

Al66 W. Albrecht, H.J. Behrend, F.W. Brasse, W. Flauger, H. Hultschwig and K.G. Steffen, Phys. Rev. Lett. **17**, 1192 (1966)

Al67 W. Albrecht, H.J. Behrend, H. Dorner, W. Flauger and H. Hultschwig, Phys. Rev. Lett. **18**, 1014 (1967)

Al68 W. Albrecht, H.J. Behrend, H. Dorner, W. Flauger and H. Hultschwig, Phys. Lett. **26B**, 642 (1968)

Al73 J. Alster, B.F. Gibson, J.S. McCarthy, M.S. Weiss and R.M. Wright, Phys. Rev. **C7**, 1089 (1973)

Ar75 R.G. Arnold, B.T. Chertok, E.B. Dally, A. Grigorian, C.L. Jordan, W.P. Schütz, R. Zdarjo, F. Martin and B.A. Mecking, Phys. Rev. Lett. **35**, 776 (1975)

Ar78 R.G. Arnold, B.T. Chertok, S. Rock, W.P. Schütz, Z.M. Szalata, D. Day, J.S. McCarthy, F. Martin, B.A. Mecking, I. Sick and G. Tamas, Phys. Rev. Lett. **40**, 1429 (1978)

Av74 H. Averdung, Internal Report KPH 3/74, Mainz, 1974 (unpublished)

Ba66 W. Bartel, B. Dudelzak, H. Krehbiel, J.M. McElroy, U. Meyer-Berkhout, R.J. Morrison, H. Nguyen-Ngoc, W. Schmidt and G. Weber, Phys. Rev. Lett. **17**, 608 (1966)

Ba67a W. Bartel, B. Dudelzak, H.K. Krehbiel, J.M. McElroy, U. Meyer-Berkhout, R.J. Morrison, H. Nguyen-Ngoc, W. Schmidt and G. Weber, Phys. Lett. **25B**, 236 (1967)

Ba67b P. Barreau and J.B. Bellicard, Phys. Lett. **25B**, 470 (1967)

Ba70 W. Bartel, F.W. Büsser, W.R. Dix, R. Felst, D. Harms, H. Krehbiel, P.E. Kuhlmann, J. McElroy and G. Weber, Phys. Lett. **33B**, 245 (1970)

Ba72 W. Bartel, F.W. Büsser, W.R. Dix, R. Felst, D. Harms, H. Krehbiel, P.E. Kuhlmann, J. McElroy, J. Meyer and G. Weber, Phys. Lett. **39B**, 407 (1972)

Ba73 W. Bartel, F.W. Büsser, W.R. Dix, R. Felst, D. Harms, H. Krehbiel, P.E. Kuhlmann, J. McElroy, J. Meyer and G. Weber, Nucl. Phys. **B58**, 429 (1973)

Be60 J.B. Bellicard and P. Barreau, Nucl. Phys. **17**, 141 (1960)

Be62 J.B. Bellicard and P. Barreau, Nucl. Phys. **36**, 476 (1962)

Be63 K. Berkelman, M. Feldman, R.M. Littauer, G. Rouse and R.R. Wilson, Phys. Rev. **130**, 2061 (1963)

Be64a D. Benaksas, D. Drickey and D. Frèrejacque, Phys. Rev. Lett. **13**, 353 (1964)

Be64b J. Bellicard, P. Barreau and D. Blum, Nucl. Phys. **60**, 319 (1964)

Be65 M. Bernheim, Ph.D. thesis, University of Paris (Orsay LAL-1126), 1965 (unpublished)

Be67a H.J. Behrend, F.W. Brasse, J. Engler, H. Hultschwig, S. Galster, G. Hartwig, H. Schopper and E. Ganssauge, Nuovo Cimento **A48**, 140 (1967)

Be67b M. Bernheim, T. Stovall and D. Vinciguerra, Nucl. Phys. **A97**, 488 (1967)

Be67c H. Bentz, R. Engfer and W. Bühring, Nucl. Phys. **A101**, 527 (1967)

Be67d J.B. Bellicard, P. Bounin, R.F. Frosch, R. Hofstadter, J.S. McCarthy, F.J. Uhrhane, M.R. Yearian, B.C. Clark, R. Herman and D.G. Ravenhall, Phys. Rev. Lett. **19**, 527 (1967)

Be67e J.B. Bellicard and K.J. van Oostrum, Phys. Rev. Lett. **19**, 242 (1967)

Be68 C. Berger, E. Gersing, G. Knop, B. Langenbeck, K. Rith and F. Schuhmacher, Phys. Lett. **28B**, 276 (1968)

Be69 M. Bernheim, R. Riskalla, T. Stovall and D. Vinciguerra, Phys. Lett. **30B**, 412 (1969)

Be70a H.A. Bentz, M. Löwenhaupt and H. Theissen, Z. Phys. **231**, 484 (1970)

Be70b J. Bellicard, Ph. Leconte, T.H. Curtis, R.A. Eisenstein, D.W. Madsen and C.K. Bockelman, Nucl. Phys. **A143**, 213 (1970)

Be71a C. Berger, V. Burkert, G. Knop, B. Langenbeck and K. Rith, Phys. Lett. **35B**, 87 (1971)

Be71b H.A. Bentz, Z. Phys. **243**, 138 (1971)

Be72 M. Bernheim, D. Blum, W. McGill, R. Riskalla, C. Trail, T. Stovall and D. Vinciguerra, Lett. Nuovo Cimento **5**, 431 (1972)

Be73a R.W. Berard, F.R. Buskirk, E.B. Dally, J.N. Dyer, X.K. Maruyama, R.L. Topping and T.J. Traverso, Phys. Lett. **47B**, 355 (1973)

Be73b J.C. Bergstrom, I.P. Auer, M. Ahmad, F.J. Kline, J.H. Hough, H.S. Caplan and J.L. Groh, Phys. Rev. **C7**, 2228 (1973)

Be77 J.B. Bellicard, P. Bounin, R.F. Frosch, R. Hofstadter, J.S. McCarthy, F.J. Uhrhane, B.C. Clark and R. Herman, Phys. Rev. **C16**, 1262 (1977)

Be80 J.B. Bellicard, P. Bounin, R.F. Frosch, R. Hofstadter, J.S. McCarthy, F.J. Uhrhane, B.C. Clark and R. Herman, Phys. Rev. **C21**, 1652 (1980)

Be82 D.H. Beck, J. Asai and D.M. Skopik, Phys. Rev. **C25**, 1152 (1982)

Be83 G. Beuscher, Ph.D. thesis, University of Mainz, 1983 (unpublished)

Be84 D.H. Beck, S.B. Kowalski, M.E. Schulze, W.E. Turchinetz, J.W. Lightbody, Jr., X.K. Maruyama, W.J. Stapor, H.S. Caplan, G.A. Retzlaff, D.M. Skopik and R. Goloskie, Phys. Rev. **C30**, 1403 (1984)

REFERENCES FOR TABLES continued

Be85 J.C. Bergstrom, R. Neuhausen and G. Lahm, to be published

Bi64 G.R. Bishop, M. Bernheim and P. Kossanyi-Demay, Nucl. Phys. **54**, 353 (1964)

Bi71 S.I. Bilen'kaya, Yu.M. Kazarinov and L.I. Lapidus, Zh. Eksp. Teor. Fiz. **60**, 460 (1971) (transl.: Sov. Phys.-JETP 33, 247 (1971))

Bl56 R. Blankenbecler and R. Hofstadter, Bull. Am. Phys. Soc. **1**, 10 (1956)

Bo73 D.R. Botteril, D.W. Braben, H.E. Montgomery, P.R. Norton, G. Matone, A. Del Guerra, A. Giazzotto, H.A. Giorgi, F. Orsitto and A. Stefanini, Phys. Lett. **46B**, 125 (1973)

Bo74 F. Borkowski, P. Peuser, G.G. Simon, V.H. Walther and R.D. Wendling, Nucl. Phys. **A222**, 269 (1974)

Bo75a F. Borkowski, G.G. Simon, V.H. Walther and R.D. Wendling, Z. Phys. **A275**, 29 (1975)

Bo75b F. Borkowski, G.G. Simon, V.H. Walther and R.D. Wendling, Nucl. Phys. **B93**, 461 (1975)

Bo83 W.T.A. Borghols, Master's thesis, University of Amsterdam (1983) (unpublished)

Br66 A. Browman, B. Grossetête and D. Yount, Phys. Rev. **143**, 899 (1966)

Br77 S.W. Brain, A. Johnston, W.A. Gillespie, E.W. Lees and R.P. Singhal, J. Phys. **G3**, 821 (1977)

Br80 W.J. Briscoe, H. Crannel and J.C. Bergstrom, Nucl. Phys. **A344**, 475 (1980)

Bu58 G.R. Burleson and R. Hofstadter, Phys. Rev. **112**, 1282 (1958)

Bu60 G.R. Burleson and H.W. Kendall, Nucl. Phys. **19**, 68 (1960)

Bu61 F. Bumiller, M. Croissiaux, E. Dally and R. Hofstadter, Phys. Rev. **124**, 1623 (1961)

Bu68 R.J. Budnitz, J. Appe, L. Caroll, J. Chen, J.R. Dunning, Jr., M. Goitein, K. Hanson, D. Imnie, C. Mistretta, J.K. Walker and R. Wilson, Phys. Rev. **173**, 1357 (1968)

Bu69 F.W. Büsser, W.R. Dix, R. Folst, D. Harms, H. Krehbiel, P.E. Kuhlmann, J. McElroy, W. Schmidt, V. Walther and G. Weber, Phys. Lett. **30B**, 285 (1969)

Bu70 F.A. Bumiller, Phys. Rev. Lett. **25**, 1774 (1970)

Bu72 F.A. Bumiller, F.R. Buskirk, J.N. Dyer and W.A. Monson, Phys. Rev. **C5**, 391 (1972)

Ca73 L.S. Cardman, D. Kalinsky, J.R. Legg, R. Yen and C.K. Bockelman, Nucl. Phys. **A216**, 285 (1973)

Ca78 L.S. Cardman, D.H. Dowell, R.L. Gulbranson, D.G. Ravenhall and R.L. Mercer, Phys. Rev. **C18**, 1388 (1978)

Ca80a L.S. Cardman, J.W. Lightbody, Jr., S. Penner, S.P. Fivozinsky, X.K. Maruyama, W.P. Trower and S.E. Williamson, Phys. Lett. **91B**, 203 (1980)

Ca80b J.M. Cavedon, Ph.D. thesis, University of Paris-Sud, Centre d'Orsay, 1980 (unpublished)

Ca82a J.M. Cavedon, J.B. Bellicard, B. Frois, D. Goutte, M. Huet, P. Leconte, X.H. Phan, S.K. Platchkov and I. Sick, Phys. Lett. **118B**, 311 (1982)

Ca82b J.M. Cavedon, B. Frois, D. Goutte, M. Huet, Ph. Leconte, C.N. Papanicolas, X.-H. Phan, S.K. Platchkov and S. Williamson, Phys. Rev. Lett. **49**, 978 (1982)

Ch63 K.W. Chen, A.A. Cone, J.R. Dunning, Jr., S.G.F. Frank, N.F. Ramsey, J.K. Walker and R. Wilson, Phys. Rev. Lett. **11**, 561 (1963)

Ch66a L.H. Chan, K.W. Chen, J.R. Dunning, Jr., N.F. Ramsey, J.K. Walker and R. Wilson, Phys. Rev. **141**, 1298 (1966)

Ch66b K.W. Chen, J.R. Dunning, Jr., A.A. Cone, N.F. Ramsey, J.K. Walker and R. Wilson, Phys. Rev. **141**, 1267 (1966)

Co65 H. Collard, R. Hofstadter, E.B. Hughes, A. Johansson and M.R. Yearian, Phys. Rev. **138**, B57 (1965)

Co76 T. Cooper, W. Bertozzi, J. Heisenberg, S. Kowalski, W. Turchinetz, C. Williamson, L. Cardman, S. Fivozinsky, J. Lightbody, Jr. and S. Penner, Phys. Rev. **C13**, 1083 (1976)

Cr61 H. Crannell, R. Helm, H. Kendall, J. Oeser and M. Yearian, Phys. Rev. **121**, 283 (1961)

Cr65 M. Croissiaux, R. Hofstadter, A.E. Walker, M.R. Yearian, D.G. Ravenhall, B.C. Clark and R. Herman, Phys. Rev. **137**, B865 (1965)

Cr66 H. Crannell, Phys. Rev. **148**, 1107 (1966)

Cr67 H. Crannell, L.R. Suelzle, F.J. Uhrhane and M.R. Yearian, Nucl. Phys. **A103**, 677 (1967)

Cr77 C.W. Creswell, Ph.D. thesis, Massachusetts Institute of Technology, 1977 (unpublished)

Cu69 T.H. Curtis, R.A. Eisenstein, D.W. Madsen and C.K. Bockelman, Phys. Rev. **184**, 1162 (1969)

Da70 E.B. Dally, M.G. Croissiaux and B. Schweitz, Phys. Rev. **C2**, 2057 (1970)

Do57 B.W. Downs, D.G. Ravenhall and D.R. Yennie, Phys. Rev. **106**, 1285 (1957)

Do79 B.S. Dolbilkin, in Proceedings of the International Conference on Nuclear Physics with Electromagnetic Interactions, edited by H. Arenhövel and D. Drechsel (Springer Verlag, Berlin, 1979)

Do83 B.S. Dolbilkin, R.L. Kondrat'ev, N.N. Kostin, V.P. Lisin, V.N. Ponomarev and A.L. Polonskii, Yad. Fiz. **37**, 264 (1983) (transl: Sov. J. Nucl. Phys. 37 (2), 157 (1983))

Dr62 D.J. Drickey and L.N. Hand, Phys. Rev. Lett. **9**, 521 (1962)

Dr63 D.J. Drickey, B. Grossetête and P. Lehmann in Proceedings of the International Conference on Elementary Particle Physics, Sienna, 1963 (Societá Italiana di Fisica, Bologna), p. 493

Dr74 B. Dreher, Ph.D. thesis, University of Mainz, 1974 (unpublished)

Dr75 B. Dreher, Phys. Rev. Lett. **35**, 716 (1975) and private communication

Du63 J.R. Dunning, Jr., K.W. Chen, N.F. Ramsey, J.R. Rees, W. Shlaer, J.K. Walker and R. Wilson, Phys. Rev. Lett. **10**, 500 (1963)

Du64 B. Dudelzak, A. Isakov, P. Lehmann and R. Tchapoutian, Proceedings of the XII International Conference on High-Energy Physics 1, Dubna, 1964, p. 916

Du65 B. Dudelzak, Ph.D. thesis, University of Paris (Orsay), 1965 (unpublished)

REFERENCES FOR TABLES continued

Du66 J.R. Dunning, Jr., K.W. Chen, A.A. Cone, G. Hartwig, N.F. Ramsey, J.K. Walker and R. Wilson, Phys. Rev. **141**, 1286 (1966)

Du83 P.C. Dunn, S.B. Kowalski, F.N. Rad, C.P. Sargent, W.E. Turchinetz, R. Goloskie and D.P. Saylor, Phys. Rev. **C27**, 71 (1983)

Eh59 H.F. Ehrenberg, R. Hofstadter, U. Meyer-Berkhout, D.G. Ravenhall and S.E. Sobottka, Phys. Rev. **113**, 666 (1959)

Ei69 R.A. Eisenstein, D.W. Madsen, H. Theissen, L.S. Cardman and C.K. Bockelman, Phys. Rev. **188**, 1815 (1969)

El69 J.E. Elias, J.I. Friedman, G.C. Hartman, H.W. Kendall, P.N. Kirk, M.R. Sogard, L.P. van Speybroek and J.K. de Pagter, Phys. Rev. **177**, 2075 (1969)

Em83a H.J. Emrich, G. Fricke, G. Mallot, H. Miska, H.-G. Sieberling, J.M. Cavedon, B. Frois and D. Goutte, Nucl. Phys. **A396**, 401c (1983)

Em83b H.J. Emrich, Ph.D. thesis, University of Mainz, 1983 (unpublished)

En66 R. Engfer, Z. Phys. **192**, 29 (1966)

En67 R. Engfer and T. Türck, Z. Phys. **205**, 90 (1967)

Er68 U. Erich, H. Frank, D. Haas and H. Prange, Z. Phys. **209**, 208 (1968)

Eu76a H. Euteneuer, J. Friedrich and N. Vögler, Phys. Rev. Lett. **36**, 129 (1976)

Eu76b H. Euteneuer, Ph.D. thesis, University of Mainz, 1976 (unpublished)

Eu77a H. Euteneuer, H. Rothhaas, O. Schwentker, J.R. Moreira, C.W. de Jager, L. Lapikás, H. de Vries, J. Flanz, K. Itoh, G.A. Peterson, D.V. Webb, W.C. Barber and S. Kowalski, Phys. Rev. **C16**, 1703 (1977)

Eu77b H. Euteneuer, J. Friedrich and N. Vögler, Z. Phys. **A280**, 165 (1977)

Eu78 H. Euteneuer, J. Friedrich and N. Vögler, Nucl. Phys. **A298**, 452 (1978)

Fa71 L.A. Fajardo, J.R. Ficenec, W.P. Trower and I. Sick, Phys. Lett. **37B**, 363 (1971)

Fe73a G. Fey, H. Frank, W. Schütz and H. Theissen, Z. Phys. **265**, 401 (1973)

Fe73b G. Fey, Master's thesis, Technische Hochschule Darmstadt, 1973 (unpublished)

Fi64 C.R. Fischer and G.H. Rawitscher, Phys. Rev. **135**, B377 (1964)

Fi70 J.R. Ficenec, W.P. Trower, J. Heisenberg and I. Sick, Phys. Rev. Lett. **32B**, 460 (1970)

Fi72 J.R. Ficenec, L.A. Fajardo, W.P. Trower and I. Sick, Phys. Lett. **42B**, 213 (1972)

Fi74 S.P. Fivozinsky, S. Penner, J.W. Lightbody, Jr. and D. Blum, Phys. Rev. **C9**, 1533 (1974)

Fi76 J.M. Finn, Hall Crannell, P.L. Hallowell, J.T. O'Brien and S. Penner, Nucl. Phys. **A274**, 28 (1976)

Fr56 J.H. Fregeau, Phys. Rev. **104**, 225 (1956)

Fr66 D. Frèrejacque, D. Benaksas and D. Drickey, Phys. Rev. **141**, 1308 (1966)

Fr67 R.F. Frosch, J.S. McCarthy, R.E. Rand and M.R. Yearian, Phys. Rev. **160**, 874 (1967)

Fr68 R.F. Frosch, R. Hofstadter, J.S. McCarthy, G.K. Nöldeke, K.J. van Oostrum, M.R. Yearian, B.C. Clark, R. Herman and D.G. Ravenhall, Phys. Rev. **174**, 1380 (1968)

Fr72a H. Frank, K.H. Schmidt, W. Schütz and H. Theissen, Tagungsbericht Elektronen-Beschleuniger-Arbeitsgruppen, Giessen, 1972, edited by H. Schneider (AED-Conf-71-400, Giessen, 1972), p. 177

Fr72b J. Friedrich and F. Lenz, Nucl. Phys. **A183**, 523 (1972)

Fr77a B. Frois, J.B. Bellicard, J.M. Cavedon, M. Huet, P. Leconte, P. Ludeau, A. Nakada and Phan Xuan Ho, Phys. Rev. Lett. **38**, 152 (1977)

Fr77b J.L. Friar, J. Heisenberg and J.W. Negele, in Proceedings of the June Workshop in Intermediate Energy Electromagnetic Interactions, edited by A.M. Bernstein, Massachusetts Institute of Technology (1977), p. 325

Fr83 B. Frois, J.M. Cavedon, D. Goutte, M. Huet, Ph. Leconte, C.N. Papanicolas, X.-H. Phan, S.K. Platchkov and S.E. Williamson, Nucl. Phys. **A396**, 409c (1983)

Ga71 S. Galster, H. Klein, J. Moritz, K.H. Schmidt, D. Wegener and J. Bleckwenn, Nucl. Phys. **B32**, 221 (1971)

Ga72 D. Ganichot, B. Grossetête and D.B. Isabelle, Nucl. Phys. **A178**, 545 (1972)

Ge72 W.J. Gerace and G.C. Hamilton, Phys. Lett. **39B**, 481 (1972)

Gi75 W. A. Gillespie, S.W. Brain, A. Johnston, E.W. Lees, R.P. Singhal, A.G. Slight, M.W.S.M. Brimicombe, D.N. Stacey, V. Stacey and H. Huehnermann, J. Phys. **G1**, L6 (1975)

Go63 J. Goldemberg, J. Pine and D. Yount, Phys. Rev. **132**, 406 (1963)

Go67 M. Goitein, R.J. Budnitz, L. Carroll, J. Chen, J.R. Dunning, Jr., K. Hanson, D. Imrie, C. Mistretta, J.K. Walker, R. Wilson, G.F. Dell, M. Fotino, J.M. Paterson and H. Winick, Phys. Rev. Lett. **18**, 1016 (1967)

Go70 M. Goitein, R.J. Budnitz, L. Caroll, J.R. Chen, J.R. Dunning, Jr., K. Hanson, D.C. Imrie, C. Mistretta and R. Wilson, Phys. Rev. **D1**, 2449 (1970)

Go74 H. Gompelman, Master's thesis, University of Amsterdam, 1974 (unpublished)

Gr66a B. Grossetête, D. Drickey and P. Lehmann, Phys. Rev. **141**, 1425 (1966)

Gr66b B. Grossetête, S. Jullian and P. Lehmann, Phys. Rev. **141**, 1435 (1966)

Gr71 J.L. Groh, R.P. Singhal and H.S. Caplan, Can. J. Phys. **49**, 2073 (1971)

Gu82 A. von Gunten, Ph.D. thesis, Technische Hochschule Darmstadt, 1982 (unpublished)

Ha56 B. Hahn, D.G. Ravenhall and R. Hofstadter, Phys. Rev. **101**, 1131 (1956)

Ha57 B. Hahn, R. Hofstadter and D.G. Ravenhall, Phys. Rev. **105**, 1353 (1957)

Ha71 D. Harms, Ph.D. thesis, University of Hamburg (DESY), 1971 (unpublished)

Ha73a K. Hanson, J.R. Dunning, Jr., M. Goitein, T. Kirk, L.E. Price and R. Wilson, Phys. Rev. **D8**, 753 (1973)

REFERENCES FOR TABLES continued

Ha73b P.L. Hallowell, W. Bertozzi, J. Heisenberg, S. Kowalski, X. Maruyama, C.P. Sargent, W. Turchinetz, C.F. Williamson, S.P. Fivozinsky, J.W. Lightbody, Jr. and S. Penner, Phys. Rev. **C7**, 1396 (1973)

He56 R.H. Helm, Phys. Rev. **104**, 1466 (1956)

He63 R. Herman, B.C. Clark and D.G. Ravenhall, Phys. Rev. **132**, 414 (1963)

He69 J. Heisenberg, R. Hofstadter, J.S. McCarthy, I. Sick, B.C. Clark, R. Herman and D.G. Ravenhall, Phys. Rev. Lett. **23**, 1402 (1969)

He70a J. Heisenberg, J.S. McCarthy and I. Sick, Nucl. Phys. **A157**, 435 (1970)

He70b J. Heisenberg, R. Hofstadter, J.S. McCarthy, I. Sick, M.R. Yearian, B.C. Clark, R. Herman and D.G. Ravenhall, in Topics in Modern Physics: Tribute to E.U. Condon, edited by W.E. Brittin and H. Odabasi (Adam Hilger, London, 1970), p. 169

He71a J.H. Heisenberg, J.S. McCarthy, I. Sick and M.R. Yearian, Nucl. Phys. **A164**, 340 (1971)

He71b J. Heisenberg, J.S. McCarthy and I. Sick, Nucl. Phys. **A164**, 353 (1971)

He72 J. Heisenberg, R. Hofstadter, J.S. McCarthy, R. Herman, B.C. Clark and D.G. Ravenhall, Phys. Rev. **C6**, 381 (1972)

He82 F.W. Hersman, Ph.D. thesis, Massachusetts Institute of Technology, 1982 (unpublished)

Hi77 A.S. Hirsch, Ph.D. thesis, Massachusetts Institute of Technology, 1977 (unpublished)

Ho56 R. Hofstadter, Rev. Mod. Phys. **28**, 214 (1956)

Ho57 R. Hofstadter, Ann. Rev. Nucl. Sci. **7**, 231 (1957)

Ho76 G. Höhler, E. Pietarinen, I. Sabba-Stefanescu, F. Borkowski, G.G. Simon, V.H. Walther and R.D. Wendling, Nucl. Phys. **B114**, 505 (1976)

Ho80 R. Hofmann, Ph.D. thesis, University of Mainz, 1980 (unpublished)

Hu66a E.B. Hughes, T.A. Griffy, R. Hofstadter and M.R. Yearian, Phys. Rev. **146**, 973 (1966)

Hu66b E.B. Hughes, M.R. Yearian and R. Hofstadter, Phys. Rev. **151**, 841 (1966)

Hu70 H. Hultzsch, Ph.D. thesis, University of Mainz, 1970 (unpublished)

Ja66 T. Janssens, R. Hofstadter, E.B. Hughes and M.R. Yearian, Phys. Rev. **142**, 922 (1966)

Ja71 J.A. Jansen, Ph.D. thesis, University of Amsterdam, 1971 (unpublished)

Ja72 J.A. Jansen, R.Th. Peerdeman and C. de Vries, Nucl. Phys. **A188**, 337 (1972)

Ja73 C.W. de Jager, Ph.D. thesis, University of Amsterdam, 1973 (unpublished)

Ja76 E. Jans, Master's thesis, University of Amsterdam, 1976 (unpublished)

Ju70 P. Junk, Ph.D. thesis, University of Mainz, 1970 (unpublished)

Ju85 F.-P. Juster, S. Auffret, J.-M. Cavedon, J.-C. Clemens, B. Frois, D. Goutte, M. Huet, P. Leconte, J. Martino, Y. Mizuno, X.-H. Phan, S. Platchkov, S. Williamson and I. Sick, Phys. Rev. Lett. **55**, 2261 (1985)

Ka73 D. Kalinsky, L.S. Cardman, R. Yen, J.R. Legg and C.K. Bockelman, Nucl. Phys. **A216**, 312 (1973)

Ke63 H.W. Kendall and J. Oeser, Phys. Rev. **130**, 245 (1963)

Ke77 W. Kegel, Master's thesis, University of Amsterdam, 1977 (unpublished)

Kh70a V.M. Khvastunov, N.G. Afanas'ev, V.D. Afanas'ev, E.V. Bondarenko, I.S. Gul'karov, G.A. Savitskii and N.G. Shevchenko, Yad. Fiz. **12**, 9 (1970) (transl.: Sov. J. Nucl. Phys. **12**, 5 (1971))

Kh70b V.M. Khvastunov, N.G. Afanas'ev, V.D. Afanas'ev, I.S. Gul'karov, A.S. Omelaenko, G.A. Savitskii, A.A. Khomich, N.G. Shevchenko, V.S. Romanov and N.V. Rusanova, Nucl. Phys. **A146**, 15 (1970)

Ki73 P.M. Kirk, M. Breidenbach, J.I. Friedman, G.C. Hartmann, H.W. Kendall, G. Buschhorn, D.H. Coward, H. DeStaebler, R.A. Early, J. Litt, A. Minten, L.W. Mo, W.K.H. Panofsky, R.E. Taylor, B.C. Barish, S.C. Loken, J. Mar and J. Pine, Phys. Rev. **D8**, 63 (1973)

Ki78 J.C. Kim, R.S. Hicks, R. Yen, I.P. Auer, H.S. Caplan and J.C. Bergstrom, Nucl. Phys. **A297**, 301 (1978)

Kl73 F.J. Kline, H. Crannell, J.T. O'Brien, J. McCarthy and R.R. Whitney, Nucl. Phys. **A209**, 381 (1973)

Kl75 F.J. Kline, I.P. Auer, J.C. Bergstrom and H.S. Caplan, Nucl. Phys. **A255**, 435 (1975)

Kn81 E.A. Knight, R.P. Singhal, R.G. Arthur and M.W.S. Macauley, J.Phys. **G7**, 1115 (1981)

Ko65 P. Kossanyi-Demay, R.M. Lombard and G.R. Bishop, Nucl. Phys. **62**, 615 (1965)

Ko76 L. Koester, W. Nistler and W. Waschkowski, Phys. Rev. Lett. **36**, 1021 (1976)

Kr73 V.E. Krohn and G.R. Ringo, Phys. Rev. **D8**, 1305 (1973)

La61 F. Lacoste and G.R. Bishop, Nucl. Phys. **26**, 511 (1961)

La76 J.J. Lapikás, Master's thesis, University of Amsterdam, 1976 (unpublished)

La82 G. Lahm, Ph.D. thesis, University of Mainz, 1982 (unpublished) and private communication

La86 J.B. van der Laan, Ph.D. thesis, University of Amsterdam, 1986 (unpublished)

Le62 P. Lehmann, R.E. Taylor and R. Wilson, Phys. Rev. **126**, 1183 (1962)

Le76 E.W. Lees, C.S. Curran, T.E. Drake, W.A. Gillespie, A. Johnston and R.P. Singhal, J. Phys. **G2**, 105 (1976)

Li61 R.M. Littauer, H.F. Schopper and R.R. Wilson, Phys. Rev. Lett. **7**, 141 (1961)

Li70 J. Litt, G. Buschhorn, D.H. Coward, H. DeStaebler, L.W. Mo, R.E. Taylor, B.C. Barish, S.C. Loken, J. Pine, J.I. Friedman, G.G. Hartman and H.W. Kendall, Phys. Lett. **31B**, 40 (1970)

Li71a G.C. Li, I. Sick, R.R. Whitney and M.R. Yearian, Nucl. Phys. **A162**, 583 (1971)

Li71b A.S. Litvinenko, N.G. Shevchenko, A. Yu. Buki, G.A. Savitskii, V.M. Khvastunov and R.L. Kondrat'ev, Yad. Fiz. **14**, 40 (1971) (transl.: Sov. J. Nucl. Phys. **14**, 23 (1972))

Li72a A.S. Litvinenko, N.G. Shevchenko, N.G. Afanas'ev, A.Yu. Buki, G.A. Savitskii, V.M. Khvastunov, A.A. Khomich, I.I. Chkalov and V.P. Likhachev, Yad. Fiz. **15**, 1104 (1972) (transl.: Sov. J. Nucl. Phys. **15**, 611 (1972))

REFERENCES FOR TABLES continued

Li72b A.S. Litvinenko, N.G. Shevchenko, A.Yu. Buki, G.A. Savitskii, V.M. Khvastunov, A.A. Khomich, V.N. Polishchuk and I.I. Chkalov, Nucl. Phys. **A182**, 265 (1972)
Li73 A.S. Litvinenko, N.G. Shevchenko, N.G. Afanas'ev, V.D. Afanas'ev, A.Yu. Buki, V.P. Likhachev, V.N. Polishchuk, G.A. Savitskii, V.M. Khvastunov, A.A. Khomich and I.I. Chkalov, Yad. Fiz. **18**, 250 (1973) (transl. Sov. J. Nucl. Phys. **18**, 128 (1974)).
Li74 G.C. Li, M.R. Yearian and I. Sick, Phys. Rev. **C9**, 1861 (1974) and private communication
Li76 J.W. Lightbody, Jr., S. Penner, S.P. Fivozinsky, P.L. Hallowell and Hall Crannell, Phys. Rev. **C14**, 952 (1976)
Li83 J.W. Lightbody, Jr., J.B. Bellicard, J.M. Cavedon, B. Frois, D. Goutte, M. Huet, Ph. Leconte, A. Nakada, Phan Xuan Ho, S.K. Platchkov, S. Turck-Chieze, C.W. de Jager, J.J. Lapikás and P.K.A. de Witt Huberts, Phys. Rev. **C27**, 113 (1983)
Lo64 R.M. Lombard, P. Kossanyi-Demay and G.R. Bishop, Nucl. Phys. **59**, 398 (1964)
Lo67 R.M. Lombard and G.R. Bishop, Nucl. Phys. **A101**, 601 (1967)

MA56 R.W. McAllister, R. Hofstadter, Phys. Rev. **102**, 851 (1956)
Ma71 D.W. Madsen, L.S. Cardman, J.R. Legg and C.K. Bockelman, Nucl. Phys. **A168**, 97 (1971)
Ma74 R. Maas and C.W. de Jager, Phys. Lett. **48B**, 212 (1974)
Ma84 G.K. Mallot, Ph.D. thesis, University of Mainz, 1984 (unpublished)
MC77 J.S. McCarthy, I. Sick and R.R. Whitney, Phys. Rev. **C15**, 1396 (1977)
Me59 U. Meyer-Berkhout, K.W. Ford and A.E.S. Green, Ann. Phys. (N.Y.) **8**, 119 (1959)
Me76 K. Merle, Ph.D. thesis, University of Mainz, 1976 (unpublished) and private communication
MI57a J.A. McIntyre and S. Dhar, Phys. Rev. **106**, 1074 (1957)
Mi57b R.C. Miller and C.S. Robinson, Ann. Phys. (N.Y.) **2**, 129 (1957)
MI58 J.A. McIntyre and G.R. Burleson, Phys. Rev. **112**, 2077 (1958)
Mi79 H. Miska, B. Norum, M.V. Hynes, W. Bertozzi, S. Kowalski, F.N. Rad, C.P. Sargent, T. Sasanuma and B.L. Berman, Phys. Lett. **83B**, 165 (1979)
Mi82 H. Miessen, Ph.D. thesis, University of Mainz, 1982 (unpublished)
Mo71 J.R. Moreira, R.P. Singhal and H.S. Caplan, Can. J. Phys. **49**, 1434 (1971)
Mo81 M.A. Moinester, J. Alster, G. Azuelos, J.B. Bellicard, B. Frois, M. Huet, P. Leconte and Phan Xuan Ho, Phys. Rev. **C24**, 80 (1981), and erratum Phys. Rev. **C25**, 2137 (1982)
Mu70 G. Mülhaupt, Ph.D. thesis, University of Mainz, 1970 (unpublished)
Mu74 J.J. Murphy, II, Y.M. Shin and D.M. Skopik, Phys. Rev. **C9**, 2125 (1974) and erratum Phys. Rev. **C10**, 2111 (1974)
Mu84 M. Müller, Ph.D. thesis, University of Mainz, 1984 (unpublished)

Na71 M. Nagao and Y. Torizuka, Phys. Lett. **37B**, 383 (1971)
Na72 A. Nakada and Y. Torizuka, J. Phys. Soc. Jap. **32**, 1 (1972)
Na74 I.C. Nascimento, J.R. Moreira, J. Goldemberg, S. Fukuda, T. Terasawa, T. Saito, K. Hosoyama and Y. Torizuka, Phys. Lett. **53B**, 168 (1974)
Ne72 R. Neuhausen, J.W. Lightbody, Jr., S.P. Fivozinsky and S. Penner, Phys. Rev. **C5**, 124 (1972)
Ng64 H. Nguyen-Ngoc, Ph.D. thesis, University of Paris (Orsay), 1964 (unpublished)
Ni69 G.J.C. van Niftrik, Nucl. Phys. **A131**, 574 (1969)
Ni71 G.J.C. van Niftrik, L. Lapikás, H. de Vries and G. Box, Nucl. Phys. **A174**, 173 (1971)
No82 B.E. Norum, M.V. Hynes, H. Miska, W. Bertozzi, J. Kelly, S. Kowalski, F.N. Rad, C.P. Sargent, T. Sasanuma and W. Turchinetz, Phys. Rev. **C25**, 1778 (1982)

Ol61 D.N. Olsen, H.F. Schopper and R.R. Wilson, Phys. Rev. Lett. **6**, 286 (1961)
Ot80 C. Ottermann, Ph.D. thesis, University of Mainz, 1980 (unpublished)
Ot82 C.R. Ottermann, Ch. Schmitt, G.C. Simon, F. Borkowski and V.H. Walther, Nucl. Phys. **A379**, 396 (1982)
Ot85 C.R. Ottermann, G. Köbschall, K. Maurer, K. Röhrich, Ch. Schmitt and V.H. Walther, Nucl. Phys. **A436**, 688 (1985)
Oy75 M. Oyamada, T. Terasawa, K. Nakahara, Y. Endo, H. Saito and E. Tanaka, Phys. Rev. C7, 1346 (1975)

Pa68 L. Paul, Ph.D. thesis, University of Paris (Orsay), 1968 (unpublished)
Pa79 C.N. Papanicolas, Ph.D. thesis, Massachusetts Institute of Technology, 1979 (unpublished)
Pe65 G.A. Peterson, J.F. Ziegler and R.B. Clark, Phys. Lett. **17**, 320 (1965)
Pe66 I.Zh. Petkov, V.K. Luk'yanov and Yu.S. Pol', Yad. Fiz. **4**, 57 (1966) (transl. : Sov. J. Nucl. Phys. **4**, 41 (1967))
Pe68 G.A. Peterson and J. Alster, Phys. Rev. **166**, 1136 (1968)
Pe73 G.A. Peterson, K. Hosoyama, M. Nagao, A. Nakada and Y. Torizuka, Phys. Rev. **C7**, 1028 (1973)
Ph72 Phan Xuan Ho, J.B. Bellicard, A. Bussiere, Ph. Leconte and M. Priou, Nucl. Phys. **A179**, 529 (1972)
Pi55 R.W. Pidd and C.L. Hammer, Phys. Rev. **99**, 1396 (1955)
Pr71 L.E. Price, J.R. Dunning, Jr., M. Goitein, K. Hanson, T. Kirk and R. Wilson, Phys. Rev. **D4**, 45 (1971)

Ra78 F.N. Rad, T. Sasanuma, W. Bertozzi, J. Heisenberg, M.V. Hynes, S. Kowalski, H. Miska, B. Norum, C.P. Sargent, W. Turchinetz and C.F. Williamson, Phys. Rev. Lett. **40**, 368 (1978)
Re65 J.P. Repellin, P. Lehmann, J. Lefrancois and D.B. Isabelle, Phys. Lett. **16**, 169 (1965)

REFERENCES FOR TABLES continued

Re82 W. Reuter, G. Fricke, K. Merle and H. Miska, Phys. Rev. **C26**, 806 (1982)
Re84a W. Reuter, E.B. Shera, M.V. Hoehn, F.W. Hersman, T. Milliman, J.M. Finn, C. Hyde-Wright, R. Lourie, B. Pugh and W. Bertozzi, Phys. Rev. **C30**, 1465 (1984)
Re84b G.A. Retzlaff and D.M. Skopik, Phys. Rev. **C29**, 1194 (1984)
Ri71 R. Riskalla, Ph.D. thesis, University of Paris (Orsay LAL-1243), 1971 (unpublished)
Ro71 E.F. Romberg, N.S. Wall, D. Blum, J.W. Lightbody, Jr. and S. Penner, Nucl. Phys. **A173**, 124 (1971)
Ro76 H. Rothhaas, Ph.D. thesis, University of Mainz, 1976 (unpublished)
Ro86 H. Rothhaas, private communication
Ry83a D. Rychel, H.J. Emrich, H. Miska, G. Gyufko and C.A. Wiedner, Phys. Lett. **130B**, 5 (1983)
Ry83b D. Rychel, Ph.D. thesis, University of Mainz, 1983 (unpublished)

Sa67 R.S. Safrata, J.S. McCarthy, W.A. Little, M.R. Yearian and R. Hofstadter, Phys. Rev. Lett. **18**, 667 (1967)
Sa69a G.A. Savitskii, N.G. Afanas'ev, I.S. Gul'karov, V.D. Kovalev, V.M. Khvastunov, N.G. Shevchenko and I.V. Andreeva, Izv. Akad. Nauk. SSSR Ser. Fiz. **33**, 60 (1969) (transl.: Bull. Acad. Sci. USSR Phys. Ser. **33**, 56 (1969))
Sa69b G.A. Savitskii, N.G. Afanas'ev, I.V. Andreeva, I.S. Gul'karov, L.M. Krugovaya, V.M. Khvastunov, A.A. Khomich and N.G. Shevchenko, Izv. Akad. Nauk. SSSR Ser. Fiz. **33**, 53 (1969) (transl.: Bull. Acad. Sci. USSR Phys. Ser. **33**, 50 (1969))
Sa69c G.A. Savitskii, N.G. Afanas'ev, I.S. Gul'karov, V.D. Kovalev, A.S. Omelaenko, V.M. Khvastunov and N.G. Shevchenko, Yad. Fiz. **8**, 648 (1969) (transl.: Sov. J. Nucl. Phys. **8**, 376 (1969))
Sa79 T. Sasanuma, Ph.D. thesis, Massachusetts Institute of Technology, 1979 (unpublished)
Sc71 W. Schütz and H. Frank, Z. Phys. **243**, 132 (1971)
Sc74 H. von der Schmitt, Master's thesis, University of Mainz, 1974 (unpublished)
Sc75 W. Schütz, Z. Phys. **A273**, 69 (1975)
Sc77 O. Schwentker, Ph.D. thesis, University of Mainz, 1977 (unpublished)
Se85 A.M. Selig, Ph.D. thesis, University of Amsterdam, 1985 (unpublished)
Sh67a N.G. Shevchenko, N.G. Afanas'ev, G.A. Savitskii, V.M. Khvastunov, V.D. Kovalev, A.S. Omelaenko and I.S. Gul'karov, Yad. Fiz. **5**, 948 (1967) (transl.: Sov. J. Nucl. Phys. **5**, 676 (1967))
Sh67b N.G. Shevchenko, N.G. Afanas'ev, G.A. Savitskii, V.M. Khvastunov, I.S. Gul'karov, A.S. Omelaenko and V.D. Kovalev, Nucl. Phys. **A101**, 187 (1967)
Sh78a N.G. Shevchenko, A.A. Khomich, A.Yu. Buki, V.N. Polischchuk, B.V. Mazank and Yu.A. Kasatkin, Yad. Fiz. **27**, 293 (1978) (transl.: Sov. J. Nucl. Phys. **27**, 159 (1978))
Sh78b N.G. Shevchenko, V.N. Polishchuk, Yu.A. Kasatkin, A.A. Khomich, A.Yu. Buki, B.V. Mazanko and G.V. Shula, Yad. Fiz. **28**, 276 (1978) (transl.: Sov. J. Nucl. Phys. **28**, 139 (1978))
Sh78c N.G. Shevchenko, V.Yu. Gonkar, A.Yu. Buki, Yu.A. Kasatkin, V.N. Polishchuk, B.V. Mazan'ko and L.G. Lishenko, Yad. Fiz. **28**, 557 (1978) (transl.: Sov. J. Nucl. Phys. **28**, 295 (1978))
Si70a R.P. Singhal, J.R. Moreira and H.S. Caplan, Phys. Rev. Lett. **24**, 73 (1970)
Si70b I. Sick and J.S. McCarthy, Nucl. Phys. **A150**, 631 (1970) and private communication
Si72 B.B.P. Sinha, G.A. Peterson, G.C. Li and R.R. Whitney, Phys. Rev. **C6**, 1657 (1972)
Si73a B.B.P. Sinha, G.A. Peterson, R.R. Whitney, I. Sick and J.S. McCarthy, Phys. Rev. **C7**, 1930 (1973)
Si73b I. Sick, Nucl. Phys. **A208**, 557 (1973)
Si73c R.P. Singhal, S.W. Brain, C.S. Curran, T.E. Drake, W.A. Gillespie, A. Johnston and E.W. Lees, Nucl. Phys. **A216**, 29 (1973)
Si74a I. Sick, Nucl. Phys. **A218**, 509 (1974)
Si74b I. Sick, Phys. Lett. **53B**, 15 (1974)
Si75 I. Sick, J.B. Bellicard, M. Bernheim, B. Frois, M. Huet, Ph. Leconte, J. Mougey, Phan Xuan Ho, D. Royer and S. Turck, Phys. Rev. Lett. **35**, 910 (1975)
Si76 I. Sick, J.S. McCarthy, R.R. Whitney, Phys. Lett. **64B**, 33 (1976)
Si79 I. Sick, J.B. Bellicard, J.M. Cavedon, B. Frois, M. Huet, P. Leconte, Phan Xuan Ho and S. Platchkov, Phys. Lett. **88B**, 245 (1979)
Si80 C.G. Simon, Ch. Schmitt, F. Borkowski and V.H. Walther, Nucl. Phys. **A333**, 381 (1980)
Si81 C.G. Simon, Ch. Schmitt and V.H. Walther, Nucl. Phys. **A364**, 285 (1981)
Si82 I. Sick, Phys. Lett. **116B**, 212 (1982) and private communication
Sk73 D.M. Skopik, Y.M. Shin, E.L. Tomusiak, M.C. Phenneger and K.F. Chong, Phys. Lett. **43B**, 481 (1973)
St66a P. Stein, M. Binkley, R. McAllister, A. Suri and W. Woodward, Phys. Rev. Lett. **16**, 592 (1966)
St66b T. Stovall, J. Goldemberg and D.B. Isabelle, Nucl. Phys. **86**, 225 (1966)
St69 T. Stovall and D. Vinciguerra, Lett. Nuovo Cimento **1**, 100 (1969) and **2**, 17 (1969)
St76 G. Stephan, Ph.D. thesis, University of Mainz, 1976 (unpublished) and private communication
Su67 L.R. Suelzle, M.R. Yearian and H. Crannell, Phys. Rev. **162**, 992 (1967)
Sz77 Z.M. Szalata, J.M. Finn, J. Flanz, F.J. Kline, G.A. Peterson, J.W. Lightbody, Jr., X.K. Maruyama and S. Penner, Phys. Rev. **C15**, 1200 (1977)

Th67 H. Theissen, Z. Phys. **202**, 190 (1967)
Th69 H. Theissen, R.J. Peterson, W.J. Alston, III and J.R. Stewart, Phys. Rev. **186**, 1119 (1969)
Th70 H. Theissen, H. Fink and H.A. Bentz, Z. Phys. **231**, 475 (1970)
Th72 H. Theissen, Habilitationsschrift, T.H. Darmstadt, 1972 (unpublished)
Th74 H. Theissen and W. Schütz, Z. Phys. **266**, 33 (1974)

REFERENCES FOR TABLES continued

Uh71 F.J. Uhrhane, J.S. McCarthy and M.R. Yearian, Phys. Rev. Lett. **26**, 578 (1971)

Vo78 B.B. Voitsekhovskii, V.G. Zelevinskii, S.G. Popov and D.M. Nikolenko, Izv. Akad. Nauk. SSSR Ser. Fiz. **42**, 2413 (1978) (transl.: Bull. Acad. Sci. USSR Phys. Ser. **42**, 170 (1978))
Vr64 C. de Vries, R. Hofstadter, A. Johansson and R. Herman, Phys. Rev. **134**, B848 (1964)
Vr86 J.W. de Vries, D. Doornhof, C.W. de Jager, H. de Vries, C. van der Leun, S.A. Salem and R.P. Singhal, to be published
We74 R.D. Wendling and V.H. Walther, Nucl. Phys. **A219**, 450 (1974)
Wh79 K.E. Whitner, Ph.D. thesis, Massachusetts Institute of Technology, 1979 (unpublished)
Wi78 C.F. Williamson, F.N. Rad, S. Kowalski, J. Heisenberg, H. Crannell, J.T. O'Brien and H.C. Lee, Phys. Rev. Lett. **40**, 1702 (1978)
Wo76 H.D. Wohlfahrt, Habilitationsschrift, University of Mainz, 1976 (unpublished)
Wo80 H.D. Wohlfahrt, O. Schwentker, G. Fricke, H.G. Andresen and E.B. Shera, Phys. Rev. **C22**, 264 (1980)

Ya71 C.S. Yang, E.L. Tomusiak, R.K. Gupta and H.S. Caplan, Nucl. Phys. **A162**, 71 (1971)