Tables of E2 Transition Probabilities from the first 2⁺ States in Even-Even Nuclei

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Abstract

Experimental results of E2 transition probabilities or B(E2) values for the known first 2^+ states in 447 even-even nuclei have been compiled and evaluated. The evaluation policies for the analysis of experimental data have been described and new results are discussed. The recommended B(E2) values have been compared with comprehensive shell model calculations for a selected set of nuclei, where such theoretical procedures are amenable. The present work was motivated by a rapid increase in the number of new B(E2) measurements for the first 2^+ states since the previous evaluation of such data by S. Raman *et al.* published in 2001. Future plans to investigate the systematics of B(E2) \uparrow values, and intercomparison of different experimental techniques to obtain these data are outlined.

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1. Introduction

Measurements of the quadrupole collectivity of atomic nuclei started in the early 1950s. Such collectivity was extensively studied along the N~Z or "valley of stability" region. In this region, many nuclear structure phenomena, such as nuclear shell closure, were identified and explained in the framework of the nuclear shell model [1, 2]. With the advent of radioactive beam and isotope production techniques, scientists were presented with a unique opportunity to test nuclear models for neutron- and proton-rich nuclei. This approach produced many interesting and often unexpected results on the evolution of nuclear properties near the neutron and proton driplines [3].

To demonstrate the importance of B(E2) values in nuclear physics research and model development, we will consider nuclear "magic numbers" and their evolution along the nuclear chart. In stable nuclei, large gaps exist between nuclear shells when the proton or neutron number is equal to 2, 8, 20, 28, 50, 82, and 126 [1, 4]. These gaps result in large transition energy values between the ground and first excited states, relatively low quadrupole collectivities and small neutron capture cross sections. The "magic numbers" and their values are not preserved; they evolve for unstable nuclei due to nuclear structure effects. Therefore, nuclear properties of the first excited 2_1^+ states in even-even nuclei provide important information on the evolution of nuclear properties and shell model studies. Accurate knowledge of these properties is necessary for continuing the development of nuclear model calculations and theoretical understanding of many interesting phenomena in the quantum world.

Another significant application of B(E2) evaluated data is for nuclear reaction model calculations. Precise values of quadrupole deformation parameters are essential for the Reference Input Parameter Library (RIPL) [5] and nuclear reaction model codes such as EMPIRE and TALYS [6, 7], which are extensively used for ENDF evaluations [8–10]. Such evaluations are critically important for applications of nuclear data as the ENDF/B-VII.1 library [8] provides evaluated neutron cross sections for frequently-used nuclear science and technology codes GEANT and MCNP.

The importance of compilation and evaluation of E2 transition probabilities for even-even nuclei was recognized in the 1960s by P.H. Stelson and L. Grodzins at Oak Ridge National Laboratory. They produced the first compilation of B(E2) values for 2_1^+ states [11], which was then continued by S. Raman *et al.* [12, 13]. Presently, this work proceeds under the auspices of the U.S. Nuclear Data Program (USNDP). It began as periodic update of B(E2) values for the mass regions, where a large number of new experimental results became available. The first update of B(E2) values for Cr, Fe, Ni and Zn isotopes (Z~28 region) has been recently published by the joint effort of NNDC, Brookhaven National Laboratory (BNL), McMaster and Central Michigan Universities [14]. This update supplied valuable feedback to our collaboration from the research community [15], which has helped to improve the quality of the present work. The detailed description of compilation and evaluation tools, procedures and results is given in the following sections.

2. Nuclear Databases used in the present work

Nuclear Science References (NSR) [16], Evaluated Nuclear Structure Data File (ENSDF) [17, 18] and Experimental Unevaluated Nuclear Data List (XUNDL) [19] databases each played a crucial role in this project. A short description of the databases is presented below.

The NSR database [16] is the most comprehensive source of low- and intermediate-energy nuclear physics bibliographical information, containing more than 219000 articles, mostly in peer-reviewed journals, since the beginning of

nuclear science. It consists of primary (journals) and secondary (proceedings, lab reports, theses, private communications) references. The main goal of the NSR is to provide bookmarks for experimental and theoretical articles in nuclear science using keywords. NSR keywords are assigned to articles that contain results on atomic nuclei and masses, nuclear decays, nuclear reactions and other properties. Keywords are also used to build author and subject indexes, which allow users to search for articles by subject (Coulomb excitation, σ , B(E2), T_{1/2}, etc.) or author. This database is updated weekly and serves as a primary source of bibliographical information for the ENSDF database.

The ENSDF database [17, 18] contains evaluated nuclear structure and decay data. An international network of evaluators [20] contributes to the database. For each nuclide, all known experimental data used to deduce nuclear structure information are included. Each type of experiment is presented as a separate dataset. In addition, there is a dataset of "adopted" level and γ -ray transition properties, which represent the evaluator's determination of the recommended values for these properties, based on all the available experimental data. Information in the database is regularly updated and most of this information is also published in Elsevier Nuclear Data Sheets journal as A-chain evaluations. Due to the large scope of the database, evaluation updates are often conducted on an \sim 10-year basis, with some nuclides updated more frequently.

The XUNDL database [19] contains compiled experimental nuclear structure data from current publications in the "ENSDF" format. In general, the information in a given XUNDL dataset comes from a single journal article, or from a set of closely-related articles by one group of authors. The information in the XUNDL database is often used in the updated ENSDF evaluations.

We primarily used NSR and XUNDL database content for the experimental data search. These searches were verified using the ENSDF database, previous evaluation of S. Raman *et al.* [13] and references from the original experimental papers.

3. Experimental B(E2) values

Experimental values of B(E2), τ and β_2 are compiled in Table 1. This Table extends the list of the previously reported quantities by S. Raman *et al.* [13], and includes target, beam, beam energy and annotation where the beam energy exceeds the Coulomb barrier [21]. In general, Coulomb excitation and nuclear resonance fluorescence measurements list $0_1^+ \rightarrow 2_1^+$ transitions, while lifetime measurements list $2_1^+ \rightarrow 0_1^+$ transitions. A short review of the recent experimental results that motivated the current evaluation is presented below and provides summary of experimental activities in the last 10-15 years. It lists new nuclides, nuclear physics rationale, experimental techniques, theoretical calculations, laboratories, references, etc. The following data indicate strong international collaborations and broad popularity of quadrupole collectivity studies worldwide.

3.1. ⁶He

A neutron- α -particle coincidence experiment was performed at Notre Dame University to study breakup of ⁶He [2007Ko23], and a B(E2) value of 0.00054(7) e²b² was deduced for breakup via the 2⁺ excited state reaction channel. The measured collectivity is for the particle unbound state. These data are also model dependent due to Coulomb-nuclear interference effects.

3.2. $^{10,12}Be$

Lifetimes 0.205 ± 5 (stat) ±7 (syst) ps and 2.5 ± 7 (stat) ±3 (syst) ps of the first 2^+ states in 10 Be and 12 Be have been measured using the Doppler shift attenuation method at Argonne National Laboratory [2009Mc02] and inelastic scattering at RIKEN [2009Im01], respectively. The former measurement provides a discriminating test of *ab initio* calculations of light nuclei. While the later result shows a large quadrupole strength in the ground state transition, providing further evidence on the disappearance of the N=8 "magic number".

3.3. $^{10,16,18,20}C$

To further test *ab initio* model predictions, the lifetime of the 2_1^+ state in 10 C has been precisely re-measured at Argonne using the Doppler shift attenuation method [2012Mc03] to be 0.219(12) ps. Four different measurements [2004Im01, 2008Wi04, 2008On02] helped to pin-point the recommended B(E2) value for 16 C at 0.00179(20) e^2b^2 . The electric quadrupole transition from the first 2^+ state to the ground 0^+ state in 18 C was studied through a lifetime measurement by an upgraded recoil shadow method at RIKEN [2008On02]. The lifetime of the 2_1^+ state in the near-dripline nucleus 20 C was recently measured to be $9.8(^{+28}_{-30})$ ps at the Michigan State University (MSU) Cyclotron Laboratory [2011Pe21]. That measurement is consistent with the previous limit [2009El03].

$3.4.\ ^{22,24}O$

Recent inelastic scattering experiments provided model-dependent data on quadrupole deformation parameter values, β_2 of 0.24 and 0.26 for ²²O [2006El05, 2006Be04], and 0.15(4) for ²⁴O [2012Ts03]. These data provide complementary experimental evidence for a new "magic number" N = 14.

$3.5.\ ^{18,26,28,30}Ne$

Quadrupole collectivity of neon isotopes has been extensively studied at RIKEN. ¹⁸Ne collectivity was verified in a Coulomb excitation experiment (Coulex) [2006YaZV]. The measurement of the $2_1^+ \rightarrow 0_1^+$ transition in ³⁰Ne [2003Ya05] and confirmation of B(E2) values in ^{26,28}Ne [2007Gi06, 2005Iw02] have helped to pin-point the boundary of the "island of inversion" or nuclear shell ordering along Z=10. Finally, ^{28,30}Ne deformation lengths and parameters were extracted from the angle-integrated cross sections using distorted-wave calculations [2014Mi09].

$$3.6.^{20,30,32,34}Mg$$

Investigation of nuclear shell closure effects in the "island of inversion" region served as an additional motivation for study of magnesium isotopes. Coulomb excitation of ^{20,34}Mg was performed at the RIKEN cyclotron facility [2008Iw04, 2001Iw07]. The deduced B(E2)↑ value for ³⁴Mg of 0.0631(126) e²b² is in agreement with the MSU measurements [1999Pr09, 2005Ch66]. In addition, REX-ISOLDE Coulex B(E2)↑ values of 0.0241(31) and 0.0434(52) e²b² in ³⁰Mg and ³²Mg [2005Ni11, 2005NiZS], respectively, confirmed the previous MSU and RIKEN results [1999Pr09, 1995Mo16]. Recently, complementary values of deformation lengths and parameters for the first 2⁺ states in ^{32,34,36}Mg were measured at RIKEN [2014Mi09]. These deformation parameters provide a glimpse of quadrupole collectivity in the vicinity of ³²Mg. Finally, in 2015, the RIKEN group demonstrated that the electromagnetic properties of ³²Mg can be studied with Coulomb excitation at beam energies of a few hundreds of MeV/nucleon, where a thicker target can be used to increase the excitation yields [2015Li28].

3.7. 24,36,38,40 Si

The Coulomb excitation technique was used for the study of collectivity in the proton-rich nucleus 24 Si. The reduced transition probability from its 2_1^+ state was probed using a radioactive beam of 24 Si at 57.9 MeV/nucleon bombarding a 208 Pb target [2002Ka80]. This B(E2) \downarrow value of 19.1 \pm 5.9 e²fm⁴ is smaller than that of the mirror nucleus 24 Ne. β_2 values of 0.25(4), 0.36(3), and 0.37(5) have been deduced for 36,38,40 Si, respectively, using inelastic proton-scattering cross sections at MSU [2007Ca35]. Enhanced collectivity at N=26 indicates a reduced N=28 shell gap at large neutron excess in this chain of isotopes.

$3.8.^{28}S$

 28 S was measured at RIKEN with the Coulomb excitation technique [2012To06]. The resulting B(E2) value of 181(31) e^2 fm⁴ is smaller than the expected value based on empirical B(E2) systematics. These results indicate the emergence of the "magic number" Z=16 in the $|T_z|=2$ nucleus 28 S.

$3.9. \ ^{32,44,46,48}Ar$

The collective strengths of the $0_1^{gs} \rightarrow 2_1^+$ excitations in 32,48 Ar were measured at MSU using NaI- and SeGA- gamma detector arrays [2002Co09, 2012Wi05]. The 32 Ar measurement, taken together with previously existing Coulomb excitation data for 32 Si [1998Ib01], yields the isoscalar and isovector multipole matrix elements for the transition between T=2 states in the A=32 system. Complementary Coulex and RDM measurements of 44,46 Ar were conducted at GANIL, France and Legnaro, Italy facilities [2009Zi01, 2010Me07], respectively. These experiments addressed the development of deformation and shape coexistence in the vicinity of the doubly magic 48 Ca, related to the weakening of the N=28 shell closure.

3.10. 40,42,44,46,48,50 Ca

Electric quadrupole strength distributions in doubly magic nuclei 40,48 Ca were studied using the resonance fluorescence technique at Darmstadt, Germany [2002Ha13]. The transient field technique was employed to study collectivity in 42,44,46 Ca at the Cologne tandem accelerator [2003Sc21, 2003Sp04]. The 46 Ca g-factor [2003Sp04] is in disagreement with the large positive value predicted by the large scale shell model (LSSM) calculations which included sd shell core excitations into the fp shell and accounted well for the corresponding 42,44 Ca results [2003Sc21]. Both $g(2_1^+)$ and B(E2) in 46 Ca can be explained by full fp-shell model calculations using the FPD6 interaction without invoking core excitations. Lifetimes of the first excited state in 46,48 Ca were measured with the recoil distance method using the PRISMA-CLARA setup at Legnaro [2009Me23, 2012Mo11]. The same facility has been employed to measure a lifetime of the first excited state of the N=30 isotone, 50 Ca [2009Va06]. This extends the lifetime knowledge beyond the $f_{7/2}$ -shell closure near the doubly magic nucleus 48 Ca.

3.11. ^{52,54,56,58} Ti

The even-even 52,54,56,58 Ti isotopes have been studied with intermediate-energy Coulex experiments at MSU and absolute B(E2) transition rates have been deduced [2005Di05]. These data confirm the presence of a subshell closure at neutron number N=32 in neutron-rich nuclei above the doubly magic nucleus 48 Ca and do not support the predicted N=34 closure. 52 Ti low-level structure properties were verified using an inverse kinematics reaction Doppler shift

attenuation method at Köln (Cologne), Germany [2006Sp02]. Finally, the 58 Ti deformation length was recently probed at RIKEN, Japan [2013Su20]. The energy of the first 2^+ state and the deformation length value are comparable to the ones of 56 Ti, which indicates that the collectivity of the Ti isotopes does not increase significantly with neutron number until N=36.

3.12. 46,56,58,60,62,64 Cr

To complete the systematics in the N=Z=28 region, a B(E2;0 $_1^+\to 2_1^+$) value of 0.093(20) e²b² has been reported from the intermediate-energy Coulex of ⁴⁶Cr [2005Ya26]. Coulomb excitation B(E2) values of 8.7(30) and 14.8(42) W.u. for ^{56,58}Cr, respectively, have been measured by the RISING collaboration [2005Bu29]. These results agree well with the shell model calculation based on GXPF1A and GXPF1 effective interactions [40, 41]. B(E2) and lifetime values for the first 2⁺ states of ^{58,60,62,64}Cr have been recently measured at MSU [2012Ba31, 2013Cr02, 2015Br10]. The deformation length and quadrupole deformation parameter have been studied in the inelastic scattering of ^{60,62}Cr on hydrogen [2009Ao01]. These data provide evidence for enhanced collectivity in chromium nuclei. Recently, quadrupole collectivity of neutron-rich ⁶⁴Cr was measured with the Coulex technique [2013Cr02]. Its deformation has been interpreted with shell-model calculations using the state-of-the-art LNPS effective interaction.

3.13. ^{50,52,62,64,66,68} Fe

A B(E2;0 $_1^+ \to 2_1^+$) value of 0.140(30) e²b² in ⁵⁰Fe has been reported from an intermediate-energy Coulex experiment [2005Ya26]. A Coulex measurement at MSU [2004Yu07] has produced a B(E2;0 $_1^+ \to 2_1^+$) value of 0.082(10) e²b² for ⁵²Fe. The increase in B(E2) strength with respect to the even-mass neighbor ⁵⁴Fe agrees with shell model calculations as the "magic number" N=28 is approached. ^{62,64}Fe lifetimes of 7.4(9) and 7.4(26) ps [2010Lj01], have been originally reported by the GANIL group using the recoil-distance Doppler shift method after multinucleon transfer reactions in inverse kinematics. A recent MSU measurement of lifetimes provides the following results: 8.0(10), 10.3(10), 39.0(40) ps for ^{62,64,66}Fe [2011Ro02], respectively. The deduced B(E2) strengths demonstrate the enhanced collectivity of the neutron-rich Fe isotopes up to N=40. Note that both groups used the plunger method. B(E2) values of 0.1445(124) and 0.1777(216) e²b² for ^{66,68}Fe, respectively, have also been recently measured at MSU [2013Cr02].

3.14. 54,58,60,62,64,70,74 Ni

The Coulex technique was employed to deduce the B(E2) value for 54 Ni [2004Yu10, 2005Ya26]. High-precision reduced electric-quadrupole transition probabilities have been measured from the single-step Coulomb excitation of semi-magic 58,60,62,64 Ni beams at 1.8 MeV per nucleon on a natural carbon target at the Holifield Radioactive Ion Beam Facility [2014Al20]. A reduced transition probability, B(E2;0 $_1^+ \rightarrow 2_1^+$), of 0.086(14) e²b² [2006Pe13] has been measured by Coulex for the neutron-rich nucleus 70 Ni in a 208 Pb target at intermediate energy. The current B(E2) value for 70 Ni is unexpectedly large, which may indicate that neutrons added above N=40 strongly polarize the Z=28 proton core. The deformation length and quadrupole deformation parameter have been measured by inelastic scattering of 74 Ni on hydrogen [2010Ao01]. Results of this experiment indicate that the magic character of Z=28 or N=50 is weakened in 74 Ni. The precision of this measurements was improved with Coulomb excitation techniques at MSU [2014Ma85].

$3.15. \ ^{72,74,76,78,80}Zn$

A reduced transition probability, $B(E2;0_1^+ \to 2_1^+)$, of 0.174(21) e²b² [2002Le17] for the ⁷²Zn nucleus has been measured by the Coulex technique at intermediate energy. This result is consistent with the expected values from the neighboring nucleus ⁷³Zn and indicates that the behavior of B(E2) strengths around the N=40 sub-shell closure in Zn is very different from the Ni isotopic chains. A reduced transition probability $B(E2;0_1^+ \to 2_1^+)$ of 0.204(15) e²b² [2006Pe13] for the neutron-rich ⁷⁴Zn nucleus has been measured by Coulomb excitation on a ²⁰⁸Pb target at intermediate energy. This result agrees well with 0.201(16) e²b² which was measured at REX-ISOLDE [2007Va20]. Recent B(E2) measurements at GANIL and Legnaro facilities [2013Ce01, 2013Lo04] highlight needs for additional systematics. The reduced transition probabilities, $B(E2;0_1^+ \to 2_1^+)$, of 0.145(18), 0.077(19) and 0.073(9) e²b² for ^{76,78,80}Zn have been reported by the REX-ISOLDE group [2007Va20, 2009Va01] using the Coulex method at low-energy. Lifetimes of ^{70,72,74}Zn were deduced with the AGATA spectrometer demonstrator [2013Lo04]. These data are consistent with shell model predictions using JUN45 and LNPS effective interactions.

$3.16.^{64,66,70,76,78,80,82}Ge$

Collectivity of germanium isotopes was extensively studied in the last ten years. A lifetime value of 3.3(5) ps for the N=Z nucleus ⁶⁴Ge was measured with the recoil distance method at MSU [2007St16]. The last result is in excellent agreement with large-scale shell-model calculations applying the GXPF1A interactions. Recent lifetime measurements in ⁶⁶Ge [2013Co23, 2012Lu03] indicate potential problems with the original measurement [1979Wa23]. A low-level structure of ⁷⁰Ge was investigated at Munich tandem with the Doppler shift attenuation technique [2006Le31]. Complementary B(E2) values for a ⁷⁶Ge primary beam were deduced and used for calibration of secondary fragment values at MSU, GANIL, and Legnaro [2005Di05, 2006Pe13, 2013Lo04]. Reduced transition probabilities in ^{78,80,82}Ge were investigated at RIKEN, Oak Ridge, and MSU [2005Iw03, 2005Pa23, 2010Ga14]. The B(E2) systematic trend approaching N=50 indicates strong sensitivity of its values to the effective interaction.

3.17. ^{68,70,72,82,84}Se

Recently B(E2) values have been deduced from the Coulomb excitation of 68,82,84 Se at MSU and RIKEN [2009Ob02, 2005Iw03, 2010Ga14]. It was found that the 68 Se transition strength is similar to that of the triaxial 64 Ge nucleus [2007St16]; in sharp contrast to the much stronger collectivity observed for the oblate 72 Kr nucleus [2005Ga22]. Meanwhile, a 84 Se measurement [2010Ga14] has helped to complete the B(E2) systematics for the N=50 isotones from zinc to molybdenum. 70,72 Se lifetimes were measured with the recoil-distance method at Legnaro [2008Lj01]. The Legnaro results reveal considerable discrepancies with the literature values [1986He17]. The HFB-based configuration-mixing calculations indicate an oblate rotational ground-state band in 68 Se [2008Lj01]. The collectivity in 68,70 Se was recently verified at MSU using the recoil distance Doppler shift technique [2014Ni09]. This trend is consistent with shell model calculations using the GXPF1A interaction in an fp-model space including the Coulomb, spin-orbit and isospin nonconserving interactions.

$3.18.~^{72,74,76,78,88,90,92,94,96} Kr$

A B(E2) \uparrow value of 0.4997(647) e^2b^2 for the N=Z nucleus 72 Kr was measured with the Coulex technique at MSU [2005Ga22]. This value is in agreement with the self-consistent models that predict an oblate shape for the ground state

of ⁷²Kr. Quadrupole collectivity of ^{74,76,78}Kr was studied with the Coulomb excitation and recoil distance methods. The ^{74,76}Kr results [2005Go43] resolve discrepancies between lifetime and Coulomb excitation measurements. A series of ⁷⁸Kr measurements [2005Ga22, 2006Be18, 2009Ob02] agree well with one another. A GRETINA array lifetime measurement of ^{72,74}Kr [2014Iw01] agrees with the previous values [2005Ga22, 2005Go43] and indicates a future potential use of this detector. Results for ^{88,92}Kr were reported at a recent conference [2009MuZW], and may require further experimental work. The ⁹⁰Kr lifetime was measured by cold-neutron-induced fission of ²³⁵U [2014Re15]. B(E2) values of 0.247(28) and 0.436(93) e²b² for ^{94,96}Kr, respectively, were measured with Coulex at the CERN REX-ISOLDE facility [2012Al03]. This measurement helped to clarify energies of the first excited states and the erroneous statements on sudden onset of deformation in ⁹⁶Kr.

$3.19.\,^{76,78,84,86,88,96}Sr$

The lifetimes of the first excited states in ^{76,78}Sr and ^{84,86,88}Sr were measured with the Doppler shift attenuation technique at MSU [2012Le05] and Yale [2012Ku14], respectively. The former results highlight the importance of the mixing of coexisting shapes for the description of well-deformed nuclei, and the latter data are consistent with the large-scale shell-model calculations using the JUN45 interaction. The B(E2) value of ⁹⁶Sr was measured in a Coulex experiment at the REX-ISOLDE facility [2011Cl03]. The combination of a rather large B(E2) value with a large spectroscopic quadrupole moment in ⁹⁶Sr suggests a quasi vibrator character and excludes static quadrupole deformation. These results are reproduced with Gogny D1S force calculations.

3.20, 88,92,96,104,106 Zr

Lifetimes of 3.6(4) and 0.82(10) ps for the first 2⁺ states in ^{88,96}Zr, respectively, were measured at Yale with the Doppler shift attenuation method [2012Ku14, 2003Ku11]. These data are in fair agreement with shell-model calculations. ⁹²Zr collectivity was investigated at Darmstadt and Köln [2013Sc01, 2002We15]. A combination of experimental data and shell model calculations shows that both, single particle and collective degrees of freedom are present in ⁹²Zr. The first excited state lifetime in ¹⁰⁴Zr was deduced to be 2885(435) ps at Argonne by employing a ²⁵²Cf(SF) decay technique [2006Hw01]. This experiment indicates that ¹⁰⁴Zr has one of the most deformed 2⁺ state among medium and heavy even-even nuclei. The deformation can also be reproduced with HFB calculations. Fast timing in beta decay results were published recently for ^{104,106}Zr [2015BrP].

$3.21. \ ^{106,108}Mo$

The ¹⁰⁶Mo lifetime of 173(14) ps was deduced at Lawrence Berkeley National Laboratory with a delayed coincidence (DC) technique [2006Hw01]. This result helped to resolve ambiguities in previous measurements. The previously discussed preliminary results have helped to shed more light on ^{106,108}Mo [2015Br03].

3.22.96,98,106 Ru

Lifetimes of ^{96,98}Ru were extracted with the Doppler shift attenuation technique at Köln [2002Kl07] and Yale [2012To01, 2012Ra03]. The Köln measurement is well reproduced with shell model calculations, and the Yale experimental ratio of 4⁺/2⁺ transition strengths agrees well with the vibrational character of the low-energy excitations in ⁹⁸Ru. A time-delayed technique at Jyvaskyla, Finland was used to deduce a lifetime of 249(5) ps in ¹⁰⁶Ru [2008Sa05]. This value is consistent with the General Collective Model and Interacting Boson Approximation (IBA) calculations.

3.23. 98,100,110,114 Pd

The recoil distance method (RDM) was employed at Köln to set a lifetime limit of <16.3 ps for ⁹⁸Pd [2009FrZZ] and a value of 9.0(4) ps for ¹⁰⁰Pd [2009Ra28]. The ⁹⁸Pd nucleus is not very collective due to its closeness to doubly-magic ¹⁰⁰Sn, and ¹⁰⁰Pd is well reproduced by shell model calculations. The Yale RDM value [2012An17] is rather preliminary in nature, and was excluded from the evaluation process. The identical technique was used at MSU to deduce lifetimes of 67(8) and 118(20) ps for ^{110,114}Pd nuclei, respectively [2008De30]. The new B(E2) values are described in the framework of the Interacting Boson Model (IBM), and ¹¹⁴Pd data fit nicely into the systematic trends deduced from the lighter Pd isotopes.

$3.24.\ ^{100,102,104,110,122,124,126}Cd$

Coulomb excitation and recoil distance techniques were used to measure excitation strength in 100,102,104 Cd [2009Ek01, 2007Bo17, 2001Li24]. These data could be described within the shell-model using realistic matrix elements obtained from a G-matrix renormalized CD-Bonn interaction. The recoil distance Doppler shift technique was used to deduce a lifetime of 8.7(12) ps in 110 Cd at Köln [2001Ha09]. The E2-transition probabilities in 110 Cd are in rather good agreement with the predictions of the U(5)-limit of the IBM-1. The REX-ISOLDE collaboration employed the Coulex technique to deduce B(E2) values in 122,124,126 Cd [2014Il01]. These data agree well with other preliminary results [2006KrZV, 2008KrZZ], and clarify the onset of collectivity in the vicinity of the Z=50 and N=82 shell closures.

3.25. 104,106,108,110,112,114,116,118,120,122,124,126,128,130,132,134 S_n

Quadrupole collectivity of even-A tin isotopes was extensively studied during the last decade. The intermediateenergy Coulomb excitation technique was used to deduce the B(E2) value in ¹⁰⁴Sn [2013Ba57, 2014Do19]. Both results are consistent, and show the enhanced collectivity below the midshell, approaching N=Z=50. These results disagree with the modern many-body calculations. The same technique was used to measure B(E2) values in ^{106,108,110}Sn at GSI RISING, MSU, and REX-ISOLDE at CERN [2005Bb09, 2007Va22, 2008Ek01, 2008EkZZ]. These results show that the transition strengths for these nuclei are larger than predicted by current state-of-the-art shell-model calculations. For spectroscopic purposes, ^{112,114}Sn nuclei were re-measured at MSU, and IUAC in New Delhi, India [2007Va22, 2010Ku07, 2011Ku05]. Precise measurements of the first 2⁺ excited states lifetimes in ^{112,114,116,122}Sn and B(E2) values in ^{116,118,120,124}Sn were conducted with the Doppler shift attenuation technique at GSI and Australian National University, respectively [2011Ju01]. For the isotopes ^{112,114,116}Sn, the E2 transition strengths, deduced from the measured lifetimes, are in disagreement with the previous values and indicate a shallow minimum at N=66. A series of Coulomb excitation and Doppler shift attenuation measurements were conducted at Oak Ridge National Laboratory to measure collectivity in 124,126,128,130,132,134 Sn, employing carbon and titanium targets [2012Ku24, 2011Al25, 2004Ra27, 2005Va31]. The Oak Ridge data were compared to large-scale shell-model and quasiparticle random-phase calculations. The shell model predictions are consistent with a generalized-seniority scheme, which predicts relatively constant 2_1^+ energies and a parabolic trend in the matrix elements for A=102-130.

3.26. 108,112,114,118,120,122,128,130,132,134,136 Te

The lifetime of the first excited 2⁺ state in ¹⁰⁸Te has been measured, using a combined recoil decay tagging and recoil distance Doppler shift technique at Jyvaskyla (JYFL), Finland [2011Ba37]. In contrast to the earlier results for the light

tin isotopes, ¹⁰⁸Te does not show any enhanced transition probability with respect to the theoretical predictions and the tellurium systematics. The lifetime in the neutron-deficient nucleus ¹¹²Te has been measured using the DPUNS plunger and the recoil distance Doppler shift technique [2015Do04]. ¹¹⁴Te lifetimes were determined using the recoil distance Doppler-shift technique with a plunger device at Köln [2005Mo20]. The energy spectrum of ¹¹⁴Te is a slightly anharmonic vibrator, however, the obtained B(E2) values are in strong contradiction with the theoretical predictions of the U(5) limit of IBM. Lifetimes of excited states in ¹¹⁸Te have been measured using the Doppler Shift Attenuation method (DSAM) and Recoil Distance method (RDM) at the Niels Bohr Institute in Denmark [2002Pa19]. The excitation energies and B(E2) values are satisfactorily interpreted in the framework of IBM. ¹²⁰Te was recently studied at Yale with a plunger device and inverse kinematics Coulomb excitation with heavy beams [2010We12], and at IUAC, New Delhi by DSAM [2014Sa49]. 122 Te excitations have been investigated using γ -ray spectroscopy following inelastic neutron scattering at Kentucky [2005Hi04]. The energies of low-lying levels of tellurium are described by the IBM. ^{126,128,130,132}Te collectivities were measured with time correlation between fission fragments and γ -rays at Grenoble [2001Ge07]. Independently, B(E2) values of ^{132,134,136}Te were studied with Coulomb excitation at Oak Ridge [2002Ra21], and explained within the shell model formalism. The results of this measurement were further re-analyzed by the Oak Ridge group and updated values were published in a subsequent measurement publication [2011Da21]. Complementary B(E2) values in ^{130,132,134}Te were determined through Coulomb excitation in inverse kinematics [2003Ba01]. This led to the extension of systematics of experimental quadrupole collectivities from the ground state to the first excited state to the N=82 shell closure.

327 114,124,126,128,130,132,134,138,140,142,144 χ_e

Quadrupole collectivity in 114 Xe was studied using the 4π spectrometer, EUROBALL IV and Cologne plunger device [2002De26], then explained with a total Routhian surfaces calculation. As a first test of SeGA Ge-array, the MSU group has conducted a Coulex experiment at the Argonne tandem [2006Mu04] to study 124,126,128,130,132,134 Xe. These results agree well with the previously published data. Preliminary values for the B(E2) values in 138,140,142,144 Xe were deduced using the Coulex technique and MINIBALL Ge-array [2007Kr12, 2007Kr19, 2008KrZZ]. The 140 Xe value agrees well with a previously published measurement [1999Li18], while the 138 Xe experimental value exceeds that predicted by the quasiparticle random phase approximation.

$3.28.~^{122,136,140}Ba$

 122 Ba lifetime was studied with RDM using the Cologne plunger device [2010Bi11]. The corresponding B(E2) value agreed with the predictions of the X(5) model and calculations performed in the framework of the IBA-1 and IBA-2 models. A 136 Ba stable beam Coulex measurement at Oak Ridge yielded a reduced transition probability of 0.46(4) e^2b^2 [2002Ra21]. The transition probability is in agreement with the adopted value [13]. A B(E2) value and lifetime of 0.484($^{+38}_{-101}$) e^2b^2 and 10.4($^{+22}_{-8}$) ps, respectively, were measured at REX-ISOLDE and MINIBALL setup at CERN using 140 Ba particle beams [2012Ba40]. The present result agrees with predictions of Monte Carlo shell-model and energy density functional calculations.

$3.29.~^{148,152}Ce$

A 252 Cf(SF) radioactive source and the Gammasphere array were employed to measure lifetimes of 130(43) and 360(24) ps in 148,152 Ce [2006Hw01, 2005Fo17], respectively. The 148 Ce lifetime is marginally lower but still consistent

with the previously reported values, while ¹⁵²Ce was measured for the first time.

$$3.30. \ ^{136,140}Nd$$

A relativistic Coulex technique was employed to deduce a B(E2) strength of 80(11) W.u. in 136 Nd at Darmstadt [2008Sa35]. The comparison with the asymmetric rotor and the Geometrical Collective Model (GCM) yields information on the nuclear shape, quadrupole deformation parameters, and indicates γ -softness of the N=76 isotone. A low-energy Coulex experiment was used to deduced a B(E2) \uparrow value of 0.72(5) e^2b^2 in 140 Nd using the Miniball array at the REX-ISOLDE-CERN facility [2013Ba38]. The quasiparticle phonon and large-scale shell model calculations of N=80 isotones could not reproduce an E2 strength enhancement in 140 Nd.

$$3.31. \ ^{140,142,152}Sm$$

Lifetime of the first 2⁺ excited state at 530.7 keV was measured from recoil-distance Doppler shift method [2015Be25] at the Heavy Ion Laboratory of the University of Warsaw. The Coulomb excitation technique was used to investigate evolution of quadrupole collectivity in ¹⁴²Sm [2015St08]. A recent in-flight fast-timing measurement of the ¹⁵²Sm lifetime [2014Pl01] agrees well with the ENSDF recommendation.

$$3.32. \, ^{138,148,160,162,164} Gd$$

The first excited state lifetime, 308(17) ps, for 138 Gd was confirmed using RDM with the Cologne plunger at the Javaskyla facility [2011Pr10]. The excitation energies in 138 Gd can be reproduced with X(5) critical-point calculations, however, large experimental B(E2) uncertainties cannot rule out contributions from rotational and vibrational modes of excitation. The same technique was applied to measure a lifetime of 6.0(19) ps in 148 Gd using the EUROBALL array [2003Po02], and results were reproduced with shell model calculations. 148 Gd has the smallest B(E2) value among the N>82 nuclei in the region. Lifetimes in 160,162,164 Gd were recently measured using a β - γ timing technique at JAEA [2010NaZY]. These results suggest that the deformation of nuclear shape would be enhanced at N=98.

To test the X(5) model, the lifetime for ¹⁵⁶Dy was measured to be 106(15) ps with the recoil distance Doppler-shift method using the Cologne coincidence plunger apparatus at Legnaro [2006Mo22]. A fit of the data using the general collective model suggests contribution of a deeper collective potential.

3.34.
$$^{158,170}Er$$

A lifetime of 341(10) ps for ¹⁵⁸Er was measured with the recoil distance technique and the Gammasphere array [2002Sh09]. This result is consistent with the previous measurement [1986Os02] and was reproduced using Ultimate Cranker model calculations. The Coulex technique was used to deduce properties of ¹⁷⁰Er at Legnaro [2011Di07]. The reduced matrix elements extracted with the Coulomb excitation code GOSIA are in agreement with collective model predictions.

3.35. 168,170,172,174,176 Hf

Preliminary values of the lifetimes for the first 2⁺ states in ^{168,172}Hf, were measured using the delayed-coincidence technique at Yale [2011We08, 2010We12] to be 1237(10) and 2655(79) ps, respectively. The results for ¹⁶⁸Hf and ¹⁷²Hf are in agreement and slightly higher than ENSDF adopted values, respectively. These results and the transition strengths in ^{174,176}Hf were tested at the university of Cologne [2011ReZZ, 2015Ru03]. A lifetime of 1740(60) ps for ¹⁷⁰Hf was deduced at the Stony Brook University TANDEM-LINAC facility with the help of a pulsed beam technique [2006Co20]. The corresponding E2 transition rate follows the expected trend and empirically confirms the correlation between deformation and the filling of major shells. An extended e⁻-e⁻ lifetime measurement of ¹⁷⁴Hf has been performed at the Cologne Tandem Van-de-Graaff accelerator [2009Re20]. This measurement suggests a value lower than previously reported.

$3.36.~^{172,174,176,178,188}W$

The first excited 2^+ state lifetimes of 970(29), 1431(9), and 1642(21) ps in 172,176,178 W, respectively, were measured in fast timing experiments using conversion electron spectroscopy at Köln [2010Ru12, 2009Re20]. IBM calculations reproduce systematics of energy levels for the tungsten isotopes, however, transition rates could only be satisfactorily reproduced with individual adjustments of the effective charge. The preliminary value of the 174 W lifetime was deduced using a DC technique at Yale [2011We08]. The IFIN-HH, Romania facility was used to measure a lifetime of 1255(173) ps in 188 W with a fast-timing technique [2013Ma66]. This result, in combination with systematics and Woods-Saxon potential energy surface calculations, suggests a prolate deformed minima with rapidly increasing γ -softness for tungsten isotopes.

3.37. $^{174,176,178,180,188,190}Os$

The first excited 2^+ state lifetime of 513(20) ps in 174 Os was measured with a DC technique at the China Institute of Atomic Energy [2012Li50]. The low uncertainty makes this value sufficiently precise to serve as a normalization parameter for meaningful tests of nuclear models. The DC technique was also employed to deduce the lifetimes of 176,178,180 Os at Köln [2005Mo33]. Data for the even-even osmium isotopes transition strengths show a maximum value at the N=104 midshell that corresponds to the simple expectation of the $N_{\pi}N_{\nu}$ rule of the IBA. Lifetimes of 930(140) and 540(36) ps in 188,190 Os, respectively, were measured with the recoil distance technique at Yale [2001Wu03]. The measured lifetimes confirm the E2 properties derived from prior heavy-ion induced Coulomb excitation experiments [1996Wu07]. The previously known 190 Os lifetime was verified at the IFIN-HH facility [2012MaZP].

$3.38.\ ^{178,182,186,196}Pt$

The lifetime of the 2₁⁺ state in ¹⁷⁸Pt was measured by using fast-timing techniques with the high-purity Ge and LaBr₃ scintillator at the China Institute of Atomic Energy [2014Li45]. The first excited 2⁺ state lifetime of 590(102) ps in ¹⁸²Pt was measured with RDM at Köln [2012Gl01]. Calculations within the IBM and the GCM indicate shape coexistence in ¹⁸²Pt. This is consistent with the previous measurement lifetimes of 709(43) and 318(24) ps in ^{182,186}Pt, which were deduced using the same method at the ATLAS facility [2012Wa16]. The experimental lifetime value in ¹⁹⁶Pt has been revisited recently [2015Jo01].

3.39. 180,182,184,186 Hq

The first excited 2⁺ state lifetimes of 17.5(25) and 41(3) ps in ^{180,182}Hg were measured with RDM at Jyvaskyla [2009Gr09]. These results support the shape coexistence of weak prolate and intruding prolate structures in neutron-deficient Hg nuclei. ^{184,186}Hg lifetimes were measured using the recoil distance Doppler-shift method using the Köln plunger device [2014Ga04]. These more precise lifetime values have been used in the analysis of Coulomb excitation of ^{182,184,186,188}Hg measurements at the REX-ISOLDE facility [2014Br05]. Further analysis of properties of the low-lying states in ^{182–188}Hg indicates a partial agreement with beyond mean field and IBM-based models and a possible interpretation within a two-state mixing model.

Lifetimes of prolate intruder states in 186,188 Pb were measured with RDM at Jyvaskyla [2008Gr04]. Reduced transition probabilities, derived from the measured lifetimes confirm the high collectivity of the intruder states in this region, and shed more light on shape coexistence typical for the nuclei near Z=82 and N=104. A lifetime of 0.00147(10) ps and B(E2) \uparrow value of 0.25(6) e²b² in 208 Pb were deduced with nuclear resonance fluorescence technique at Darmstadt [2003En07] and the NIAIS, Japan [2008Sh23], respectively. The latter result was compared with an estimation of self-consistent random phase approximation using a semi-realistic interaction.

$$3.41.\ ^{194,196,198,200,202}Po$$

The first excited 2⁺ state lifetimes, 37(7) and 11.6(15) ps, in ^{194,196}Po, respectively, were measured with RDM at Jyvaskyla [2008Gr04, 2009Gr08]. Self-consistent mean-field calculations suggest that oblate intruder states in ¹⁹⁴Po could dominate the ground state. A calculated collectivity in ¹⁹⁶Po, considerably smaller than the experimental value of 47(6) W.u., indicates a contribution from the intruder structures. E2 matrix elements for ^{196,198,200,202}Po have been extracted at Leuven with GOSIA analysis [2015KeZZ]. The values of nuclear matrix elements hint towards mixing of a spherical structure with a weakly-deformed rotational structure.

$$3.42.\ ^{202,204,220}Rn$$

Shape coexistence in 202,204 Rn [2015Ga19] has been studied at CERN. The same facility also measured a B(E2) \uparrow value of 1.88(11) e^2b^2 in the 'octupole deformed' or distorted pear-shaped nucleus 220 Rn [2013Ga23].

$$3.43.\ ^{224}Ra$$

In another pear-shaped nucleus, 224 Ra, quadrupole collectivity was investigated in the same work at CERN [2013Ga23]. Its B(E2) \uparrow value of 3.96(12) e²b² provides evidence for a stronger octupole deformation than in 220 Rn.

4. B(E2)↑ Evaluation Policies

The current evaluation represents the recommended values of B(E2) \uparrow in e^2b^2 , mean lifetimes (τ) in picoseconds (ps) and deformation parameters (β_2) for the first 2⁺ states in Z=2-104, even N nuclei. These quantities are mutually related:

$$\tau = 40.81 \times 10^{13} E_{\gamma}^{-5} [B(E2) \uparrow /e^2 b^2]^{-1} (1 + \alpha_T)^{-1}$$
(1)

$$\beta_2 = (4\pi/3ZR_0^2)[B(E2)\uparrow/e^2]^{1/2},\tag{2}$$

where E_{γ} and α_T are the γ -ray energy in keV and the total conversion electron coefficient, respectively, and $R_0^2 = (1.2 \times 10^{-13} A^{1/3} \text{cm})^2$. To introduce an additional measure of collectivity for nuclear excitations, Weisskopf units (W.u.) are added. Transition quadrupole moment values Q_0 in barns (b) are not included in the current evaluation, however can be deduced from the presented work

$$Q_0 = [16\pi B(E2) \uparrow /5e^2]^{1/2}. (3)$$

All the measured values can be organized using three classes of experimental techniques:

- Model-independent or traditional types of measurements [13]: transmission Doppler-shift attenuation lifetime (TDSA), recoil distance Doppler-shift (RDM or RDDS), delayed coincidences (DC or TCS), low-energy and intermediate-energy Coulomb excitation (CE) and nuclear resonance fluorescence (γ, γ') .
- Low model-dependent: electron scattering (E,E'), hyperfine splitting.
- Model-dependent: inelastic scattering of light and heavy ions (IN-EL).

4.1. B(E2)↑ Evaluation Procedure

This evaluation is based on the analysis of results from 2579 quadrupole collectivity measurements and 1273 experimental references. The literature cut-off date is September 2015. This number includes 120 pre-2000 experimental references that were not listed in the previous compilation of S. Raman [13]. These data span more than sixty years, and experimental techniques have evolved over time. It is worth noting that in the older measurements results may have been affected by the lack of side-feeding corrections, and the newer measurements should take precedence. The evaluation procedure for deducing the adopted (recommended) B(E2)↑ values is presented below:

- Compile a list of experimental B(E2) \uparrow , \downarrow or W.u., τ and β_2 values as reported in the original papers. Reported values depend on the measured quantities and are deduced from experimental data in the offline analysis.
- Convert experimental values into B(E2) \uparrow in e^2b^2 .
- Analyze B(E2) values. In a few of the older results, where uncertainties were not quoted by the authors, we have taken the values as adopted by Raman *et al.* [13]. The experimental values listed in Table 3, with the original uncertainties as quoted by the authors (not adjusted for evaluation purposes).
- Round uncertainties to two (rarely three) significant digits.
- Accept asymmetric uncertainties, if necessary.
- Direct communication with authors in discrepant cases, if possible.
- Deduce B(E2)↑ recommended values using model-independent or traditional, combined (model-independent and low model-dependent) and model-dependent data sets with the visual averaging library software package [22] using the selected data sets.

4.2. Asymmetric Uncertainties

In this work, evaluated $B(E2)\uparrow$ values are deduced from the measured values of B(E2), mean lifetime, and, in rare cases, deformation parameters. Note that the first two quantities are inversely dependent. Previous evaluations of S. Raman et al. [12, 13] contain two different treatments of central values and uncertainties. Originally, S. Raman et al. [12] used a standard mathematical procedure to convert a particular τ value to the corresponding $B(E2)\downarrow$ value. Later, this procedure was changed in favor of converting the central τ value [13] to a value between the upper and lower bounds, by extracting the mean of the two values and assigning an uncertainty so that the value overlapped the two bounds. This treatment produced symmetric uncertainties, however the original lifetime values could not be directly reproduced from the modified $B(E2)\uparrow$ central values. To resolve this discrepancy, we kept central values and accepted asymmetric uncertainties that arise from the inverse dependence described above. In addition, original measurements may contain asymmetric uncertainties due to particular experimental conditions and analyses.

4.3. A Brief Review of the Previous Results

Consistency between the present results and the work of S. Raman et al. [13] is an important issue. The authors of the Ref. [13] indicate: "Where several B(E2) \uparrow values are available for a given nuclide, we have generally used weighting values that are inversely proportional to the quoted uncertainty rather than inversely proportional to the square of the quoted uncertainty, which would be the correct procedure if the uncertainties were purely statistical. We believe that our weighting procedure results in a more reliable average value. We did not, however, adhere religiously to the weighting procedure outlined above in all cases."

We do not know the exact course of action taken by S. Raman and his collaborators for the evaluation of B(E2) values in each particular case. However, in the present work we rely on the general statistical and uncertainty handling procedures employed in nuclear data evaluations such as in the ENSDF database, or in Particle Data Project [23], and employ the Visual Averaging Library code [22] where weighting values are inversely proportional to the square of the quoted uncertainty. To check the validity of S. Raman's claim to have used an inverse weighting procedure, we developed a custom extension for the Visual Averaging Library that produces values using averaging weights which are inversely proportional to the quoted uncertainty. This approach is also used to make an overall consistency check as described below between our results and those in Raman et al. [13] where no new experimental values are available.

In this work, we have selected 135 nuclides where no new measurements have been reported since the previous evaluation, and $B(E2)\uparrow$ value for each nuclide value was measured at least twice. The ratio of these data are shown in the upper panel of Fig. 1. The majority of the $B(E2)\uparrow$ values are within 5% agreement. Notable deviations from unity in 126 Ce and 164 Hf are due to missing data and adoption by Raman of the earliest results, respectively.

To extend this analysis we calculate both the inverse squared and inverse $B(E2)\uparrow$ averages for these nuclides. A comparative analysis of the current inverse squared, current inverse, and Raman's $B(E2)\uparrow$ results for Z=2-104 isotopes is shown in Table 2 and Fig. 1. The data analysis indicates that we have a good agreement between the present inverse squared averages and Raman's values, and the inverse averaging often results in comparable values with the corresponding inverse squared averages values. These facts and comments in the table clearly indicate that S. Raman et al. [13] were not following their practice of linear weighting consistently.

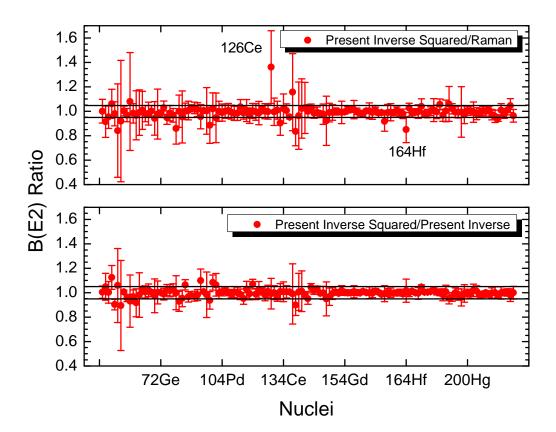


Fig. 1: The ratio of the present B(E2) values to Raman's evaluation and inverse squared to inverse (linear) averages for 135 nuclides are shown in the upper and lower panels, respectively. The majority of calculated values lie within a $\pm 5\%$ band near unity.

5. Adopted values

The recommended values for Z=2-104 isotopes from this work are shown in Table 3. These data extend the previous work of S. Raman *et al.* [13] with 119 new B(E2) \uparrow values as well as a large number of updated values. The current work also contains 646 γ -ray energies for the first 2⁺ states in even-even nuclei. A comparative analysis of the two evaluations is presented below.

In the present evaluation, we used the latest version of the visual averaging library [22], Band-Raman calculation of Internal conversion coefficients (α_T) [24] and presently available data. The visual averaging library program includes unweighted and weighted averages as well as the limitation of relative statistical weights (LWM) [25], normalized residual (NRM) [26], Rajeval technique (RT) [27], the Expected Value (EVM) [28], bootstrap and Mandel-Paule (MP) [29] statistical methods to calculate averages of experimental data with uncertainties. In our evaluation, we generally adopted the weighted average, using NRM in some discrepant cases. We accepted reduced $\chi^2 < 2$ as a reasonable fit for available data sets. Previously, S. Raman et al. [13] used an averaging procedure based on the inverse of the quoted uncertainties, while current evaluation uses statistical methods based on the inverse squared value of the quoted uncertainties. Our procedure, in addition to being mathematically justifiable, is consistent with the general methodology used in treatment of data for ENSDF database and horizontal evaluations.

The Band-Raman method [24] was used in this work, while the previous evaluation [13] employed the internal conversion coefficients code (ICCDF) [30]. The former code incorporates the Dirac-Fock atomic model with the exchange interaction between atomic electrons and the free electron receding to infinity during the conversion process. Total conversion coefficients for the Z=2-104 - region were calculated using the Australian National University BrIcc code http://bricc.anu.edu.au/ and shown in Fig. 2. The coefficient values increase over eight orders of magnitude across the nuclear chart, and reach maximum values in the actinide region.

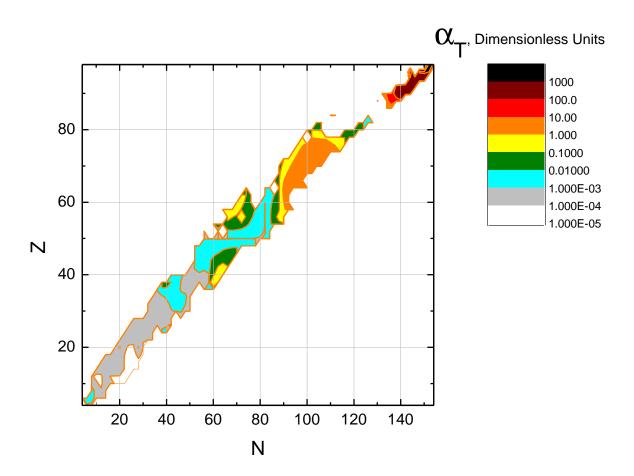


Fig. 2: Total Conversion Coefficients (α_T) for even-even Z=2-104 nuclei. The coefficients have been deduced using the frozen orbital (FO) version of the BrIcc code.

For low Z values and relatively high $2_1^+ \to 0_1^+$ transition energies, the total E2 conversion coefficients are relatively small ($\alpha_T < 0.002$) and do not substantially affect the adopted values. A complementary comparison between the present model-independent and the previous evaluation adopted values for ¹⁴C, ^{28,34,36,38}Si, ^{38,40,42}S and ³⁸Ca, where no new data were added, shows good agreement. Consequently, the differences between the current work and S. Raman *et al.* [13] evaluation for light and medium nuclei are mainly due to the addition of new experimental results.

We recommend using model-independent or traditional B(E2) \uparrow adopted values as the most reliable. If a model-independent value is not available, a low model-dependent value should be used. Finally, a model-dependent value can be used if no other values are available. Table 3 recommended values for Coulomb excitation and in-elastic scattering measurements in 28 Ne and 30,32,34 Mg isotopes support this conclusion. This is consistent with the previous evaluation of

Raman et al. [13], who treated data as follows: "However, our adopted $B(E2)\uparrow$ values are based only on the traditional types of measurements because these are more direct and involve essentially model-independent analyses." Our new recommended values are interpreted within the scope of large-scale shell-model calculations which are presented in the following sections.

5.1. Analysis of Adopted Values

Evaluated values are traditionally given in a tabular format as in the Table 3. In addition, we will also show these data in the two-, and three-dimensional graphic form and conduct a brief "visual inspection". Plots of evaluated 2_1^+ state energies, quadrupole deformation parameters, and quadrupole collectivities in e^2b^2 and W.u. units as functions of N and Z are shown in Figs. 3,4, and 5, respectively. Fig. 3 shows that energies of the 2_1^+ states are relatively high near the closed shells at Z=20, Z=28 and N=28, Z=50 and N=50, Z=82 and N=82, and N=126. However, $2_1^+ \rightarrow 0_1^+$ transition energies are not sufficient for the understanding of nuclear structure effects across the nuclear chart.

Furthermore, a combination of the transition energy and quadrupole deformation plots supplies a more compelling picture of nuclear shell closure of atomic nuclei. The deformation parameter chart indicates an anti-correlation effect between its values and the 2_1^+ state energies, as shown in Figs. 4 and 3, respectively. The nuclear shell closure effects result in small deformation parameter values and relatively large first excited state energies. These effects near Z=N=8, Z=20, Z=40 and N=50, Z=50 and N=82, and Z=82, and the deformation regions are shown in Fig. 4 using a vertical-line pattern. To gain additional insights on nuclear collectivity a complementary analysis of the B(E2) \uparrow adopted values has been conducted in Figs. 5. The last Figure clearly demonstrates distinct nuclear properties for light (Z<30), medium (Z<50), heavy (Z<84), and actinide (Z>88) nuclides. In addition, systematic trends of evaluated B(E2) \uparrow and E₂ $_1^+$ values are shown in Graphs 1-52. These Graphs demonstrate the evolution of nuclear properties of even-even nuclei and could motivate new measurements.

6. Shell Model Calculations

The experimental data presented in this paper covers regions of the nuclear chart that are best treated by a diversity of nuclear structure models, including *ab initio* models such as Green's Function Monte Carlo (GFMC) [31], No-Core Shell Model (NCSM) [32], and Coupled-Cluster model [33], but also effective models such as the traditional shell model with effective interactions, Quasi-Particle Random Phase Approximation [34], Generator-Coordinate Method [35], etc. Attempting to describe the data using all these models is clearly a tall goal. Therefore, we confine ourselves to the description of a limited amount of data using the traditional shell model with effective interactions. This model seems to have a wide range of applicability, from light p-shell nuclei to nuclei around 208 Pb, provided that good effective interactions are available. Here, we only use the shell model to give some examples for p-shell nuclei, sd-shell nuclei, sd-shell nuclei, and pf-shell nuclei, for which effective shell model interactions are established. In that vein, we avoided cases where protons or neutrons are near closed shells or in the "island of inversion".

For the p-shell examples we used the CKIHE interaction [36] for ⁶He and PWT interaction [37] for Be and C. For the sd-shell nuclei we used the USDB interaction [38] and for cases with protons in sd-shell and neutrons in the pf-shell we used the SDPFU interaction [39]. Finally, for the few cases of pf-shell nuclei we used the GXPF1A interaction [40, 41]. A few other cases for the A=60-100 region could be also considered using the JUN45 interaction [42] in a model space

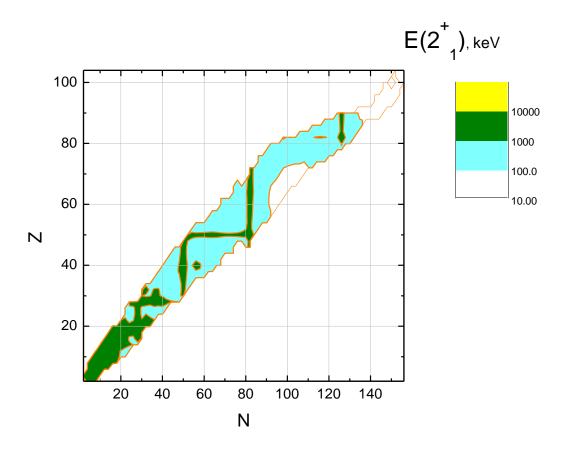


Fig. 3: Energies of 2_1^+ states $(E(2_1^+))$ for even-even Z=2-104 nuclei, in keV.

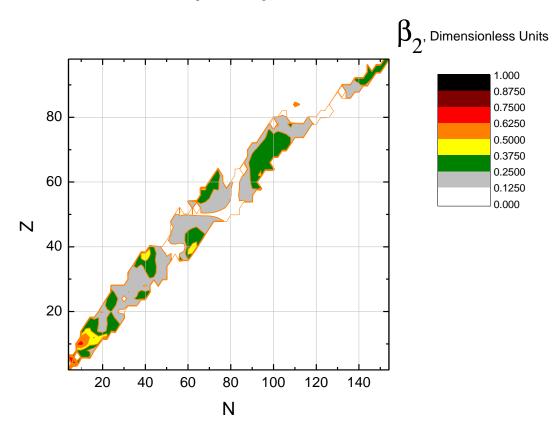


Fig. 4: Quadrupole deformation parameter (β_2) values for even-even Z=2-104 nuclei.

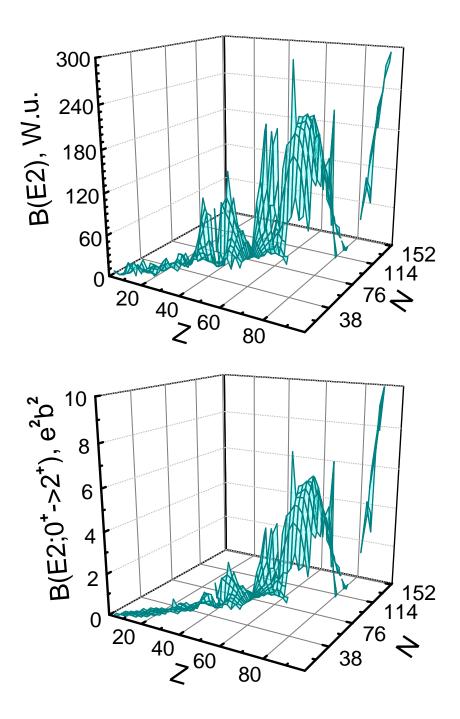


Fig. 5: B(E2) \uparrow in e²b² and W.u. for even-even Z=2-104 nuclei.

that includes the $1p_{3/2}$, $1p_{1/2}$, $0f_{5/2}$, $0g_{9/2}$ orbitals, but more insight into this region of nuclei is required for higher reliability. Isolated cases of Sn, Te, Xe, and Ba isotopes could be considered, but the effective interactions need to be further refined to show consistent reliability. Results of these calculations are shown in Table 4, and complementary details of shell model calculations and analysis of Cr, Fe, Ni and Zn nuclei could be found in our previous publication [14]. These results were produced with "canonical" effective charges: 0.5e for neutrons and 1.5e for protons.

Finally, the shell model and evaluated 2_1^+ state energies and quadrupole collectivities, are plotted in Graphs: 1 —

52 for Z=2, 8, 20, and 28, respectively. These values and their mutual correlations provide strong evidence for nuclear shell model across the nuclear chart. The strong correlations between transition energies and quadrupole collectivities are, particularly, evident for doubly-magic nuclei 40,48 Ca, 56 Ni, 132 Sn, and 208 Pb. In addition, analysis of Graph 1 data indicates "magic" properties for neutron-rich nucleus 24 O. There are other theoretical calculations of the B(E2) \uparrow values and first excited states in even-even nuclei [44, 45]. These calculations could be used for nuclei where present shell model calculations are missing.

7. Future Plans & Complementary Analyses

There is a large volume of B(E2) experimental activities worldwide; a new nucleus has been measured every month in the last 10-15 years. In such an active field of experimental work, constant compilation and evaluation work is required. A compilation of the latest experimental results will be posted on the B(E2) project website (http://www.nndc.bnl.gov/be2), and the next evaluation published in about ten years.

Due to space limitation, Grodzins systematics [46] and comparison of evaluated values based on the different types of measurements [47] are not presented here. These analyses will be addressed in subsequent publications.

8. Conclusions

A new B(E2;0 $_1^+ \rightarrow 2_1^+$) compilation and evaluation of even-even nuclei has been performed under the auspices of the USNDP. It is a continuation of the nuclear data work by P.H. Stelson and L. Grodzins, and S. Raman *et al.* on quadrupole transition probabilities [11–13]. The current evaluation literature cut-off date is September 2015, it includes experimental B(E2) \uparrow values for 119 new nuclei, a large number of updates and extends the previous evaluation to 447 nuclei. The evaluation incorporates many features requested by nuclear data users and broadens the list of compiled experimental quantities. The present evaluated results are compared with the previous evaluation, and large-scale shell model calculations, where available.

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References

References

- [1] M. Goeppert-Mayer, Phys.Rev. 78, 16 (1950).
- [2] E.K. Warburton, J.A. Becker, B.A. Brown, Phys. Rev. C 41, 1147 (1990).
- [3] "Isotope Science Facility at Michigan State University. Upgrade of the NSCL Rare Isotope Capabilities," Michigan State University Cyclotron Laboratory Report MSU-CL-1435 (2006).
- [4] O. Sorlin, M.-G. Porquet, Prog.Part.Nucl.Phys. 61, 602 (2008).
- [5] R. Capote, M. Herman, P. Obložinský et al., Nucl. Data Sheets 110, 3107 (2009).
- [6] M. Herman, R. Capote, B.V. Carlson et al., Nucl. Data Sheets 108, 2655 (2007).
- [7] A.J. Koning, D. Rochman, Nucl. Data Sheets 113, 2841 (2012).
- [8] M.B. Chadwick, M.W. Herman, P. Obložinský et al., Nuclear Data Sheets 112, 2887 (2011).
- [9] A. J. Koning, E. Bauge, C.J. Dean et al., J. of the Korean Physical Society 59, No. 2, 1057 (2011).
- [10] K. Shibata, T. Kawano, T. Nakagawa et al., "Journal of Nuclear Science and Technology 48, 1 (2011).
- [11] P.H.Stelson, L.Grodzins, Nucl. Data A1, 21 (1965).
- [12] S. Raman, C.H. Malarkey, W.T. Milner, C.W. Nestor, Jr., P.H. Stelson, At. Data Nucl. Data Tables 36, 1 (1987).
- [13] S. Raman, C.W. Nestor and P. Tikkanen, At. Data Nucl. Data Tables 98, 1 (2001).
- [14] B. Pritychenko, J. Choquette, M. Horoi, B. Karamy, B. Singh, At. Data Nucl. Data Tables 98, 798 (2012).
- [15] B. Pritychenko, M. Birch, M. Horoi, B. Singh, Nucl. Data Sheets 120, 112 (2014).
- [16] B. Pritychenko, E. Běták, M.A. Kellett, B. Singh, J. Totans, Nucl. Instr. and Meth. A 640, 213 (2011); Available from (http://www.nndc.bnl.gov/nsr).
- [17] T.W. Burrows, Nucl. Instr. and Meth. A286, 595 (1990).
- [18] J.K. Tuli, Nucl. Instr. and Meth. A369, 506 (1996); Available from (http://www.nndc.bnl.gov/ensdf).
- [19] Experimental Unevaluated Nuclear Data List (XUNDL); Available from (http://www.nndc.bnl.gov/xundl).
- [20] A.L. Nichols, O. Schwerer, S. Dunaeva, Bull. Russian Acad. Sci.: Physics 71, 1334 (2007).
- [21] V. Zagrebaev, A. Kozhin, JINR-E10-99-151 (1999); Available from (http://nrv.jinr.ru/nrv).
- [22] Available from \http://www.nndc.bnl.gov/nndcscr/ensdf_pgm/utility/vavglib/\.
- [23] K.A. Olive, K. Agashe, C. Amsler et al., Chin. Phys. C 38, 090001 (2014).
- [24] T. Kibédi, T.W. Burrows, M.B. Trzhaskovskaya et al., Nucl. Instr. and Meth. A 589, 202 (2008); "BrIcc v2.2b, Conversion Coefficient Calculator", available from (http://physics.anu.edu.au/nuclear/bricc/).
- [25] A.L. Nichols, APPL. RADIAT. ISOT. **60**, 247 (2004).
- [26] M.F. James, R.W. Mills, D.R. Weaver, Nucl. Instr. and Meth. in Phys. Res. A313, 277 (1992).

- [27] M.U. Rajput and T.D. MacMahon, Nucl. Instr. and Meth. in Phys. Res. A312, 289 (1992).
- [28] M. Birch, B. Singh, Nucl. Data Sheets 120, 106 (2014).
- [29] A.L. Rukhin and M.G. Vangel, J. Am. Stat. Assoc. 93 303 (1998).
- [30] I.M. Band and M.B. Trzhaskovskaya, At. Data Nucl. Data Tables 55, 43 (1993).
- [31] S.C. Pieper, R.B. Wiringa, J. Carlson, Phys. Rev. C 70, 054325 (2004).
- [32] P. Navratil, V. G. Gueorguiev, J. P. Vary et al., Phys. Rev. Lett. 99, 042501 (2007).
- [33] G. R. Jansen, M. Hjorth-Jensen, G. Hagen, T. Papenbrock, Phys. Rev. C 83, 054306 (2011).
- [34] J. Terasaki, J. Engel, and G. F. Bertsch, Phys. Rev. C 78, 044311 (2008).
- [35] L. M. Robledo, G. F. Bertsch, Phys. Rev. C 86, 054306 (2012).
- [36] J. Stevenson, B.A. Brown, Y. Chen et al., Phys. Rev. C 37, 2220 (1988).
- [37] E.K. Warburton, B.A. Brown, Phys. Rev. C 46, 923 (1992).
- [38] B.A. Brown and W. Richter, Phys. Rev. C 74, 034315 (2006).
- [39] F. Nowacki and A. Poves, Phys. Rev. C 79, 014310 (2009).
- [40] M. Honma, T. Otsuka, B. A. Brown, and T. Mizusaki, Phys. Rev. C 69, 034335 (2004).
- [41] M. Honma, T. Otsuka, B. A. Brown, and T. Mizusaki, Eur. Phys. J. A 25, Suppl. 1, 499 (2005).
- [42] M. Honma, T. Otsuka, T. Mizusaki, and M. Hjorth-Jensen, Phys. Rev C 80, 064323 (2009).
- [43] B.A. Brown, N.J. Stone, J.R. Stone et al., Phys. Rev. C 71, 044317 (2005); Erratum Phys.Rev. C 72, 029901 (2005).
- [44] L.M. Robledo, R. Bernard, G.F. Bertsch, Phys. Rev. C 86, 064313 (2012).
- [45] G. Scamps, D. Lacroix, Phys. Rev. C 88, 044310 (2013).
- [46] L. Grodzins, Phys.Lett. 2, 88 (1962).
- [47] J.M. Cook, T. Glasmacher, A. Gade, Phys.Rev. C 73, 024315 (2006).

Explanation of Tables

Table 1. Experimental B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei.

(Throughout this table, bracketed numbers refer to the uncertainties in the last digits of the quoted values.)

Nuclide The even Z, even N nuclide studied

 $B(E2)\uparrow$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition in

units of e^2b^2

au Mean lifetime of the state in ps

 β_2 Quadrupole deformation parameter or δ deformation length

Target nuclide
Beam Incident beam

Energy Incident beam energy

Method CE: Coulomb excitation

CE*: Coulomb excitation with beam energy above the Coulomb barrier

EE (e,e'): Inelastic electron scattering

DC: Delayed Coincidence

GG (γ, γ') : Resonance fluorescence

IN-EL: Inelastic scattering of light and heavy ions

PB: Pulsed beam

RDM, RDDS, TRDM: Recoil distance method

RSM: Recoil shadow method SCATT: Neutron scattering

TDSA, DSAM: Doppler shift attenuation

TCS: Time coincidences

Reference NSR database [16] keynumber

Comments ENSDF: ENSDF analysis

Ex: excluded

Gos: GOSIA code

MD: model dependent

NR: not in Raman

Rad: Raman adjusted

Su: superseded

Un: uncertainty introduced by Raman

Table 2. Comparative analysis of the present and S. Raman et al. [13] results.

Nuclide The even Z, even N nuclide studied

Inverse Squared $B(E2)\uparrow$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition

units of e^2b^2

Inverse $B(E2)\uparrow$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition

units of e^2b^2

Raman's $B(E2)\uparrow [13]$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition

units of e^2b^2

Comments on Raman's values [13] Description

Table 3. Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei.

(Throughout this table, bracketed numbers refer to the uncertainties in the last digits of the quoted values.)

Nuclide The even Z, even N nuclide studied

E(level) Energy of the first excited 2^+ state in keV either from a compilation or from current literature

 $B(E2)\uparrow$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition in

units of e^2b^2

Reduced electric quadrupole transition rate for the ground state to 2⁺ state transition in

W.u. (Weisskopf units); the Weisskopf single-particle value is $B(E2) \uparrow_{(sp)} = 2.97 \times 10^{-5} \text{A}^{4/3}$

 e^2b^2 [13]

Comments: Multiply $B(E2) \uparrow$ by a factor of 0.2 to convert it to $B(E2) \downarrow$,

$$(B(E2)\downarrow = \frac{(2J_i+1)}{(2J_f+1)}B(E2)\uparrow$$
, where $J_i=0$ and $J_f=2$);

use formula (3) to extract transition quadrupole moment values

 τ Mean lifetime of the state in ps

$$\tau = 40.81 \times 10^{13} E^{-5} [B(E2)\uparrow/e^2b^2]^{-1} (1+\alpha)^{-1}$$
, where α - Band-Raman internal conver-

sion coefficients

 β_2 Quadrupole deformation parameter

$$\beta_2 = (4\pi/3ZR_0^2)[B(E2)\uparrow/e^2]^{1/2}$$
, where

$$R_0^2 = (1.2 \times 10^{-13} A^{1/3} \text{cm})^2$$

 $=0.0144A^{2/3}$ b

Table 4. Shell model $E(2_1^+)$ -, $B(E2\uparrow)$ -values for even-even nuclei.

Nuclide The even Z, even N nuclide studied

E(level) Energy of the first excited 2^+ state in MeV

 $B(E2)\uparrow$ Reduced electric quadrupole transition rate for the ground state to 2^+ state transition in

units of e^2b^2

Model Space Description
Effective Interaction Description
Comments Description

Explanation of Graphs

Graph 1. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \to 2_1^+)$ values for He nuclei.

Theory CKIHE [36]

Evaluation

Graph 2. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \to 2_1^+)$ values for Be nuclei.

Theory PWT [37]

Evaluation

Graph 3. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for C nuclei.

Theory PWT [37], USDB [38]

Evaluation

Graph 4. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for O nuclei.

Theory USDB [38]

Evaluation

Graph 5. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \rightarrow 2_1^+)$ values for Ne nuclei.

Theory USDB [38]

Evaluation

Graph 6. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \rightarrow 2_1^+)$ values for Mg nuclei.

Theory USDB [38]

Evaluation

Graph 7. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Si nuclei.

Theory SDPFU [39]

Evaluation

Graph 8. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for S nuclei.

Theory SDPFU [39]

Evaluation

Graph 9. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \to 2_1^+)$ values for Ar nuclei.

Theory

Evaluation

Graph 10. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Ca nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 11. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \rightarrow 2_1^+)$ values for Ti nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 12. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Cr nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 13. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \rightarrow 2_1^+)$ values for Fe nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 14. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;0_1^+ \rightarrow 2_1^+)$ values for Ni nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 15. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Zn nuclei.

Theory GXPF1A [40, 41]

Evaluation

Graph 16. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Ge nuclei.

Evaluation

Graph 17. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Se nuclei.

Evaluation

Graph 18. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Kr nuclei.

Evaluation

Graph 19. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Sr nuclei. Evaluation

Graph 20. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Zr nuclei. Evaluation

Graph 21. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Mo nuclei. Evaluation

Graph 22. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Ru nuclei. Evaluation

Graph 23. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Pd nuclei. Evaluation

Graph 24. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Cd nuclei.

Graph 25. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Sn nuclei.

Evaluation

Evaluation

Evaluation

Graph 26. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Te nuclei.

Graph 27. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Xe nuclei. Evaluation

Graph 28. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Ba nuclei. Evaluation

Graph 29. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Ce nuclei. Evaluation

- Graph 30. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Nd nuclei. Evaluation
- Graph 31. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Sm nuclei. Evaluation
- Graph 32. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Gd nuclei. Evaluation
- Graph 33. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Dy nuclei. Evaluation
- Graph 34. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Er nuclei. Evaluation
- Graph 35. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Yb nuclei. Evaluation
- Graph 36. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Hf nuclei. Evaluation
- Graph 37. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for W nuclei. Evaluation
- Graph 38. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Os nuclei. Evaluation
- Graph 39. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Pt nuclei. Evaluation
- Graph 40. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Hg nuclei. Evaluation

- Graph 41. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Pb nuclei. Evaluation
- Graph 42. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Po nuclei. Evaluation
- Graph 43. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Rn nuclei. Evaluation
- Graph 44. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Ra nuclei. Evaluation
- Graph 45. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Th nuclei. Evaluation
- Graph 46. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for U nuclei. Evaluation
- Graph 47. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Pu nuclei. Evaluation
- Graph 48. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Cm nuclei. Evaluation
- Graph 49. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Cf nuclei. Evaluation
- Graph 50. Evaluated energies, $\mathrm{E}(2_1^+)$ for Fm nuclei.
- Graph 51. Evaluated energies, $\mathrm{E}(2_1^+)$ for No nuclei.
- Graph 52. Evaluated energy, $\mathrm{E}(2_1^+)$ for Rf nuclei.

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (* - above the Coulomb barrier experiments). Beam energy units are in MeV or (A)-MeV. NSR database keynumbers [16] are shown in the reference column.

(A)-MeV.	NSR database	e keynumbe	ers [16] are sho	wn in the r	eference colu	ımn.				
Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁶ He	0.00054(7)				⁶ He	²⁰⁹ Bi	22.5	CE?*	[2007Ko23]	MD
$^6\mathrm{He}$	0.0000 =(.)			$\delta = 1.7(3)$	⁶ He		240 A	IN-EL	[1999Au01]	Ex, NR
$^{10}\mathrm{Be}$			0.205(5)(7)	0-1.1(0)	⁷ Li	$^{ m p}_{^7{ m Li}}$	8,10	TDSA	[2009Mc02]	LA, III
$^{10}\mathrm{Be}$					1	^{9}Be			[1968Fi09]	
10 D			0.189(20)		d		1.7	TDSA	1 .	
$^{10}{\rm Be}$			0.190(30)		d	⁹ Be	2.8	TDSA	[1966Wa10]	
$^{12}\mathrm{Be}$			2.5(7)(3)		¹² Be	Au	42.9A	TDSA	[2009Im01]	
$^{12}\mathrm{Be}$				0.67(5)	$^{12}\mathrm{Be}$	p	53.8A	IN-EL	[2000Iw02]	NR
$^{14}\mathrm{Be}$				$\delta=1.18$	$^{14}\mathrm{Be}$	$_{^{12}\mathrm{C}}^{\mathrm{p}}$	68 A	IN-EL	[2007Su20]	
				(13)					,	
$^{10}\mathrm{C}$			0.219(12)		^{10}B	n	95	TDSA	[2012Mc03]	
$^{10}\mathrm{C}$			0.155(25)			$_{10}^{\mathrm{p}}\mathrm{B}$	2-9.5	TDSA	[1968Fi09]	
$^{12}\mathrm{C}$					p	11B				
			0.060(13)		$_{^{12}\mathrm{C}}^{\mathrm{p}}$		1.781	TDSA	[1988Lu04]	
$^{12}\mathrm{C}$			0.058(5)		12C	Au	0.4,0.8,1.4A	TDSA	[1988Ku33]	
$^{12}\mathrm{C}$			0.061(18)		α	27 Al, 28 Si	720	TDSA	[1980Li14]	
$^{12}\mathrm{C}$			0.045(10)		n	$^{27}\mathrm{Al}$	fast	TDSA	[1976Be64]	
$^{12}\mathrm{C}$			0.10(6)		γ	$^{12}\mathrm{C}$	< 6.75	GG	[1971Fa14]	
$^{12}\mathrm{C}$			0.065(9)		α	$^{15}\mathrm{N}$	0.898,1.640	TDSA	[1970Co09]	
$^{12}\mathrm{C}$	0.00397(33)		0.000(3)			⁴⁰ Ca	28-60	EE	[1970St10]	
$^{12}\mathrm{C}$	0.00597(55)		0.055(5)		e					
12C			0.055(7)		p	$^{12}\mathrm{C}$	4.1, 4.125,	TDSA	[1968Ri16]	
							4.55			
$^{12}\mathrm{C}$	0.00386(37)				e	$^{12}\mathrm{C}$	100-200	EE	[1967Cr01]	
$^{12}\mathrm{C}$, ,		0.060(20)		n	$^{10}{ m B}$	< 5.3	TDSA	[1967Ca02]	
$^{12}\mathrm{C}$			$0.057(^{+23}_{-17})$		α	$^9\mathrm{Be}$	3.2	TDSA	[1966Wa10]	
$^{12}\mathrm{C}$	0.00406(41)		0.007(-17)			¹² C		EE		
	0.00406(41)		0.050(0)		e		250		[1964Cr11]	
$^{12}\mathrm{C}$			0.050(6)		α	⁹ Be	2	TDSA	[1961De38,	
									1956De22]	
$^{12}\mathrm{C}$			0.066(13)		p	^{15}N	4.43	GG	[1958Ra14]	
$^{12}\mathrm{C}$	0.0047(10)		` ′	0.40(8)	e	$^{12}\mathrm{C}$	187	EE	[1956He83]	
$^{14}\mathrm{C}$	0.00187(25)			(-)	e	$^{14}\mathrm{C}$	101.2	EE	[1972CrZN]	
$^{16}\mathrm{C}$	0.00101(20)		$11.4\binom{+11}{-19}$		17 _N	$^9\mathrm{Be}$	72A	RDM	1 -	
-			11.4(-19)		16C				[2012Pe16]	
^{16}C			18.3(14)(48)		10°C	9 Be	40A	RDM	[2008On02]	
$^{16}\mathrm{C}$			11.7(20)		⁹ Be	⁹ Be	40	RDM	[2008Wi04]	
$^{16}\mathrm{C}$			77(14)(19)		$^{16}\mathrm{C}$	⁹ Be	34.6A	RDM	[2004Im01]	Su
$^{18}\mathrm{C}$			$22.4\binom{+34}{-24}$		¹⁹ Ne	⁹ Be	72A	RDM	[2012Vo05]	
$^{18}\mathrm{C}$			18.9(9)(44)		¹⁸ C	$^9\mathrm{Be}$	79A	RDM	[2008On02]	
$^{20}\mathrm{C}$			10.3(3)(44)		22O		1		1 -	
			$9.8(^{+28}_{-30})$		220	9 Be	101 A	RDM	[2011Pe21]	
¹⁶ O	0.00372(40)				γ	¹⁶ O	6.92	GG	[1977La15]	
^{16}O	0.00392(16)				e	¹⁶ O	38-60	EE	[1975Mi08]	
^{16}O	0.00512(36)				e	¹⁶ O	100-126	EE	[1973Be49]	
^{16}O	0.00432(20)				γ	¹⁶ O	6.92	GG	[1970Sw03]	
¹⁶ O	(/		$0.0064(^{+19}_{-16})$			¹⁹ F	0.874	TDSA	[1970Co09]	
$^{16}\mathrm{O}$	0.00000(40)		0.0004(-16)		P	16 O			1.	
100	0.00368(42)				е	100	Low mo-	EE	[1968St04]	
							mentum			
							transfer			
^{16}O	0.00317(27)				γ	¹⁶ O	6.8-7.3	GG	[1968Ev03]	
¹⁶ O	0.0028(8)				γ	¹⁶ O	7	GG	[1960Re05]	
^{16}O	0.0023(6)					¹⁶ O	6.91,7.12	GG	[1957Sw17]	
¹⁸ O	3.3328(3)				$\frac{\gamma}{^{18}O}$	¹⁹⁷ Au	46A	CE*	[2000Ri15]	
¹⁸ O			2 20(7)		18O	$^{4}\mathrm{He}, ^{1}\mathrm{H}$				
¹⁸ O	0.00410(35)		2.80(7)			¹ He, ¹ H	34, 47	TDSA	[1982Ba06]	
	0.00448(13)				e	100	90-370	EE	[1982No04]	
¹⁸ O	0.00390(18)				¹⁸ O	²⁰⁸ Pb	57-86	CE	[1979Fe06]	
^{18}O	0.00410(14)				¹⁸ O	¹⁹⁶ Pt,	58-75	CE	[1977Vo07]	
	, ,					$^{208}\mathrm{Pb}$,	
¹⁸ O			3.10(20)		16O	$^{3}\mathrm{H}$	10	TDSA	[1977LiZS]	
¹⁸ O	0.00453(26)		5.15(20)		18O	Au	60	CE	[1977Fl10]	
¹⁸ O	0.00400(20)		2.00(12)		18O		1		1.	
			2.90(12)		18O	p	47.3	RDM	[1976As07]	
¹⁸ O			2.99(12)			р ²⁰⁹ Ві	47.3	RDM	[1976As04]	Su
¹⁸ O	0.0048(2)				¹⁸ O	²⁰⁹ Bi	58-63	CE	[1975Kl09]	
^{18}O			2.79(11)		¹⁶ O	$^{3}\mathrm{H}$	20	TDSA	[1975He25]	
^{18}O			3.35(20)		¹⁶ O	$^{3}\mathrm{H}$	25	RDM	[1974Mc17]	
¹⁸ O			3.58(18)		α	¹⁸ O	6.0,8.5	RDM	[1974Be25]	
¹⁸ O			$2.9(^{+9}_{-6})$			¹⁹ F	2.6	TDSA	1	
	0.00000(:=:		2.9(-6)		t		1		[1973Ol02]	
¹⁸ O	0.00390(40)				¹⁸ O	$^{208}\mathrm{Pb}$	65	CE	[1971HaXH]	
¹⁸ O			3.25(20)			-		TDSA	[1968LaZZ]	
¹⁸ O	0.0046(14)				¹⁸ O	27 Al	21	CE*	[1968An20]	

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
18O	0.0049(11)				¹⁸ O	¹¹⁶ Sn, ²⁰⁸ Pb	23-55	CE	[1967DeZW]	
^{18}O			$6.1(^{+50}_{-20})$		^{12}C	$^{7}\mathrm{Li}$	11	TDSA	[1964Es02]	
^{18}O			3.7(7)		16O	3H	11-16	TDSA	[1964L302]	
^{18}O	0.0051(23)		3.1(1)		18O		150	EE	[1963Ll07] [1961La09]	
^{20}O	0.0051(23)		10.9(0)		18O	$^{ m e}_{^3{ m H}}$				
			10.3(8)				24.5	RDM	[1980Ru01]	
^{20}O			9.8(7)		¹⁸ O	³ H	20	TDSA	[1977He12]	
^{20}O			14.2(8)		¹⁸ O	³ H	30	RDM	[1975Be15]	
^{22}O				0.24(7)	²² O	$^{2}\mathrm{H}$	34A	IN-EL	[2006El05]	
^{22}O				0.26(4)	²² O	$_{197}^{ m P}{ m Au}$	46.6	IN-EL	[2006Be04]	
^{22}O	0.0021(8)				²² O	$^{197}\mathrm{Au}$	50.6A	CE^*	[2000Th11]	
^{24}O				0.15(4)	²⁴ O	p	62A	IN-EL	[2012Ts03]	
$^{18}\mathrm{Ne}$	0.0180(26)				¹⁸ Ne	Pb	50A	CE^*	[2006YaZV]	
$^{18}\mathrm{Ne}$	0.0100(20)		$0.77(^{+9}_{-7})$		16O	$^{3}\mathrm{He}$	38	TDSA	[2003Ri08]	
$^{18}\mathrm{Ne}$	0.0107(00)		0.77(-7)		$^{18}\mathrm{Ne}$	¹⁹⁷ Au				
	0.0125(22)		0.0=(0)			2xx	60A	CE*	[2000Ri15]	
$^{18}\mathrm{Ne}$			0.67(6)		¹⁶ O	³ He	38	TDSA	[1976Mc02]	
$^{18}\mathrm{Ne}$			0.63(13)		¹⁶ O	³ H	25	TDSA	[1974Mc17]	
$^{18}\mathrm{Ne}$			$0.49(^{+17}_{-9})$		³ He	¹⁶ O	8.5-13.15	TDSA	[1969Ro08]	
$^{20}\mathrm{Ne}$			1.14(24)		$^{12}\mathrm{C}$	$^{12}\mathrm{C}$	32.6,33.5	TDSA	[1982Sp02]	
$^{20}\mathrm{Ne}$	0.0322 (26)				^{32}S	$^{20}\mathrm{Ne}$	41.3-51	CE^*	[1977Sc36]	
210	(22)					1.0	11.0 01		[205000]	
$^{20}\mathrm{Ne}$	0.037(3)				$^{20}\mathrm{Ne}$	Au	4.15A	CE	[1974Ol01]	NR
²⁰ Ne	0.037(3)				- Ne	Au	4.13A	CE		
									[1973ScWZ]	Su
$^{20}{ m Ne}$					10	10			[1969ScZV]	Su
$^{20}\mathrm{Ne}$			0.8(2)		$^{12}\mathrm{C}$	$^{12}\mathrm{C}$	36.7	RDM	[1975Ho15]	
$^{20}\mathrm{Ne}$	0.0280(40)				e	$^{20}\mathrm{Ne}$	102	$_{ m EE}$	[1973Si31]	
$^{20}\mathrm{Ne}$			1.15(20)		^{12}C	$^{12}\mathrm{C}$	20-30	TDSA	[1971Ha26]	
$^{20}\mathrm{Ne}$	0.048(7)		` ´		$^{20}\mathrm{Ne}$	¹²⁰ Sn,	50-75	CE	[1970Na07]	
						¹³⁰ Te,			1,	
						$^{148}\mathrm{Sm}$				
$^{20}\mathrm{Ne}$			0.84(20)			16O	2.9-3.2	TDSA	[1969Gr03]	
$^{20}\mathrm{Ne}$					$^{\alpha}_{^{3}\mathrm{He}}$	¹⁹ F	8-10	TDSA	[1969G103]	
20M			1.25(35)						1 .	
$^{20}{ m Ne}$			1.27(24)		Li	0	5.1-6.3	TDSA	[1969Th01]	
$^{20}\mathrm{Ne}$			1.23(12)		¹² C	¹² C	12.8-16.6	TDSA	[1965Ev03]	
$^{20}\mathrm{Ne}$			0.64(20)		¹² C	$^{12}\mathrm{C}$	17-18	TDSA	[1961Cl06]	Su
$^{20}\mathrm{Ne}$	0.047(9)				^{14}N	$^{20}\mathrm{Ne}$	21.3, 27.9	CE^*	[1960An07]	
$^{20}\mathrm{Ne}$								CE^*	[1960Le07]	Su
$^{20}\mathrm{Ne}$	0.041(10)				$^{20}\mathrm{Ne}$	Be,B,	23.5	CE^*	[1959Al91]	NR
						C,Mg,			1,,	
						Al,Si,				
						MgO, ScO				
$^{20}{ m Ne}$			0.76(99)			²³ Na	1.00	TIDG A	[1076]	
22Ne	0.0040(00)		0.76(33)		$_{^{22}\mathrm{Ne}}^{\mathrm{p}}$		1.22	TDSA	[1956De22]	
$^{22}\mathrm{Ne}$	0.0243(26),				²² Ne	$Ni,^{107}Ag$	2.25A,	CE	[2005NiZS]	
	0.0220(16)					10	2.86A			
$^{22}\mathrm{Ne}$			5.16(13)		α	$^{19}\mathrm{F}$	6.3-7.3	RDM	[1984Bh03]	
$^{22}\mathrm{Ne}$			5.1(2)		¹⁸ O	$^7{ m Li}$	10-60	RDM	[1983Ko01]	
$^{22}\mathrm{Ne}$			5.15(31)		$^{19}\mathrm{F}$	$^4\mathrm{He}$	23.25,28.5	TDSA	[1979Fo02]	
$^{22}\mathrm{Ne}$	0.0271(36)		` ′		e	$^{22}\mathrm{Ne}$	60-110	EE	[1979Ma13]	
$^{22}\mathrm{Ne}$	0.02.12(00)		5.2(3)		$^{19}\mathrm{F}$	$^4\mathrm{He}$	38.5	RDM	[1977Ho01]	
$^{22}\mathrm{Ne}$	0.0223(6)		0.2(0)		^{32}S	²² Ne	41.3-51	CE*	[1977Sc36]	
$^{22}\mathrm{Ne}$	0.0225(0)				1 2	ING	41.5-51	CE	[1977Sc30] [1973ScWZ]	G.
									1 .	Su
$^{22}{ m Ne}$			F 00 (05)			10-	- 05	DEST	[1969ScZV]	Su
$^{22}{ m Ne}$			5.62(20)		α	¹⁹ F	5.65	RDM	[1977Ra01]	
$^{22}\mathrm{Ne}$			5.0(7)		α	¹⁹ F	6.48	RDM	[1977Og03]	
$^{22}\mathrm{Ne}$	0.025(2)				$^{22}\mathrm{Ne}$	Au	4.15A	CE	[1974Ol01]	NR
$^{22}\mathrm{Ne}$	0.0220(20)				e	$^{22}\mathrm{Ne}$	102	EE	[1973Si31]	
$^{22}\mathrm{Ne}$	` ´		5.4(4)		α	$^{19}\mathrm{F}$	5.5,8.6	RDM	[1973An01]	
$^{22}\mathrm{Ne}$			5.9(6)		α	$^{19}\mathrm{F}$	2.9,4	RDM	[1972Sz05]	
$^{22}\mathrm{Ne}$			5.9(11)		α	19F	6.4	RDM	[1972Sn01]	
$^{22}\mathrm{Ne}$	0.033(6)		3.5(11)		$^{\alpha}_{22}$ Ne	120Sn,	50-75	CE	[1972Sh01] [1970Na07]	
ne	0.055(0)				l we	130Te,	30-73	CE	[1910INAU1]	
						148C				
22						148Sm				
$^{22}\mathrm{Ne}$			4.6(5)		α	¹⁹ F	5.5	RDM	[1969Jo10]	
$^{22}\mathrm{Ne}$			6(4)		¹⁸ O	$^9\mathrm{Be}$	15	RDM	[1969Ni09]	
$^{22}\mathrm{Ne}$			8(3)		α	$^{19}\mathrm{F}$	5.2	TDSA	[1966Li07]	
$^{22}\mathrm{Ne}$			$6.1(^{+46}_{-26})$		¹⁶ O	$^7{ m Li}$	14.3	TDSA	[1964Es02]	
$^{22}\mathrm{Ne}$	0.039(8)		-26/		N	²² Ne	16.3	CE*	[1964Es02] [1960An07]	
ive	0.000(0)	I	1	I	1N	ING	10.5	OE	[1300AII01]	I

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
²² Ne								CE*	[1960Le07]	Su
$^{22}\mathrm{Ne}$	0.025(6)				$^{22}\mathrm{Ne}$	Be,B,	25.8	CE*	[1959Al91]	NR
						C,Mg,				
						Al,Si,				
$^{24}\mathrm{Ne}$			0.00(+36)		l ,	MgO, ScO	0.0	TDC A	[1074337.04]	
			$0.89(^{+36}_{-29})$		t	²² Ne	2.8	TDSA	[1974Wa04]	
$^{24}\mathrm{Ne}$			$1.0(^{+2}_{-4})$		²² Ne	$^{3}\mathrm{H}$	30	TDSA	[1969Bh01]	
$^{26}{ m Ne}^{26}{ m Ne}$	0.0141(18)				²⁶ Ne	Pb	54A	CE?*	[2007Gi06]	MD
²⁸ Ne	0.0228(41)			0.00(0)	²⁶ Ne	¹⁹⁷ Au	41.7A	CE*	[1999Pr09]	
$^{28}\mathrm{Ne}$	0.0129(22)			0.39(2)	²⁸ Ne ²⁸ Ne	H Pb	53.5 A 46A	IN-EL CE*	[2014Mi09] [2005Iw02]	
²⁸ Ne	$ \begin{vmatrix} 0.0132(23) \\ 0.0269(136) \end{vmatrix} $				²⁸ Ne	¹⁹⁷ Au	53A	CE*	[20051W02] [1999Pr09]	
$^{30}\mathrm{Ne}$	0.0209(130)			0.45(4)	$^{30}\mathrm{Ne}$	H	44 A	IN-EL	[2014Mi09]	
$^{30}\mathrm{Ne}$				$0.48(4)$ $0.58(^{+16}_{-22})$	³⁰ Ne		48A	IN-EL	[2003Ya05]	
$^{20}{ m Mg}$	0.0177(32)			$0.38(_{-22})$ 0.44(4)	$^{20}{ m Mg}$	p Pb	58A	IN-EL IN-EL	[2003 Fa03] [2008Iw04]	
$^{22}\mathrm{Mg}$	0.0177(32)		4.2(15)	0.44(4)	³ He	²⁰ Ne	10	TDSA	[20081W04] [1975Gr04]	
$^{22}\mathrm{Mg}$			$1.0(^{+22}_{-5})$		³ He	²⁰ Ne	4.3-11.5	TDSA	[1973G104] [1972Ro20]	
$^{24}\mathrm{Mg}$	0.0467(28)		1.0(-5)		$^{24}\mathrm{Mg}$	¹⁹⁷ Au	54.5A	CE*	[2001Co20]	
$^{24}{ m Mg}$	0.0467(28)		1.97(16)		_	$^{23}\mathrm{Na}$	0.7,1.7	TDSA	[2001C620] [1989Ke04]	
$^{24}\mathrm{Mg}$			1.76(21)		p	$^{24}\mathrm{Mg}$	0.7,1.7	GG	[1989Re04]	
$^{24}\mathrm{Mg}$	0.0445(24)		1.70(21)		$\frac{\gamma}{^{24}\mathrm{Mg}}$	208Pb	80-110	CE	[1981Ca10] [1979Fe05]	
$^{24}\mathrm{Mg}$	0.0445(24)		1.92(10)		²⁸ Si, ²⁹ Si,	$^{24}\mathrm{Mg}$	39.5-42	TDSA	[1977Sc36]	
1,118			1.02(10)		31 p	1116	00.0-42	10011	[13775690]	
					$32,33,34_{\mathbf{S}}$					
					35,37Cl					
$^{24}{ m Mg}$									[1973ScWZ]	Su
$^{24}\mathrm{Mg}$	0.0420(14)				²⁸ Si, ²⁹ Si,	$^{24}{ m Mg}$	39.5-42	CE*	[1977Sc36]	
8	,				^{31}P				' ' ' ' ' ' ' '	
					32,33,34 _S ,					
					35,37 Cl					
$^{24}{ m Mg}$	0.048(5)				$ \gamma $	$^{24}{ m Mg}$		GG	[1977Ca14]	
$^{24}{ m Mg}$			2.09(13)		$_{^{16}\mathrm{O}}^{\gamma}$	$^{12}\mathrm{C}$	41.7	RDM	[1975Ho15]	
$^{24}{ m Mg}$	0.044(3)				$^{24}{ m Mg}$	¹⁹⁷ Au,Pt	102.6	CE	[1975Bi03]	
$^{24}{ m Mg}$			1.82(14)		$^{24}{ m Mg}$	⁴ He	40	TDSA	[1974Fo13]	
$^{24}{ m Mg}$	0.0420(25)				е	$^{24}{ m Mg}$	65-116	EE	[1974Jo10]	
$^{24}\mathrm{Mg}$			2.25(9)		α	$^{24}\mathrm{Mg}$	6.18	RDM	[1973Br33]	
$^{24}\mathrm{Mg}$			2.00(45)		²³ Na	p	0.6-1.5	TDSA	[1973Le15]	NR
$^{24}\mathrm{Mg}$	0.0327(35)				e	²⁴ Mg	183	EE	[1972Na06]	
$^{24}{ m Mg}$	0.0440(30)		1.0(0)		$^{24}{ m Mg}$	²⁰⁸ Pb	90	CE	[1972HaYA]	
$^{24}{ m Mg}$			1.8(6)		p, α	²⁴ Mg	22,42-50	TDSA	[1972Ba93]	
$^{24}\mathrm{Mg}$ $^{24}\mathrm{Mg}$			1.4(4)		p	23 Na 24 Mg	0.3-1.9	TDSA	[1972Me09]	
$^{24}{ m Mg}$	0.042(2)		1.92(15)		$^{\gamma}_{^{16}\mathrm{O}}$	$^{24}\mathrm{Mg}$	<1.6 20-22	GG CE*	[1971Sw07] [1971Vi01]	
$^{24}{ m Mg}$	0.042(2)		2.07(34)		¹⁶ O	^{12}C	25	TDSA	[1971 V101] [1970Cu02]	
$^{24}\mathrm{Mg}$	0.0412(43)		2.07(34)		e	$^{24}{ m Mg}$	25	EE	[1970Cd02]	
$^{24}\mathrm{Mg}$	0.0412(40)		2.11(16)		$^{12}\mathrm{C}$	16O	17	RDM	[1970Al10]	
$^{24}\mathrm{Mg}$			1.11(13)			$^{24}{ m Mg}$	1.37	GG	[1970He01]	
$^{24}{ m Mg}$	0.0425(29)		1111(13)		$_{35}^{\gamma}$ Cl	$^{24}\mathrm{Mg}$	62	CE*	[1970Ha04]	
$^{24}{ m Mg}$			$1.7(^{+10}_{-5})$		$^3{ m He}$	²³ Na	8-10	TDSA	[1969An08]	
$^{24}{ m Mg}$	0.036(7),		- (-5 /		e	$^{24}{ m Mg}$	100-250	EE	[1969Sa14]	
	0.047(6)									
$^{24}{ m Mg}$			1.65(15)		³⁵ Cl	$^{24}{ m Mg}$	52-61	TDSA	[1969Pe11]	
$^{24}{ m Mg}$	0.0455(12)				е	$^{24}{ m Mg}$	54	EE	[1969Ti01]	
$^{24}{ m Mg}$	' '		$1.44(^{+11}_{-9})$		α	$^{24}{ m Mg}$	22	TDSA	[1968Ro05]	
$^{24}{ m Mg}$			1.60(20)		¹⁶ O	$^{12}\mathrm{C}$	26	TDSA	[1968Cu05]	
$^{24}{ m Mg}$	0.044(6)		` ′		γ	$^{24}{ m Mg}$	0.1368	GG	[1966Sk01]	
$^{24}{ m Mg}$	0.080(15)				$\dot{\gamma}$	$^{24}{ m Mg}$	1.37	GG	[1965Ka15]	
$^{24}{ m Mg}$			1.3(4)		γ	$^{24}{ m Mg}$	1.37	GG	[1964Bo22]	
$^{24}{ m Mg}$			2.2(8)		γ	$^{24}{ m Mg}$	1.37	GG	[1962Bo17]	
$^{24}{ m Mg}$	0.062(23)				$_{16}^{\gamma}$	$^{24}\mathrm{Mg}$	1.37	GG	[1960Me06]	
$^{24}{ m Mg}$	0.034(7)				16O	$^{24}{ m Mg}$	19	CE*	[1960Go08]	
$^{24}{ m Mg}$	0.065(13)				$^{14}\mathrm{N}$	$^{24}\mathrm{Mg}$	16.3	CE*	[1960An07]	
$^{24}{ m Mg}$			1.1(4)		γ	$^{24}\mathrm{Mg}$	1.37	GG	[1959Of14]	
$^{24}\mathrm{Mg}$			0.95(86)		γ	$^{24}{ m Mg}$	1.37	GG	[1959Ar56]	
$^{24}\mathrm{Mg}$	0.054(14)				N,O	C	15.9, 18.1	CE*	[1958Al22]	NR
$^{24}{ m Mg}$	0.053(12)		1.90(17)		γ	$^{24}\mathrm{Mg}$ $^{24}\mathrm{Mg}$	1.37 187	GG EE	[1958De33] [1956He83]	
$^{24}{ m Mg}$					e					

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	$(e^{2}b^{2})'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{26}\mathrm{Mg}$	0.0315(28)				$^{26}\mathrm{Mg}$	²⁰⁹ Bi	78.6A	CE*	[2005Ch66]	
$^{26}{ m Mg}$	0.0322(16)				$^{26}\mathrm{Mg}$	$^{208}{\rm Pb}$	80-120	CE	[1982Sp05]	
$^{26}{ m Mg}$			0.653(39)		23 Na	⁴ He	43.3	TDSA	[1981Dy01]	
$^{26}{ m Mg}$	0.0296(13)		` ′		^{28,29} Si,	$^{26}{ m Mg}$	39.5-42	CE*	[1977Sc36]	
Ü	\				31 D				, ,	
					¹ 32,33,34S,					
					35,37 Cl					
$^{26}{ m Mg}$									[1973ScWZ]	Su
$^{26}\mathrm{Mg}$			0.69(5)		^{28,29} Si,	$^{26}{ m Mg}$	39.5-42	TDSA	[1977Sc36]	
8					31 p	8			1	
					32,33,34S					
					35,37 Cl					
$^{26}{ m Mg}$			0.705(110)		α	$^{26}{ m Mg}$	16	TDSA	[1975Wa10]	
$^{26}\mathrm{Mg}$			0.72(3)		α	$^{26}\mathrm{Mg}$	10	TDSA	[1975Eb01]	
$^{26}\mathrm{Mg}$	0.0275(20)		0.12(0)		e	$^{26}\mathrm{Mg}$	57-111	EE	[1974Le17]	
$^{26}\mathrm{Mg}$	0.0275(20) 0.0299(29)				e	$^{26}\mathrm{Mg}$	37-111	EE	[1974Le17]	
$^{26}\mathrm{Mg}$	0.0299(29)		0.61(10)		1	²³ Na	4.6-7.5	TDSA	[1973Le17] [1972Du05]	
$^{26}\mathrm{Mg}$					$^{lpha}_{^{19}\mathrm{F}}$	¹² C			1.	
$^{26}\mathrm{Mg}$	0.0240(20)		0.70(30)			$^{26}\mathrm{Mg}$	25	RDM	[1971Mc20]	
26 Mg	0.0349(30)		0.00(±10)		e		25	EE	[1970Kh05]	
$^{26}\mathrm{Mg}$			$0.30(^{+10}_{-6})$		p	$^{26}\mathrm{Mg}$	2.8-5.5	TDSA	[1970De01]	
$^{26}{ m Mg}$			0.53(10)		p	$^{26}\mathrm{Mg}$	3.8-8.3	TDSA	[1968Ha18]	
$^{26}{ m Mg}$			$0.570(^{+39}_{-36})$		α	$^{26}\mathrm{Mg}$	22	TDSA	[1968Ro05]	
$^{26}{ m Mg}$			0.70(30)		γ	$^{26}{ m Mg}$	1.8	GG	[1964Bo22]	
$^{26}{ m Mg}$	0.035(9)				¹⁴ N, ²⁰ Ne	$^{26}\mathrm{Mg}$	18, 25.8	CE	[1961An07]	
$^{26}{ m Mg}$			0.7(3)		/	$^{26}{ m Mg}$	1.8	GG	[1961Ra05]	
$^{28}{ m Mg}$	0.0444(66)		311(3)		$\frac{\gamma}{^{28}\mathrm{Mg}}$	Pb	53A	CE*	[2012To06]	
$^{28}\mathrm{Mg}$	"""		2.0(4)		t	$^{26}\mathrm{Mg}$	2.54-3.20	TDSA	[1974Ra15]	
$^{28}\mathrm{Mg}$			1.6(2)		t	$^{26}\mathrm{Mg}$	2.9	TDSA	[1973Fi03]	
$^{30}\mathrm{Mg}$	0.0241(31)		1.0(2)		$^{6}_{30}\mathrm{Mg}$	Ni Ni	2.25A	CE*	[2005Ni11]	
$^{30}\mathrm{Mg}$	0.0435(58)				30 Mg	¹² C, ²⁰⁸ Pb	32A	IN-EL	[2003N11] [2001Ch56]	
$^{30}\mathrm{Mg}$. ,				^{10}Mg	197 Au	50A	CE*	1.	
$^{32}\mathrm{Mg}$	0.0295(26)				$^{32}\mathrm{Mg}$				[1999Pr09]	
32Mg	0.0432(51)			0.51(0)	32 Mg	Pb	195 A	CE*	[2015Li28]	
$^{32}\mathrm{Mg}$				0.51(6)	³² Mg	Н	58.9 A	IN-EL	[2014Mi09]	
$^{32}\mathrm{Mg}$				0.41(3)	³² Mg	p	190A	IN-EL	[2012Li45]	
$^{32}\mathrm{Mg}$	0.0434(52)				$^{32}\mathrm{Mg}$	¹⁰⁷ Ag	2.84A	CE*	[2005NiZS]	
$^{32}\mathrm{Mg}$			23.1(58)		20	$^{32}\mathrm{Mg}(\beta^-)$		TCS	[2005Ma81]	
$^{32}\mathrm{Mg}$	0.0447(57)				$^{32}\mathrm{Mg}$	¹⁹⁷ Au	81.1A	CE*	[2005Ch66]	
$^{32}{ m Mg}$	0.0622(90)				$^{32}\mathrm{Mg}$	²⁰⁸ Pb	32A	IN-EL	[2001Ch56]	
$^{32}{ m Mg}$	0.0449(3)				$^{32}\mathrm{Mg}$	²⁰⁸ Pb	44A*	CE*	[2001 Iw 07]	Ex
$^{32}{ m Mg}$	0.0440(55)				$^{32}{ m Mg}$	¹⁹⁷ Au	50A	CE*	[1999Pr09]	
$^{32}{ m Mg}$	0.0333(70)				$^{32}\mathrm{Mg}$	$^{197}\mathrm{Au}$	50A	CE^*	[1999Pr09]	Ex
$^{32}{ m Mg}$	0.0454(78)				$^{32}{ m Mg}$	²⁰⁸ Pb	49.2A	CE*	[1995Mo16]	NR
$^{34}{ m Mg}$				0.62(6)	$^{34}{ m Mg}$	H	51.1 A	IN-EL	[2014Mi09]	
$^{34}{ m Mg}$				0.68(16)	$^{34}\mathrm{Mg}$	p	50A	IN-EL	[2006El03]	
$^{34}{ m Mg}$	0.0541(102)				$^{134}\mathrm{Mg}$	^P ₂₀₉ Bi	76.4A	CE^*	[2005Ch66]	
$^{34}{ m Mg}$	0.0631(126)				$^{34}\mathrm{Mg}$	Pb	44.9A	CE^*	[2001Iw07]	
$^{34}{ m Mg}$	< 0.0670				$^{34}\mathrm{Mg}$	¹⁹⁷ Au	50A	CE*	[1999Pr09]	
$^{36}{ m Mg}$				0.50(6)	$^{36}\mathrm{Mg}$	H	44.5 A	IN-EL	[2014Mi09]	
$^{24}\mathrm{Si}$	0.00955(295)			(-)	$^{24}\mathrm{Si}$	$^{208}{\rm Pb}$	58.9A	CE*	[2002Ka80]	
$^{26}\mathrm{Si}$	0.0336(36)				$^{26}\mathrm{Si}$	$^{197}\mathrm{Au}$	54.5A	CE*	[2001Co20]	
$^{26}\mathrm{Si}$			0.62(6)		$^{24}\mathrm{Mg}$	³ He	50	TDSA	[1982Al15]	
$^{26}\mathrm{Si}$			$1.4\binom{+7}{-5}$		$^{3}\mathrm{He}$	$^{24}\mathrm{Mg}$	5.5,7.8,10	TDSA	[1969Be31]	
²⁸ Si	0.0350(18)		1.4(-5)		¹¹⁶ ₂₈ Si	208Pb	105	CE	[1989Be31] [1980Ba40]	
²⁸ Si					28Si	208Pb				
51	0.0326(20)				S1	PD	94.88-	CE	[1980Sp09]	
							104.86,			
							109.85-			
20 ~			0.05=/=:		28.01	4**	139.81	mp ~ :	[105-2	
$^{28}\mathrm{Si}$			0.688(26)		²⁸ Si	⁴ He	53	TDSA	[1980Sc25]	
$^{28}\mathrm{Si}$			0.697(39)		²⁸ Si	⁴ He	46.8, 28.0,	TDSA	[1979Po01]	
							48.2			
$^{28}\mathrm{Si}$			0.667(35)		²⁸ Si	⁴ He	55	TDSA	[1979Fo02]	
$^{28}\mathrm{Si}$			0.733(50)		²⁸ Si	^{24,25,26} Mg,	39.5-42	TDSA	[1977Sc36]	
						²⁷ Al			1	
$^{28}\mathrm{Si}$	0.0337(30)				e	²⁸ Si	18.5-117.1	EE	[1977Br16]	
$^{28}\mathrm{Si}$	0.0331(12)				²⁸ Si	^{24,25,26} Mg,	39.5-42	CE*	[1977Sc36]	
		1	1	1	1	1 27	1		1.	1
						²⁷ Al				

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
²⁸ Si	<u> </u>	<u> </u>	0.83(17)		p	²⁷ Al	3	TDSA	[1977MiZM]	
$^{28}\mathrm{Si}$			0.70(8)		α	²⁸ Si	7.5	TDSA	[1975Eb01]	
$^{28}\mathrm{Si}$	0.0280(38)				e	²⁸ Si	183, 250	EE	[1972Na06]	
$^{28}\mathrm{Si}$	0.0330(28)				$\frac{\gamma}{^{28}\mathrm{Si}}$	²⁸ Si		GG	[1972ArZD]	
$^{28}\mathrm{Si}$	0.033(4)				²⁸ Si	²⁰⁶ Pb	100-120	CE	[1970Na05]	
$^{28}\mathrm{Si}$			0.59(13)		p	²⁷ Al	1.317	TDSA	[1970Hu14]	
$^{28}\mathrm{Si}$			0.78(15)		p	²⁷ Al	0.7-2.0	TDSA	[1970Al05]	
$^{28}\mathrm{Si}$			0.87(22)		α	$^{24}\mathrm{Mg}$	2.9-3.2	TDSA	[1969Gr03]	
$^{28}\mathrm{Si}$			0.73(5)		^{32}S	²⁸ Si	60	TDSA	[1969Pe08]	
$^{28}\mathrm{Si}$			$0.56(^{+40}_{-22})$		p	²⁷ Al	1-3	TDSA	[1969Bi09]	
$^{28}\mathrm{Si}$			$0.56(^{+40}_{-22}) \\ 0.59(^{+60}_{-15})$		p	²⁷ Al	0.29-1.01	TDSA	[1969Me14]	
$^{28}\mathrm{Si}$			0.86(11)		³ He	27 Al	8-10	TDSA	[1969An08]	
$^{28}\mathrm{Si}$	0.0317(17)				$^{28}\mathrm{Si}$	$^{62}\mathrm{Ni}$	70	CE^*	[1969Ha31]	
$^{28}\mathrm{Si}$			0.62(15)		γ	²⁷ Al	1.8-3.6	GG	[1968Cr07]	
$^{28}\mathrm{Si}$			0.706(+24-23)		α	²⁸ Si	22	TDSA	[1968Ro05]	
$^{28}\mathrm{Si}$			0.71(6)		p	²⁸ Si	9-10	TDSA	[1968Ma05]	
$^{28}\mathrm{Si}$			0.58(+10-9)		p	²⁷ Al	1.2-2.4	TDSA	[1968Gi05]	
$^{28}\mathrm{Si}$	0.040(8)				$\frac{\gamma}{^{12}\mathrm{C}}$	²⁸ Si	1-2	GG	[1967Be39]	
$^{28}\mathrm{Si}$	0.034(7)				^{12}C	²⁸ Si	36.8	CE*	[1967Af03]	
$^{28}\mathrm{Si}$	0.0428(40)				e	²⁸ Si	30-56	EE	[1966Li08]	
^{28}Si	0.0329(46)				γ	²⁸ Si	1.772	GG	[1966Sk01]	
$^{28}\mathrm{Si}$			0.56(15)		γ	²⁸ Si	0.5-3	GG	[1964Bo22]	
$^{28}\mathrm{Si}$			0.72(6)		γ	²⁸ Si	1.8	GG	[1963Sk01]	
²⁸ Si	0.029(10)				$\frac{\gamma}{^{16}\mathrm{O}}$	²⁸ Si	4	GG	[1962Bo17]	
²⁸ Si	0.027(9)					²⁸ Si		CE	[1960Ad01]	
²⁸ Si	0.044(9)				$^{20}\mathrm{Ne}$	²⁸ Si	23-28	CE*	[1960An07]	_
²⁸ Si					16.0	20 00		CE	[1960Le07]	Su
²⁸ Si	0.025(5)		0 =0(00)		¹⁶ O	²⁸ Si	25	CE*	[1960Go08]	
²⁸ Si			0.73(22)		γ	²⁸ Si ²⁸ Si	1.8	GG	[1959Of14]	
²⁸ Si			0.60(10)		e ²⁸ Si		99	EE	[1956He83]	
³⁰ Si ³⁰ Si			0.358(18)		1	$^{3}\mathrm{H}$ $^{27}\mathrm{Al}$	33	TDSA	[1980Sc25]	
³⁰ Si	0.0057(94)		0.310(40)		$\frac{\alpha}{^{30}\mathrm{Si}}$	²⁰⁸ Pb	12,14.1,15	TDSA	[1980Bi14]	
³⁰ Si	0.0257(34)		0.07(14)		^{32}S	³⁰ Si	106-136	CE	[1979Fe08]	
³⁰ Si			0.27(14)		°2S	30 S1	41.3-51	TDSA	[1977Sc36]	
³⁰ Si	0.000(7)				$^{32}\mathrm{S}$	$^{30}\mathrm{Si}$	41 9 51	CE*	[1973ScWZ]	Su
$^{30}\mathrm{Si}$	0.029(7) 0.0216(30)					³⁰ Si	41.3-51 18.5-117.1	CE* EE	[1977Sc36] [1977Br16]	
$^{30}\mathrm{Si}$	0.0210(30)		0.36(4)		e	³⁰ Si	8.5	TDSA	[1977B110] [1975Eb01]	
$^{30}\mathrm{Si}$			0.30(4) $0.351(19)$		$\frac{\alpha}{^{28}\mathrm{Si}}$	3H	33	TDSA	[1975He25]	
$^{30}\mathrm{Si}$			0.351(19) 0.35(7)		α	²⁷ Al	9-10	TDSA	[1973He25] [1972Ga05]	
$^{30}\mathrm{Si}$			0.330(50)		α	27 Al	5.0,6.3,8.0	TDSA	[1972Ga05]	
$^{30}\mathrm{Si}$			0.332(21)		α	27 Al	4.5-8.2	TDSA	[1971Sh11] [1970Cu02]	
$^{30}\mathrm{Si}$			0.300(40)		p p	³⁰ Si	3.435	TDSA	[1969Bi11]	
$^{30}\mathrm{Si}$			0.26(6)		α	²⁷ Al	3.47-4.55	TDSA	[1967Li05]	
$^{30}\mathrm{Si}$			0.46(5)		α	27 Al	4.1	TDSA	[1967Br01]	
$^{32}\mathrm{Si}$	0.0113(33)		0.10(0)		^{32}Si	¹⁹⁷ Au	37.4-48.2A	CE*	[1998Ib01]	
$^{32}\mathrm{Si}$	0.0110(00)		0.48(7)		t	³⁰ Si	2.5-3.3	TDSA	[1974Gu11]	Ex
$^{32}\mathrm{Si}$			0.92(32)		t	³⁰ Si	2.7,2.8	TDSA	[1972Pr18]	
$^{34}\mathrm{Si}$	0.0085(33)		0.02(02)		^{34}Si	¹⁹⁷ Au	37.4-48.2A	CE*	[1998Ib01]	
$^{36}\mathrm{Si}$	0.0000(00)			0.25(4)	36Si		0.4c	IN-EL	[2007Ca35]	
$^{36}\mathrm{Si}$	0.0193(59)				³⁶ Si	p ¹⁹⁷ Au	37.4-48.2A	CE*	[1998Ib01]	
$^{38}\mathrm{Si}$				0.36(3)	^{38}Si	р	0.4c	IN-EL	[2007Ca35]	
$^{38}\mathrm{Si}$	0.0193(71)				^{38}Si	p ¹⁹⁷ Au	37.4-48.2A	CE*	[1998Ib01]	
$^{40}\mathrm{Si}$,			0.37(5)	$^{40}\mathrm{Si}$	p	0.4c	IN-EL	[2007Ca35]	
$^{28}\mathrm{S}$	0.0181(31)				^{28}S	Pb	53A	CE*	[2012To06]	
$^{30}\mathrm{S}$	0.0350(33)				$^{30}\mathrm{S}$	$^{197}\mathrm{Au}$	45.9A	CE*	[2002Co09]	
$^{30}\mathrm{S}$, ,		0.254(23)		$^{28}\mathrm{Si}$	$^3\mathrm{He}$ -	60	TDSA	[1982Al22]	
						implanted Au				
$^{30}\mathrm{S}$			0.14(5)		$^3{ m He}$	²⁸ Si	7.0-10.0	TDSA	[1973Ku15]	
$^{30}\mathrm{S}$			0.31(8)		³ He	Si	6.5-10	TDSA	[1973Ku15] [1972Ca22]	
$^{30}\mathrm{S}$			0.31(8)		t	³¹ ₂₈ Si	4-8	TDSA	[1972Ca22] [1970Bi08]	
$^{32}\mathrm{S}$			0.175(35) 0.258(8)		$\frac{1}{32}$ S	C	65	TDSA	[2006Sp01]	
$^{32}\mathrm{S}$			0.238(8)			$^{\circ}_{32}$ S	9.9	GG	[2006Sp01] [2002Ba28]	
$^{32}\mathrm{S}$			0.212(33)		$\frac{\gamma}{^{31}P}$		0.21c	TDSA	[1998Ka31]	NR
S	I	1	0.202(40)	1	1 1	p	0.210	IDDA	[1330I/a31]	1111

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{32}\mathrm{S}$			0.236(16)		$^{32}\mathrm{S}$	⁴ He im-	70	TDSA	[1980Ba40]	
						planted in				
$^{32}\mathrm{S}$			0.240(27)		$^{32}\mathrm{S}$	Cu Si	17 51	TDCA	[10770,26]	
$^{32}\mathrm{S}$	0.0300(13)		0.240(27)		^{32}S	Si	47-51 47-51	TDSA CE*	[1977Sc36] [1977Sc36]	
$^{32}\mathrm{S}$	0.0300(13)		0.195(70)		p	^{31}P	0.811,	TDSA	[1974Ch09]	
b			0.130(10)		P	1	1.117	IDSIL		
$^{32}\mathrm{S}$	0.0305(16)				^{32}S	$^{204}\mathrm{Pb}$	100, 112.5,	CE	[1974Ol02]	
	\						125		,	
$^{32}\mathrm{S}$			0.18(8)		p $_{32}$ S	P	0.35-2.03	TDSA	[1972Co13]	
^{32}S	0.0284(20)				^{32}S	$^{112}\mathrm{Cd}$	90, 100	CE	[1971Ha47]	
^{32}S			0.23(6)		α	^{32}S	14.39,	TDSA	[1971Ga01]	
22.0			0.455(0.0)			21.5	14.50	mp.a.t	[40=470 45]	
$^{32}\mathrm{S}$			0.175(30)		P	^{31}P	439, 541,	TDSA	[1971Re15]	
$^{32}\mathrm{S}$			0.35(6)		n	P, S	642	TDSA	[1971In02]	
۵			0.55(0)		p	Γ, δ	9.275, 1.555	IDSA	[197111102]	
$^{32}\mathrm{S}$			0.23(5)		e	^{32}S	28-60	EE	[1970St10]	
$^{32}\mathrm{S}$	0.033(5)		0.23(3)		^{32}S	²⁰⁶ Pb	130-150	CE	[1970Na05]	
$^{32}\mathrm{S}$			0.26(8)		p	^{31}P	0.811-1.555	TDSA	[1969Th03]	
^{32}S			0.30(8)		α	$^{28}\mathrm{Si}$	2.9-3.2	TDSA	[1969Gr03]	
$^{32}\mathrm{S}$	0.042(9)				$^{12}\mathrm{C}$	S	36.8	CE*	[1967Af03]	
^{32}S			0.33(8)		γ	^{32}S	2.24	GG	[1964Ma01]	
^{32}S			0.27(9)		γ	$^{32}\mathrm{S}$	0.5 to 3.0	GG	[1964Bo22]	
^{32}S	0.0200(22)		0.00(0)		e	S	120-180	EE	[1964Lo08]	
$^{32}\mathrm{S}$ $^{32}\mathrm{S}$			0.26(9)		γ	$\frac{\mathrm{S}}{^{32}\mathrm{S}}$	3	GG	[1962Bo17]	
$^{32}\mathrm{S}$ $^{34}\mathrm{S}$	0.0102(7)		0.160(15)		$^{\mathrm{e}}_{\mathrm{34S}}$		187	EE	[1956He83]	
- S	0.0193(7)				5	e	120, 240, 320	EE	[1985Wo06]	
$^{34}\mathrm{S}$			0.442(26)		$^{34}\mathrm{S}$	⁴ He im-	70	TDSA	[1980Ba40]	
S			0.112(20)			planted in	"	12511	[1000Ba10]	
						Cu				
$^{34}\mathrm{S}$			0.490(30)		^{32}S	$^{2,3}{ m H}$	38	TDSA	[1977He12]	NR
$^{34}\mathrm{S}$			0.465(50)		^{34}S	Si	49-52.5	TDSA	[1977Sc36]	
^{34}S	0.0203(13)				^{34}S	Si	49-52.5	CE*	[1977Sc36]	
$^{34}{ m S}$	0.0250(40)				^{34}S	²⁰⁶ Pb	122	CE	[1974Ol02]	
^{34}S			0.400(40)		α	³¹ P	7.2-8.0	TDSA	[1974Gr06]	
^{34}S			0.47(9)		α	^{31}P	8.05, 8.14,	TDSA	[1970Cu02]	
$^{34}\mathrm{S}$			0.46(10)		α	³¹ P	8.35 4.67	TDSA	[1970Br18]	
$^{34}\mathrm{S}$			0.400(32)		α	31 P	5.0-7.3	TDSA	[1970Ra17]	
$^{34}\mathrm{S}$			0.44(5)		α	^{31}P	5.0-7.3	TDSA	[1970Gr11]	
$^{34}\mathrm{S}$			0.35(6)		α	^{31}P	4.5-6.1	TDSA	[1969Gr03]	
$^{36}\mathrm{S}$			0.12(1)		$^{36}\mathrm{S}$	$^{12}\mathrm{C}$	70	TDSA	[2008Sp01]	
$^{36}\mathrm{S}$			0.110(30)		t	$^{34}\mathrm{S}$	3.1	TDSA	[1972Sa09]	
^{38}S				0.35(4)	38S	p ¹⁹⁷ Au	39A	IN-EL	[1997Ke07]	NR
$^{38}{ m S}$ $^{40}{ m S}$	0.0235(30)			0.05(5)	³⁸ S ⁴⁰ S		39.2A	CE*	[1996Sc31]	NID
$^{40}\mathrm{S}$	0.0334(36)			0.35(5)	40S	$^{ m p}_{ m 197}{ m Au}$	30A 39.5A	IN-EL CE*	[1999Ma63] [1996Sc31]	NR
$^{42}\mathrm{S}$	0.0334(30) 0.0397(63)				^{42}S	¹⁹⁷ Au	39.5A 40.6A	CE*	[1996Sc31]	
$^{44}\mathrm{S}$	0.0314(88)				44S	197 Au	35A	CE*	[1997Gl02]	
$^{32}\mathrm{Ar}$	0.0266(68)				^{32}Ar	¹⁹⁷ Au	50.9A	CE*	[2002Co09]	
$^{34}\mathrm{Ar}$	0.0200(00)		0.46(6)		^{32}S	³ He-	80	TDSA	[1985Al18]	
						implanted			,	
						Au				
$^{34}{ m Ar}$			0.33(8)		³ He	$^{32}\mathrm{S}$	8	TDSA	[1974Be18]	_
$^{34}{ m Ar}$			0.20(6)		³ He	S	8-12	TDSA	[1974Gr19]	Ex
$^{34}\mathrm{Ar}$ $^{36}\mathrm{Ar}$			0.15(5)		$^3{ m He}$ $^{32}{ m S}$	Si	6.5-10	TDSA	[1972Ca22]	Ex
$^{36}\mathrm{Ar}$	0.0310(31)		0.65(2)		^{32}S ^{36}Ar	C ¹⁹⁷ Au	65 56.1A	TDSA CE*	[2006Sp01] [1999Co23]	
$^{36}\mathrm{Ar}$	0.0310(31) 0.0286(23)				^{36}Ar	¹⁹⁷ Au	50.1A 50A	CE*	[1999C623] [1999Pr09]	
36 Ar	0.0280(23)				e	$^{36}\mathrm{Ar}$	65-115	EE	[1977Fi09]	
$^{36}\mathrm{Ar}$			0.34(11)		p	35 Cl	0.4-3.0	TDSA	[1974Jo02]	
$^{36}\mathrm{Ar}$			0.35(12)			$^{35}\mathrm{Cl}$	0.8-2.3	TDSA	[1972Ho40]	
$^{36}\mathrm{Ar}$	0.032(5)				$_{ m ^{36}Ar}^{ m p}$	$^{206}\mathrm{Pb}$	150	CE	[1971Na06]	
$^{36}\mathrm{Ar}$			0.40(10)		p	$^{35}\mathrm{Cl}$	1.7-2.6	TDSA	[1970Th04]	
36 Ar			0.46(11)		α 24 α	S	3.189	TDSA	[1969Gr03]	
$^{38}\mathrm{Ar}$			0.71(3)		^{34}S	C	67	TDSA	[2006Sp01]	

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{38}\mathrm{Ar}$			0.68(3)		³⁵ Cl	⁴ He im-	55	TDSA	[1976Fo12]	
						planted in				
						Ti, Fe, Ni,				
00						Cu, Ag, Au				
38 Ar			0.76(24)		α	³⁷ Cl	6.25	TDSA	[1971Ja15]	
$^{38}\mathrm{Ar}$			0.93(27)		α	³⁵ Cl	8.00	TDSA	[1971Ja10]	
$^{38}\mathrm{Ar}$			$0.47(^{+15}_{-11})$		α	Cl	8.10	TDSA	[1970Cu02]	
$^{38}\mathrm{Ar}$			0.54(7)		α	Cl	7.61	TDSA	[1969En04]	
$^{38}\mathrm{Ar}$			0.45(11)		α	Cl	6.1	TDSA	[1969Gr03]	
38 Ar			0.65(9)		α	Cl	5.9, 10.5	TDSA	[1968Li04]	
$^{40}\mathrm{Ar}$			1.8(2)		^{36}S	C	70	TDSA	[2008Sp01,	
									2008 Sp04]	
40 Ar	0.037(7)				¹⁹⁷ Au	40 Ar	38.4A	CE*	[1998Ib01]	
$^{40}\mathrm{Ar}$			2.00(40)		α	³⁷ Cl	11	TDSA	[1983Bi08]	
$^{40}\mathrm{Ar}$			$1.04(^{+116}_{-4})$		p	$^{40}\mathrm{Ar}$	5.75	TDSA	[1979Be41]	
$^{40}\mathrm{Ar}$	0.0382(13)				e	$^{38}\mathrm{Ar}$	65-115	EE	[1977Fi09]	
$^{40}\mathrm{Ar}$			1.95(15)		p	$^{40}\mathrm{Ar}$	6.75	TDSA	[1976So03]	
$^{40}\mathrm{Ar}$			1.20(37)		α	$^{37}\mathrm{Cl}$	6.25	TDSA	[1971Ja15]	
$^{40}\mathrm{Ar}$			$2\binom{+18}{-1}$		α	Cl	8.4	TDSA	[1970Cu02]	Ex
$^{40}\mathrm{Ar}$	0.032(5)				$^{40}\mathrm{Ar}$	¹³⁰ Te,	110-125	CE	[1970Na05]	
						¹²⁰ Sn,			1	
						$^{206}\mathrm{Pb}$				
$^{40}\mathrm{Ar}$	0.049(10)				$^{40}\mathrm{Ar}$	Al	48	CE*	[1965Gu10]	
$^{42}\mathrm{Ar}$	` ´		$3.8(^{+10}_{-8})$		t	$^{40}\mathrm{Ar}$	2.8	TDSA	[1974Fi01]	
$^{44}\mathrm{Ar}$			5.9(20)		⁴⁸ Ca	$^{208}\mathrm{Pb}$	310	RDM	[2010Me07]	
$^{44}\mathrm{Ar}$	$0.0378(^{+34}_{-55})$		***(=*)		$^{44}\mathrm{Ar}$	109Ag,	2.68A,	CE*	[2009Zi01]	
111	0.0010(_55)				111	²⁰⁸ Pb	3.68A	CL	[20002101]	
$^{44}\mathrm{Ar}$	0.0345(41)				$^{44}\mathrm{Ar}$	¹⁹⁷ Au	80A	CE*	[1996Sc31]	
$^{46}\mathrm{Ar}$	$0.0271(^{+22}_{-26})$				$^{46}\mathrm{Ar}$	Pb	60A	CE*	[2014Ca10]	
$^{46}\mathrm{Ar}$	0.0211(-26)		$0.8(^{+3}_{-4})$		⁴⁸ Ca	²⁰⁸ Pb	310	RDM	[2010Me07]	Ex
$^{46}\mathrm{Ar}$	0.0010(91)		0.8(-4)		^{46}Ar	¹⁹⁷ Au	I		1.	EX
$^{46}\mathrm{Ar}$	0.0218(31) 0.0196(39)				46Ar	¹⁹⁷ Au	76.4A 80A	CE* CE*	[2003Ga20]	
$^{48}\mathrm{Ar}$. ,				^{48}Ar	⁹ Be	96A		[1996Sc31]	
18 Ca	0.0346(55)				³⁸ Ca	¹⁹⁷ Au		CE*	[2012Wi05]	
38 Ca	0.0096(21)		0.000(+43)			³ He	56.1A	CE*	[1999Co23]	ND
			$0.098(^{+43}_{-40})$		36 Ar		9,10,10.5	TDSA	[1975HaYU]	NR
⁴⁰ Ca			0.042(12)		γ	⁴⁰ Ca	9.9	GG	[2002Ha13]	g 375
40 Ca			0.052(20)		n	⁴⁰ Ca	E=fast	TDSA	[1989Ge09]	Su, NR
40 Ca	0.0000(10)		0.052(20)		n	⁴⁰ Ca	E=fast	TDSA	[1984El12]	
40 Ca 40 Ca	0.0090(10)		0.040(16)		e	Ca	120	EE	[1973Ha13]	
40 Ca			0.040(16)		p	$_{ m ^{40}Ca}^{ m Ca}$	9.86, 10.81	TDSA	[1972Si01]	
40 Ca			0.048(10)		p	³⁹ K	7.2 1.344	TDSA	[1971Ma03]	
40 Ca			0.058(10)		p	" K	1.544	TDSA	[1971Ma03]	
	0.0110(04)		0.054(14)			$^{40}\mathrm{Ca}$	00.00	TDSA	[1970StZP]	
40 Ca 40 Ca	0.0112(24)		0.045(5)		e	10 Ca	28-60	GG	[1970St10] [1970RaZC]	
40 Ca	0.00700(20)		0.045(5)			⁴⁰ Ca	100 050			
40 Ca	0.00720(30)		0.07(5)		e	⁴⁰ Ca	183, 250 8.5, 9	EE TDSA	[1970It01] [1969Po04]	
$^{40}\mathrm{Ca}$	0.0084(11)		0.07(3)		p	⁴⁰ Ca	20-60	EE	[1969Ei03]	
40 Ca	0.0004(11)		0.064(19)		e	⁴⁰ Ca	8-10	TDSA	[1969E105] [1968Ma05]	
40 Ca			$0.004(19) \\ 0.025(6)$		p	³⁹ K	8-10 1.1-2.5	TDSA	[1968Kia05]	
40 Ca			\ /		p	³⁹ K	4	TDSA	[1968Do12]	
40 Ca	0.0029(9)		0.019(6)		p	⁴⁰ Ca	$\begin{vmatrix} 4 \\ 120, & 150, \end{vmatrix}$	EE		
Ca	0.0029(9)				e	Ca		EE	[1963Bl04]	
$^{42}\mathrm{Ca}$			1.50(10)		42 Ca		180 220	EDGA GE	[00000]	
^{42}Ca ^{42}Ca	0.0419/15		1.52(10)		1	$^{ m C}_{ m ^{42}Ca}$	95	TDSA,CE	[2003Sc21]	
^{42}Ca	0.0418(15)				$^{\mathrm{e}}_{^{32}\mathrm{S}}$	^{42}Ca ^{42}Ca	62.5-250	EE CF*	[1989It02]	
	0.0412(15)		0.75(+5)				60	CE*	[1973To07]	
⁴² Ca	0.0820(22)		$0.75(^{+5}_{-4})$		γ	⁴² Ca	1.524	GG	[1972KaXR]	
42 Ca	0.0320(20)		0.00(00)		e	42 Ca	297.5	EE	[1971He08]	
⁴² Ca			0.90(30)		α	K	7.5	TDSA	[1971Ha12]	
⁴² Ca			1.60(30)		p	$^{42}\mathrm{Ca}$	7.8	TDSA	[1969Ko03]	
$^{42}\mathrm{Ca}$			0.75(30)		α	K	7.5, 9.0,	TDSA	[1969Ha02]	
42.0			1.00(90)				10.6	TIDG 4	[10000 04]	
⁴² Ca	0.087(0)		1.00(30)			42 ~	1.50	TDSA	[1969Ca24]	
⁴² Ca	0.037(8)		1.4(4)		$_{44}^{\gamma}$ Ca	⁴² Ca	1.52	GG	[1966Me11]	
⁴⁴ Ca	0.0550(20)		4.4(4)			C 44.C-	95	TDSA,CE	[2003Sc21]	
44 Ca 44 Ca	0.0550(20)				$^{\mathrm{e}}_{^{32}\mathrm{S}}$	⁴⁴ Ca ⁴⁴ Ca	62.5-250	EE CE*	[1989It02]	
TT1 '0	0.0473(20)	1	1	1	1 22 5	TTCa	55	CE*	[1973To07]	1

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$\mathbf{B(E2)} \\ (e^2b^2)$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁴⁴ Ca			5.1(10)		α	K	9	TDSA	[1973Mc16]	
$^{44}\mathrm{Ca}$			4.60(38)		³⁵ Cl	Ca	56-68	TDSA	[1973Fi15]	
$^{44}\mathrm{Ca}$			$2.9(^{+11}_{-7})$		p	Ca	4.235	TDSA	[1972Gr04]	
$^{44}\mathrm{Ca}$	0.0545(35)				α	$^{44}\mathrm{Ca}$	4.5, 4.75, 5	CE	[1972Bi17]	
$^{44}\mathrm{Ca}$	0.0480(30)				e	⁴⁴ Ca	297.5	EE	[1971He08]	
$^{44}\mathrm{Ca}$	0.035(7)				¹⁴ N, ²⁰ Ne	⁴⁴ Ca	16.8, 21.5, 26	CE	[1961An07]	
$^{46}\mathrm{Ca}$			7.3(13)		⁴⁸ Ca	⁶⁴ Ni, ²⁰⁸ Pb	282,310	RDM	[2012Mo11]	
$^{46}\mathrm{Ca}$			5.5(22)		⁴⁸ Ca	$^{208}\mathrm{Pb}$	310	RDM	[2009Me23]	
46 Ca			6.6(15)		⁴⁶ Ca	$^{12}\mathrm{C}$	95	TDSA,CE*	[2003Sp04]	
$^{46}\mathrm{Ca}$	0.0182(13)				α	$^{46}\mathrm{Ca}$	4.5, 4.75, 5	CE	[1972Bi17]	
$^{48}\mathrm{Ca}$	` ´		0.051(6)		γ	⁴⁸ Ca	5.5, 8, 9.9	GG	[2002Ha13]	
$^{48}\mathrm{Ca}$			$0.060(^{+11}_{-12})$		n	⁴⁸ Ca	4.8-8	TDSA	[1992Va06]	NR
$^{48}\mathrm{Ca}$	0.0082(5)		\-12'		e	⁴⁸ Ca	240.1	EE	[1985Wi06]	NR
$^{48}\mathrm{Ca}$			0.053(24)		p	$^{48}\mathrm{Ca}$	7-9	TDSA	[1970Be39]	
$^{48}\mathrm{Ca}$	0.0086(12)				e	⁴⁸ Ca	20-60	EE	[1969Ei03]	
$^{48}\mathrm{Ca}$, ,		0.065(27)		p	⁴⁸ Ca	7-9	TDSA	[1968SeZZ]	
$^{50}\mathrm{Ca}$			99(8)		$_{50}^{\mathrm{p}}\mathrm{Ca}$	$^{1}\mathrm{H}$	90 A	DSAM	[2014Ri04]	Ex
$^{50}\mathrm{Ca}$			96(3)		⁴⁸ Ca	$^{208}{\rm Pb}$	310	RDDS	[2009Va06]	
$^{42}\mathrm{Ti}$			0.56(16)		³ He	$^{40}\mathrm{Ca}$	10.0-11.5	TDSA	[1973Ha10]	
$^{42}\mathrm{Ti}$			0.75(30)		³ He	$^{40}\mathrm{Ca}$	8.0	TDSA	[1973Co38]	
$^{42}\mathrm{Ti}$			$0.49(^{+23}_{-18})$		³ He	⁴⁰ Ca	6.0, 6.5, 10.0	TDSA	[1971FoZV]	
$^{42}\mathrm{Ti}$			$0.55(^{+30}_{-20})$		³ He	$^{40}\mathrm{Ca}$	5.8, 7.5	TDSA	[1971BrYK]	
$^{42}\mathrm{Ti}$			$1.7(^{+3}_{-5})$		³ He	Ca	9-10	TDSA	[1971Bo23]	Ex
$^{44}\mathrm{Ti}$			3.97(28)		$^{40}\mathrm{Ca}$	C	95	TDSA	[2003Sc19]	LX
$^{44}\mathrm{Ti}$			4.5(11)		α	40 Ca	4.5-6.0	TDSA	[20035C19] [1977Di07]	Su, NR
⁴⁴ Ti			4.5(11)		α	⁴⁰ Ca	4.00, 4.26, 4.52	TDSA	[1973Di04]	Su, Wit
$^{44}\mathrm{Ti}$			5.0(20)		^{32}S	^{14}N	28	RDM	[1971HuZR]	
$^{46}\mathrm{Ti}$			7.3(4)		²⁸ Si	$^{24}{ m Mg}$	110	RDM	[2006Je04]	
⁴⁶ Ti			7.63(7)		16O	$^{32}\mathrm{S}$	38	RDM	[2003Mo02]	
$^{46}\mathrm{Ti}$			8.1(4)		С	⁴⁶ Ti	110-120	TDSA,CE*	[2000Er01, 2000Er06]	NR
$^{46}\mathrm{Ti}$			$2.0(^{+50}_{-10})$		p	$^{45}\mathrm{Sc}$	1.8	TDSA	[1983Ra17]	NR
$^{46}\mathrm{Ti}$			6.7(5)		P	DC .	1.0	TCS	[1976Kl04]	1110
$^{46}\mathrm{Ti}$	0.0855(40)		0.7(3)		^{32}S	⁴⁶ Ti	60	CE*	[1975To06]	
$^{46}\mathrm{Ti}$	0.0033(40)		6.5(7)		16O	^{32}S	34.5	RDM	[1973De09]	
⁴⁶ Ti	0.0740(20)		0.5(1)		e	⁴⁶ Ti	250	EE	[1971He08]	
$^{46}\mathrm{Ti}$	0.097(7)				16O	46Ti	26-31	CE*	[1971De29]	
⁴⁶ Ti	0.111(10)				³⁵ Cl	⁴⁶ Ti	54	CE*	[1970MiZQ]	
$^{46}\mathrm{Ti}$	0.107(10)				³⁵ Cl	⁴⁶ Ti	70.35-74	CE*	[1970Ha24]	
$^{46}\mathrm{Ti}$			9.7(24)		γ	Ti	0.885	GG	[1967TaZZ]	
$^{46}\mathrm{Ti}$			14.2(20)		γ	Ti	0.885	GG	[1963Ka29]	Ex
$^{46}\mathrm{Ti}$			7.8(22)					GG	[1963Ak01]	
$^{46}\mathrm{Ti}$	0.083(17)				^{14}N	$^{46}\mathrm{Ti}$	16.3, 26, 36	CE*	[1960An07]	
$^{46}\mathrm{Ti}$	0.130(40)				N	$^{46}\mathrm{Ti}$	15.9-35	CE*	[1959Al95]	
$^{46}\mathrm{Ti}$	0.056(11)				³ He	⁴⁶ Ti	6-7	CE	[1956Te26]	Ex
⁴⁸ Ti			5.7(2)		С	⁴⁸ Ti	110-120	TDSA,CE	[2000Er01, 2000Er06]*	NR
$^{48}\mathrm{Ti}$			6.7(6)		γ	⁴⁸ Ti	0.5-1.65	GG	[1981Ca10, 1977Ca14]	
$^{48}\mathrm{Ti}$			4.3(20)		α	$^{45}\mathrm{Sc}$	9.6	TDSA	[1978Li13]	
$^{48}\mathrm{Ti}$			$4.2(^{+30}_{-17})$		p	⁴⁸ Ti	6	TDSA	[1978DeYT]	
$^{48}\mathrm{Ti}$			8.29(36)		^{35}Cl	Ti	56-68	TDSA	[1973Fi15]	
$^{48}\mathrm{Ti}$			6.0(13)		³⁵ Cl	⁴⁸ Ti	64	TDSA	[1973Ba02]	
$^{48}\mathrm{Ti}$			5.3(8)		¹⁶ O	⁴⁸ Ti		TDSA	[1972WaYZ]	
$^{48}\mathrm{Ti}$	0.0537(15)				e	⁴⁸ Ti	250	EE	[1971He08]	
$^{48}\mathrm{Ti}$	0.0720(40)				¹⁶ O	⁴⁸ Ti	26-31	CE*	[1971De29]	
$^{48}\mathrm{Ti}$	0.081(8)				³⁵ Cl	⁴⁸ Ti	54	CE*	[1970MiZQ]	
$^{48}\mathrm{Ti}$	0.069(6)				³⁵ Cl	⁴⁸ Ti	70.35-74	CE*	[1970Ha24]	
$^{48}\mathrm{Ti}$	` ´		$1.2(^{+20}_{-3})$		P	⁴⁸ Ti	7.8	TDSA	[1969Ka10]	NR
$^{48}\mathrm{Ti}$	0.080(16)		_3 /		$^{\mathrm{p}}_{^{12}\mathrm{C}}$	⁴⁸ Ti	38.6	CE*	[1967Af03]	
⁴⁸ Ti			3.6(15)		γ	Ti	0.5-3	GG	[1964Bo22]	
	I			1	I *			GG	[1963Ak02]	
$^{48}\mathrm{Ti}$			7.1(22)	1				GG		
⁴⁸ Ti ⁴⁸ Ti ⁴⁸ Ti	0.070(14) 0.140(40)		(1.1(22)		¹⁴ N N	⁴⁸ Ti ⁴⁸ Ti	16.3, 26, 36 15.9-35	CE*	[1960An07] [1959Al95]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁴⁸ Ti			6.0(20)		$_{^{3}\mathrm{He}}^{\gamma}$	Ti	0.910-1.070	GG	[1958Kn36]	
⁴⁸ Ti	0.031(6)				³ He	⁴⁸ Ti	6-7	CE	[1956Te26]	Ex
⁵⁰ Ti			1.73(20)		⁴⁶ Ca	C	95	TDSA	[2003Sp04]	
⁵⁰ Ti			1.62(7)		$^{50}\mathrm{Ti}$	C	110	TDSA,CE*	[2000Sp08]	NR
⁵⁰ Ti	0.0017(00)		1.30(40)		$\frac{\gamma}{^{32}\mathrm{S}}$	⁵⁰ Ti ⁵⁰ Ti	1.3-4.7	GG	[1976Ra03]	
⁵⁰ Ti ⁵⁰ Ti	0.0315(30)		1.10/15)		16O	⁵⁰ Ti	57	CE*	[1975To06]	
⁵⁰ Ti	0.0307(10)		1.10(15)		1	50 Ti	250	TDSA EE	[1972WaYZ] [1971He08]	
$^{50}\mathrm{Ti}$	0.0307(10)				$^{\mathrm{e}}_{^{32}\mathrm{S}}$	⁵⁰ Ti	67	CE*	[1971He08] [1970Ha24]	
$^{50}\mathrm{Ti}$	0.0330(30)				12C	50Ti	38.6	CE*	[1967Af03]	
$^{50}\mathrm{Ti}$	0.024(2)				16 O	$^{50}\mathrm{Ti}$	31-33	CE*	[1965Si02]	
$^{50}\mathrm{Ti}$	0.040(8)				N	⁵⁰ Ti	30	CE*	[1962Va22]	
$^{52}\mathrm{Ti}$			5.2(2)		⁴⁸ Ca	C	100	TDSA,CE*	[2006Sp02]	
$^{52}\mathrm{Ti}$	0.0567(51)		, ,		$^{52}\mathrm{Ti}$	¹⁹⁷ Au	89A	CE*	[2005Di05]	
$^{52}\mathrm{Ti}$			$4.8(^{+80}_{-21})$		t	$^{50}\mathrm{Ti}$	2.9	TDSA	[1974Pr04]	NR
$^{54}\mathrm{Ti}$	0.0357(63)				$^{54}\mathrm{Ti}$	$^{197}\mathrm{Au}$	89A	CE*	[2005Di05]	
$^{56}\mathrm{Ti}$	0.060(20)				⁵⁶ Ti	¹⁹⁷ Au	89A	CE*	[2005Di05]	
$^{58}\mathrm{Ti}$				$\delta = 0.83$	p	⁵⁸ Ti	42A	IN-EL	[2013Su20]	
				(+22,-						
46 ~	0.000(20)			30)	46.0	2085	1,,,	GD*	[OOOFT CS]	
$^{46}\mathrm{Cr}$ $^{48}\mathrm{Cr}$	0.093(20)		10.0(11)		⁴⁶ Cr ¹⁴ N	$^{208}{}{\rm Pb}$ $^{36}{\rm Ar}$	44A	CE*	[2005Ya26]	
48Cr			10.6(11) 16.7(22)		16O	^{36}Ar ^{34}S	29-36 30-36	TRDM TRDM	[1979Ek03] [1975Ha04]	
⁴⁸ Cr			9.7(26)		10B	40 Ca	19-25	TRDM	[1973Ha04] [1973Ku10]	
$^{50}\mathrm{Cr}$			13.2(4)		$^{50}\mathrm{Cr}$	^{12}C	110-120	CE*	[2000Er01,	NR
OI			13.2(4)				110-120	CL	2000Er06]	1110
$^{50}\mathrm{Cr}$	0.093(5)				e	$^{50}\mathrm{Cr}$	30-400	EE	[1983Li02]	
$^{50}\mathrm{Cr}$	0.102(5)				^{32}S	$^{50}\mathrm{Cr}$	60	CE*	[1975To06]	
$^{50}\mathrm{Cr}$			12.6(21)		¹⁶ O	$^{40}\mathrm{Ca}$	47	TDSA	[1974Br04]	
$^{50}\mathrm{Cr}$			12.1(12)		$^{12}\mathrm{C}$	$^{40}\mathrm{Ca}$	28	TRDM	[1973De09]	
$^{50}\mathrm{Cr}$			10(2)		p 35Cl	$^{52}\mathrm{Cr}$	31.4	TDSA	[1972Ra14]	
$^{50}\mathrm{Cr}$	0.115(10)				³⁵ Cl	$^{50}\mathrm{Cr}$	54	CE	[1972Ra14]	
$^{50}\mathrm{Cr}$	0.092(10)				³⁵ Cl	⁵⁰ Cr	21-79	CE*	[1971DaZM]	
$^{50}\mathrm{Cr}$	0.115(12)			α		$^{50}\mathrm{Cr}$		CE	[1961Mc18,	NR
$^{50}{ m Cr}$	0.15(9)				NT.	$^{50}\mathrm{Cr}$	00.0	CIE 2	1966Mc18]	ND
$^{52}\mathrm{Cr}$	0.15(3)		1 19/9)		$^{ m Ne}_{ m 52Cr}$	C	23.2 110-120	CE? CE*	[1960An09] [2000Er01,	NR NR
*-Cr			1.13(3)		J -Cr		110-120	CE.	2000Er01,	INA
$^{52}\mathrm{Cr}$	0.0632(40)				e	$^{52}\mathrm{Cr}$	30-400	EE	[1983Li02]	
$^{52}\mathrm{Cr}$	0.0687(13)				$\begin{vmatrix} \sigma \\ \gamma \end{vmatrix}$	$^{52}\mathrm{Cr}$	1.431	GG	[1981Ah02]	
$^{52}\mathrm{Cr}$	0.080(8)				e	$^{52}\mathrm{Cr}$	90, 120,	EE	[1978Po04]	
							226			
$^{52}\mathrm{Cr}$	0.0634(39)				e	$^{52}\mathrm{Cr}$	40-110	EE	[1976Li19]	
$^{52}\mathrm{Cr}$	0.0660(30)				^{32}S	$^{52}\mathrm{Cr}$	60	CE*	[1975To06]	
$^{52}\mathrm{Cr}$	0.076(8)				e	$^{52}\mathrm{Cr}$	50-100	EE	[1975DeXW]	
$^{52}\mathrm{Cr}$			0.86(13)		¹⁶ O; ³⁵ Cl	$^{52}\mathrm{Cr}$	21, 79	TDSA	[1972WaYZ]	
$^{52}\mathrm{Cr}$	0.071(9)				e	$^{52}\mathrm{Cr}$	60, 150,	EE	[1971Pe11]	
E0 ~			(±45)		2	E1	180, 250			
⁵² Cr	0.0=0(0)		$0.99(^{+45}_{-25})$		³ He ¹⁶ O: ³⁵ Cl	51 V	11	TDSA	[1971Sp12]	
$^{52}\mathrm{Cr}$	0.072(8)				10O; 35Cl	$^{52}\mathrm{Cr}$	21-30; 60-	CE*	[1971DaZM]	
$^{52}\mathrm{Cr}$	0.043(9)				$^{12}\mathrm{C}$	$^{52}\mathrm{Cr}$	79 36.8	CE*	[1967Af03]	
$^{52}\mathrm{Cr}$	0.043(9) 0.048(2)				16O	^{52}Cr	33.8, 35.6	CE*	[1967A103] [1965Si02]	
$^{52}\mathrm{Cr}$	0.048(2)				e	$^{52}\mathrm{Cr}$	150-180	EE	[1963S102] [1964Be32]	
$^{52}\mathrm{Cr}$	0.0320(40)		1.02(13)		$\begin{vmatrix} c \\ \gamma \end{vmatrix}$	$^{52}\mathrm{Cr}$	0.5-3.0	GG	[1964Bo22]	
$^{52}\mathrm{Cr}$	0.072(9)		1.02(10)		α	$^{52}\mathrm{Cr}$	0.0 0.0	CE	[1961Mc18,	NR
-	01012(0)								1966Mc18]	
$^{52}\mathrm{Cr}$	0.062(12)				Ne	$^{52}\mathrm{Cr}$	23.2	CE?	[1960An09]	NR
$^{52}\mathrm{Cr}$	0.060(15)				¹⁶ O	$^{52}\mathrm{Cr}$	39	CE*	[1960Ad01]	
$^{52}\mathrm{Cr}$	' '		0.8(2)		γ	$^{52}\mathrm{Cr}$	<2	GG	[1959Of14]	
$^{54}\mathrm{Cr}$	0.095(5)				$^{\mathrm{e}}_{^{32}\mathrm{S}}$	$^{54}\mathrm{Cr}$	30-400	EE	[1983Li02]	
$^{54}\mathrm{Cr}$	0.0850(30)				³² S	⁵⁴ Cr	60	CE*	[1975To06]	
⁵⁴ Cr	0.096(9)				³⁵ Cl	54 Cr	54	CE	[1970MiZQ]	
$^{54}\mathrm{Cr}$	0.10(1)				α	$^{54}\mathrm{Cr}$		CE	[1961Mc18,	NR
54.0	0.057(11)				14 N	54 C	16.00	CE	1966Mc18]	
$^{54}\mathrm{Cr}$ $^{54}\mathrm{Cr}$	0.057(11)				14 N 14 N	$^{54}\mathrm{Cr}$ $^{54}\mathrm{Cr}$	16, 26	CE	[1960An07]	
$^{56}\mathrm{Cr}$	0.079(20)	8.7(30)			⁵⁶ Cr	¹⁹⁷ Au	15.9-35 100A	CE CE*	[1959Al95] [2005Bu29]	
OI	1	0.7(00)	1	1	O1	Λu	1007	OL	[2000Du29]	I

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁵⁸ Cr			6.8(9)		⁵⁹ Mn	⁹ Be	92.1A	RDM	[2015Br10]	
$^{58}\mathrm{Cr}$	0.0860(125)				$^{58}\mathrm{Cr}$	¹⁹⁷ Au	81.1A	CE*	[2012Ba31]	
$^{58}\mathrm{Cr}$		14.8(42)			$^{58}\mathrm{Cr}$	¹⁹⁷ Au	100A	CE*	[2005Bu29]	
$^{60}\mathrm{Cr}$			26.5(32)		$^{61}\mathrm{Mn}$	⁹ Be	91.9A	RDM	[2015Br10]	
$^{60}\mathrm{Cr}$	0.1105(145)				$^{60}\mathrm{Cr}$	¹⁹⁷ Au	81.7A	CE*	[2012Ba31]	
$^{60}\mathrm{Cr}$				0.23(3)	$^{60}\mathrm{Cr}$	p	63A	IN-EL	[2009Ao01]	
$^{62}\mathrm{Cr}$			125(13)		$^{63}\mathrm{Mn}$	⁹ Be	98A	RDM	[2015Br10]	
$^{62}\mathrm{Cr}$	0.1625(220)				$^{62}\mathrm{Cr}$	$^{197}\mathrm{Au}$	79A	CE*	[2012Ba31]	
$^{62}\mathrm{Cr}$				0.27(3)	$^{60}\mathrm{Cr}$	p	63A	IN-EL	[2009Ao01]	
$^{64}\mathrm{Cr}$	0.1561(396)				$^{64}\mathrm{Cr}$	Bi	<130A	CE*	[2013Cr02]	
50 Fe	0.1400(300)				50 Fe	Pb	41A	CE*	[2005Ya26]	
52 Fe	0.0817(102)				⁵² Fe	¹⁹⁷ Au	59.6A	CE*	[2004Yu07]	
54 Fe	0.0676(38)				$^{40}\mathrm{Ca}$	54 Fe	86	CE	[1981Le02]	
⁵⁴ Fe	0.060(6)				е	⁵⁴ Fe	50,60, 80,90	EE	[1975DeXW]	
54 Fe			$1.10(^{+50}_{-32})$		р	54 Fe	10	TDSA	[1972Mo31]	
$^{54}\mathrm{Fe}$			0.95(14)		р ¹⁶ О, ³⁵ Сl	⁵⁴ Fe	21-30, 60- 79	TDSA	[1972WaYZ]	
$^{54}\mathrm{Fe}$	0.0532(33)				e	$^{54}\mathrm{Fe}$	150, 225	EE	[1972Li28]	
54 Fe	0.0595(60)				¹⁶ O, ³⁵ Cl	⁵⁴ Fe	21-30, 60-	CE*	[1971DaZM]	
$^{54}\mathrm{Fe}$	0.061(14)				$^{12}\mathrm{C}$	⁵⁴ Fe	79 36.8	CE*	[1967Af03]	
54 Fe	0.051(2)				16O	54 Fe	38.1	CE*	[1965Si02]	
$^{54}\mathrm{Fe}$	0.0533(24)				е	54 Fe	150	EE	[1962Be18]	
$^{56}\mathrm{Fe}$	0.1022(55)				$^{52}\mathrm{Cr}$	¹² C; ⁵⁶ Fe	22; 110-120	CE*	[1981Le02]	
$^{56}\mathrm{Fe}$	******		7.9(12)		$^7\mathrm{Li}$	51 V	25	RDM	[1974Po15]	
$^{56}\mathrm{Fe}$	0.111(6)				α . ¹⁶ O	$^{56}\mathrm{Fe}$	8, 28	CE	[1972Ca05]	
$^{56}\mathrm{Fe}$	0.0970(20)				$_{^{32}\mathrm{S}}^{\alpha,~^{16}\mathrm{O}}$	$^{56}\mathrm{Fe}$	65	CE*	[1972Le19]	
$^{56}\mathrm{Fe}$	0.0678(48)				е	$^{56}\mathrm{Fe}$	150, 225	EE	[1972Li28]	
$^{56}\mathrm{Fe}$	0.0945(45)				e	$^{56}\mathrm{Fe}$	299.5	EE	[1971He08]	
$^{56}\mathrm{Fe}$	0.1176(118)				¹⁶ O, ³⁵ Cl	$^{56}\mathrm{Fe}$	21-30, 60- 79	CE*	[1971DaZM]	
$^{56}\mathrm{Fe}$	0.125(27)				e	$^{56}\mathrm{Fe}$	60.2	EE	[1970Pe15]	
$^{56}\mathrm{Fe}$			10.3(20)		¹⁶ O	$^{56}\mathrm{Fe}$	14-35	TDSA	[1969Sp05]	
$^{56}\mathrm{Fe}$			$11.3(^{+40}_{-24})$		¹⁶ O	$^{56}\mathrm{Fe}$	34	TDSA	[1965Es01]	
$^{56}\mathrm{Fe}$	0.097(10)		(-24)		¹⁶ O	$^{56}\mathrm{Fe}$	33	CE*	[1964El03]	
$^{56}\mathrm{Fe}$	01001(20)		8.5(29)		γ	$^{56}\mathrm{Fe}$	0.5-3	GG	[1964Bo22]	
56 Fe			9.6(18)		$\begin{vmatrix} \gamma \\ \gamma \end{vmatrix}$	56 Fe	0.5-2.4	GG	[1963Be29]	
$^{56}\mathrm{Fe}$	0.0720(35)		0.0(10)		é	56 Fe	150	EE	[1962Be18]	
$^{56}\mathrm{Fe}$	010120(00)		10.6(17)		γ	$^{56}\mathrm{Fe}$		GG	[1961Me11]	
$^{56}\mathrm{Fe}$			8.6(29)			$^{56}\mathrm{Fe}$		GG	[1961Ke06]	
$^{56}\mathrm{Fe}$	0.100(20)		0.0(20)		$_{^{16}\mathrm{O}}^{\gamma}$	$^{56}\mathrm{Fe}$	36	CE	[1960Go08]	
$^{56}\mathrm{Fe}$	0.061(12)				^{14}N	$^{56}\mathrm{Fe}$	16.3, 36	CE*	[1960An07]	
$^{56}\mathrm{Fe}$	0.100(25)				¹⁶ O	$^{56}\mathrm{Fe}$	39	CE*	[1960Ad01]	
$^{56}\mathrm{Fe}$	0.070(18)				N	$^{56}\mathrm{Fe}$	15.9-35	CE*	[1959Al95]	
$^{56}\mathrm{Fe}$	0.100(20)				α	$^{56}\mathrm{Fe}$	7	CE	[1956Te26]	
$^{58}\mathrm{Fe}$	0.1234(36)				¹² C; ⁵² Cr	$^{58}\mathrm{Fe}$	22; 110-120	CE*	[1981Le02]	
58 Fe			$3.4(^{+10}_{-9})$		α	58 Fe	10	TDSA	[1978Bo35]	
58 Fe	0.086(5)		3.2(-9)		40 Ca	58 Fe	76	CE*	[1974ToZJ]	
58 Fe	0.000(3)				e Ca	58 Fe	150, 225	EE	[19741023]	
58 Fe	0.034(8) 0.110(22)				^{14}N	58 Fe	16.3	CE	[1972L126] [1960An07]	
58 Fe	0.20(5)				N	58 Fe	15.9-35	CE*	[1959Al95]	
60 Fe	0.20(0)		11.6(22)		¹⁵ N; ¹⁸ O	⁴⁸ Ca	25-55	RDM	[1977Wa10]	
60 Fe			11.4(12)		238U	⁶⁴ Ni	6.5 A	RDM	[2010Lj01]	
62 Fe			8.0(10)		$^{62}\mathrm{Fe}$	¹⁹⁷ Au	97.8 A	RDM	[2010EJ01] [2011Ro02]	
62 Fe			7.4(9)		²³⁸ U	⁶⁴ Ni	6.5 A	RDM	[20111002] [2010Lj01]	
64 Fe			10.3(10)		$^{64}\mathrm{Fe}$	¹⁹⁷ Au	95A	RDM	[2010EJ01] [2011Ro02]	
64 Fe			7.4(26)		238U	⁶⁴ Ni	6.5 A	RDM	[2011R002]	
66 Fe	0.1445(124)		1.4(20)		66 Fe	Bi	<130A	CE*	[2010Lj01] [2013Cr02]	
66 Fe	0.1440(124)		39.4(40)		64 Fe	¹⁹⁷ Au	88.3A	RDM	[2013C102] [2011Ro02]	
68 Fe	0.1777(216)		30.4(40)		⁶⁸ Fe	Bi	<130A	CE*	[2011R002]	
⁵⁴ Ni	0.1777(210) 0.0590(170)				⁵⁴ Ni	Pb	42A	CE*	[2015C102] [2005Ya26]	
$^{54}\mathrm{Ni}$	0.0626(170)				⁵⁴ Ni	¹⁹⁷ Au	70.3A	CE*	[2003 1a20] [2004Yu10]	
⁵⁶ Ni	0.0020(109)				⁵⁶ Ni	197 Au	85.8A	CE*	[2004 Yu10] [2004Yu10]	
⁵⁶ Ni	0.0494(119)			0.144(34)	⁵⁶ Ni	208Pb	70.7A	CE*	[2004 Yu10] [1998YaZR]	NR
56Ni			0.076(+49)	0.144(34)	³ He	54 Fe	1		1 .	1111
⁵⁸ Ni	0.0630(40)		$0.076(^{+49}_{-24})$				10	TDSA	[1973Sc28]	
	\pm O Ub3O(40)	1	T.	1	⁵⁸ Ni	C	1.8A	CE	[2014Al20]	I

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁵⁸ Ni			$1.00(^{+15}_{-10})$		n	Ni	1.6, 1.8	TDSA	[2008Or02]	
$^{58}\mathrm{Ni}$	0.0707(145)		10'		⁵⁸ Ni	$^{197}\mathrm{Au}$	77.8A	CE*	[2004Yu10]	
$^{58}\mathrm{Ni}$	\ \ \ \ \ \ \ \ \		1.27(2)		⁵⁸ Ni	$^{12}\mathrm{C}$	155, 160	TDSA	[2001Ke08]	
$^{58}\mathrm{Ni}$			0.042(12)		n	Ni	fast	TDSA	[1989Ge09,	Ex, NR
			` ′						1983El03	
$^{58}\mathrm{Ni}$	0.0588(40)				e	⁵⁸ Ni	124, 180	EE	[1983Kl09]	
$^{58}\mathrm{Ni}$, ,		0.90(11)		γ	⁵⁸ Ni	0.5-1.65	GG	[1981Ca10]	
$^{58}\mathrm{Ni}$			0.92(17)		n	$^{58}\mathrm{Ni}$	8	TDSA	[1973BeYD]	
$^{58}\mathrm{Ni}$	0.0660(40)				¹⁶ O	$^{58}\mathrm{Ni}$	35-60	CE*	[1973Ch13]	
$^{58}\mathrm{Ni}$	\		1.07(8)		$ \gamma $	$^{58}\mathrm{Ni}$		GG	[1972ArZD]	
$^{58}\mathrm{Ni}$	0.0680(20)				$\frac{\gamma}{^{16}O}$	$^{58}\mathrm{Ni}$	30, 32, 34	CE*	[1971ChZF]	
$^{58}\mathrm{Ni}$	\		0.98(9)		$ \gamma $	$^{58}\mathrm{Ni}$	<4.5	GG	[1970Me18]	
$^{58}\mathrm{Ni}$	0.0725(20)				$^{\gamma}_{12}$ C, 16 O,	$^{58}\mathrm{Ni}$	21-22, 25-	CE*	[1970Le17,	NR
					32S		30, 60-70		1974Le13	
$^{58}\mathrm{Ni}$	0.0554(30)				e	$^{58}\mathrm{Ni}$	150, 225	EE	[1969Af01]	
$^{58}\mathrm{Ni}$			0.94(12)		p	$^{58}\mathrm{Ni}$	7-9	TDSA	[1969Be48]	
$^{58}\mathrm{Ni}$	0.0657(11)				e	$^{58}\mathrm{Ni}$	40-70	EE	[1967Du07]	
$^{58}\mathrm{Ni}$			0.62(20)		γ	$^{58}\mathrm{Ni}$	0.5-3.0	GG	[1964Bo22]	
$^{58}\mathrm{Ni}$	0.072(7)		(=0)		ά	⁵⁸ Ni	3-10	CE	[1962St02]	
$^{58}\mathrm{Ni}$	0.098(13)				e	⁵⁸ Ni	183	EE	[1961Cr01]	
$^{58}\mathrm{Ni}$	0.063(13)				¹⁶ O	⁵⁸ Ni	36	CE*	[1960Go08]	
$^{58}\mathrm{Ni}$	0.080(16)				14N	⁵⁸ Ni	36	CE*	[1960An07]	
$^{58}\mathrm{Ni}$	0.071(14)				α	⁵⁸ Ni		CE?	[1960An07]	
$^{58}\mathrm{Ni}$	0.100(25)				N ions	⁵⁸ Ni	15.9-35	CE.	[1959Al95]	Su
$^{60}\mathrm{Ni}$	0.0906(41)				⁶⁰ Ni	C	1.8A	CE	[2014Al20]) Su
$^{60}\mathrm{Ni}$	0.0300(41)		>0.500(17)			$^{60}\mathrm{Ni}$	<6	GG	[2013Sc20]	
$^{60}\mathrm{Ni}$					γ	⁶⁰ Ni	1.8	TDSA	[2013SC20] [2008Or02]	
$^{60}\mathrm{Ni}$			$1.30(^{+30}_{-20})$		n ⁶⁰ Ni	^{12}C			1.	
⁰⁰ N1			1.31(3)		O N1	120	160	TDSA	[2001Ke02,	
60 x z ·			1.00(00)		DT / A	DT / A	NT / A	m.c.c	2001Ke08]	
60 Ni			1.30(36)		N/A	N/A	N/A	TCS	[1976Kl04]	
⁶⁰ Ni	0.1020(40)				е	⁶⁰ Ni	30-60	EE	[1974Ye01]	
⁶⁰ Ni	0.087(7)		(=)		e 25 cu	⁶⁰ Ni	45-250	EE	[1974Si01]	
$^{60}\mathrm{Ni}$			1.00(7)		³⁵ Cl	⁶⁰ Ni	56-68	TDSA	[1973Fi15]	
$^{60}\mathrm{Ni}$			$0.8(^{+15}_{-3})$		p	$^{60}\mathrm{Ni}$	12	TDSA	[1973Ro20]	NR
$^{60}\mathrm{Ni}$	0.082(6)				$\frac{\gamma}{^{16}O}$	$^{60}\mathrm{Ni}$		GG	[1972ArZD]	
$^{60}\mathrm{Ni}$	0.0910(30)				16O	$^{60}\mathrm{Ni}$	36	CE	[1971ChZF]	
$^{60}\mathrm{Ni}$	0.092(12)				$ \gamma $	$^{60}\mathrm{Ni}$	<4.5	GG	[1970Me18]	
$^{60}\mathrm{Ni}$	0.0938(20)				$ \gamma $	$^{60}\mathrm{Ni}$	1.333	GG	[1970Me08]	
$^{60}\mathrm{Ni}$	0.0930(20)				$^{\gamma}_{^{16}\text{O}, ^{32}\text{S}}$	$^{60}\mathrm{Ni}$	70	CE^*	[1969Cl05,	NR
									1974Le13]	
$^{60}\mathrm{Ni}$	0.0603(28)				e	$^{60}\mathrm{Ni}$	150,225	EE	[1969Af01]	
$^{60}\mathrm{Ni}$	0.077(8)				e	$^{60}\mathrm{Ni}$	183,250	EE	[1969To08]	
$^{60}\mathrm{Ni}$	0.112(23)				γ	$^{60}\mathrm{Ni}$	1-2	GG	[1967Be39]	
$^{60}\mathrm{Ni}$	0.0845(9)				e	$^{60}\mathrm{Ni}$	40-70	EE	[1967Du07]	
$^{60}\mathrm{Ni}$	0.091(5)				α	$^{60}\mathrm{Ni}$	3-10	CE	[1962St02]	
$^{60}\mathrm{Ni}$	0.123(15)				e	$^{60}\mathrm{Ni}$	183	EE	[1961Cr01]	
$^{60}\mathrm{Ni}$	0.11(1)				^{14}N	$^{60}\mathrm{Ni}$	36	CE*	[1960An07]	
$^{60}\mathrm{Ni}$	0.120(24)				¹⁶ O	$^{60}\mathrm{Ni}$	36	CE^*	[1960Go08]	
$^{60}\mathrm{Ni}$	\		1.0(3)		γ	$^{60}\mathrm{Ni}$	133	GG	[1959Bu12]	
$^{60}\mathrm{Ni}$	0.160(40)				$\frac{\gamma}{^{14}N}$	$^{60}\mathrm{Ni}$	15.9-35	CE	[1959Al95]	
$^{60}\mathrm{Ni}$	` ′		1.1(2)			$^{60}\mathrm{Ni}$	U	GG	[1956Me59]	
$^{62}\mathrm{Ni}$	0.0906(37)				$\frac{\gamma}{^{62}\mathrm{Ni}}$	C	1.8A	CE	[2014Al20]	
$^{62}\mathrm{Ni}$			$1.79(^{+86}_{-48})$		n	⁶² Ni	2.8-4.1	TDSA	[2011Ch05]	
$^{62}\mathrm{Ni}$			2.01(7)		⁶² Ni	$^{12}\mathrm{C}$	160	TDSA	[2001Ke02]	
$^{62}\mathrm{Ni}$			2.15(42)			⁶² Ni	0.5-1.65	GG	[1981Ca10]	
$^{62}\mathrm{Ni}$			1.55(25)		$\begin{vmatrix} \gamma \\ \alpha \end{vmatrix}$	59Co	10	TDSA	[1978Ke11]	
$^{62}\mathrm{Ni}$			1.55(25) $1.55(25)$			59Co	10	TDSA	[1978KlZR]	Su
$^{62}\mathrm{Ni}$					α	59Co		TDSA	1 -	NR
62Ni			$1.6(^{+4}_{-6})$		α		8		[1978Oh04]	
	0.100(10)		2.1(5)		γ	62 Ni	0.5-1.65	GG	[1977Ca14]	Su
62Ni	0.102(10)				е	62 Ni	50-100	EE	[1975DeXW]	
62 Ni	0.0618(42)				e 16O	62 Ni	150, 225	EE	[1972Li28]	
62Ni	0.0880(30)				160	62 Ni	34	CE	[1971ChZF]	
$^{62}\mathrm{Ni}$	0.0895(30)				¹⁶ O	$^{62}\mathrm{Ni}$	70	CE*	[1970Le17,	NR
60					20	69			1974Le13]	
⁶² Ni	0.084(5)				²⁸ Si	⁶² Ni	70	CE*	[1969Ha31]	
⁶² Ni	0.0877(11)				e	⁶² Ni	65	EE	[1967Du07]	
$^{62}\mathrm{Ni}$			2.28(18)		¹⁶ O	$^{62}\mathrm{Ni}$	36	TDSA	[1965Es01]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁶² Ni	0.083(8)	<u> </u>			α	⁶² Ni	6	CE	[1962St02]	
$^{62}\mathrm{Ni}$	0.085(17)				^{14}N	⁶² Ni	36	CE*	[1960An07]	
$^{62}\mathrm{Ni}$	0.140(35)				¹⁴ N	⁶² Ni	15.9-35	CE	[1959Al95]	Su
$^{64}\mathrm{Ni}$	0.0718(29)				⁶⁴ Ni	C	1.8A	CE	[2014Al20]	
$^{64}\mathrm{Ni}$			1.57(5)		⁶⁴ Ni	¹² C	155, 160	TDSA	[2001Ke08]	
$^{64}\mathrm{Ni}$			0.025(12)		n	⁶⁴ Ni	fast	TDSA	[1989Ge09, 1983El03]	Ex, NR
$^{64}\mathrm{Ni}$	0.0744(20)				е	⁶⁴ Ni	147.4-356.0	EE	[1988Br10]	
$^{64}\mathrm{Ni}$, ,		0.40(15)		α	$^{64}\mathrm{Ni}$	13	TDSA	[1974Iv01]	
$^{64}\mathrm{Ni}$	0.0650(40)				¹⁶ O	⁶⁴ Ni	30, 32, 34	CE	[1971ChZF]	
$^{64}\mathrm{Ni}$	0.0650(34)				e	$^{64}\mathrm{Ni}$	150, 225	EE	[1969Af01]	
$^{64}\mathrm{Ni}$	0.087(17)				^{14}N	$^{64}\mathrm{Ni}$	36.0	CE*	[1960An07]	
$^{64}\mathrm{Ni}$	0.077(15)				α	⁶⁴ Ni		CE*	[1960An07]	
$^{64}\mathrm{Ni}$	0.090(18)				N ions	⁶⁴ Ni	15.9-35	CE	[1959Al95]	Su
⁶⁶ Ni	0.06(1)				⁶⁶ Ni	²⁰⁸ Pb	50A	CE*	[2002So03]	
⁶⁸ Ni	0.028(11)				⁶⁸ Ni	¹⁰⁸ Pd	2.9A	CE*	[2008Br18]	
⁶⁸ Ni	0.0255(60)				⁶⁶ Ni ⁷⁰ Ni	²⁰⁸ Pb ²⁰⁸ Pb	50A	CE*	[2002So03]	
⁷⁰ Ni	0.086(14)						0.28c	CE*	[2006Pe13]	
⁷⁴ Ni	$0.0642(^{+216}_{-226})$			(-)	⁷⁴ Ni	¹⁹⁷ Au	95.8A	CE*	[2014Ma85]	
⁷⁴ Ni			(-)	0.21(3)	⁷⁴ Ni	p	81A	IN-EL	[2010Ao01]	
$^{62}{ m Zn}$			4.2(7)		⁶³ Zn	С	9450	RDM	[2007St16]	
$^{62}\mathrm{Zn}$			4.3(3)		⁶² Zn ⁶ Li	Fe ⁵⁸ Ni	160	TDSA	[2002Ke02]	
			4.20(30)				15-24	TDSA	[1981Wa09]	
$^{62}\mathrm{Zn}$			$1.7(^{+7}_{-14})$		$\begin{array}{c} \alpha \\ 64 \mathrm{Zn} \end{array}$	⁶¹ Ni	30	TDSA	[1977BrYO]	
$^{64}\mathrm{Zn}$			2.85(9)		64Zn	С	180	TDSA	[2005Le12]	
$^{64}\mathrm{Zn}$	0.110(6)		2.70(8)		$^{64}\mathrm{Zn}$	Fe ⁶⁴ Zn	160	TDSA	[2002Ke02]	ND
$^{64}\mathrm{Zn}$	0.112(6) 0.168(4)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$^{64}\mathrm{Zn}$	2-4.5	CE	[1998Si25]	NR
	0.108(4)				$\begin{array}{ccc} \alpha, & ^{16}\mathrm{O}, \\ ^{18}\mathrm{O} & & \end{array}$		8,35,30	CE	[1988Sa32]	
$^{64}\mathrm{Zn}$			2.97(25)		γ	$^{64}\mathrm{Zn}$	1.65	GG	[1981Ca10]	
$^{64}\mathrm{Zn}$			3.00(30)		$\frac{\gamma}{^{16}\mathrm{O}}$	⁶⁴ Zn	1.65	GG	[1977Ca14]	Su
$^{64}\mathrm{Zn}$			4.0(10)			51 V	49	RDM	[1977Al14]	
$^{64}\mathrm{Zn}$	0.162(9)				e	64Zn	100-275	EE	[1977Ne05]	
$^{64}\mathrm{Zn}$	0.155(9)		0.0(=)		е	64 Zn	40-112	EE	[1976Ne06]	
$^{64}\mathrm{Zn}$	0.101(10)		2.9(7)		α	⁶¹ Ni	6.4-8	TDSA	[1976Ch11]	
$^{64}\mathrm{Zn}$	0.161(12)				$\begin{array}{c} \alpha \\ ^{35}\mathrm{Cl} \end{array}$	$^{64}\mathrm{Zn}$ $^{64}\mathrm{Zn}$	3-5	CE*	[1975Th01]	
$^{64}\mathrm{Zn}$	0.176(21)					$^{64}\mathrm{Zn}$	56-68 U	CE GG	[1973Fi15] [1972ArZD]	
$^{64}\mathrm{Zn}$	0.155(11)		3.11(22)		γ	$^{64}\mathrm{Zn}$	0	GG	[1972AFZD] [1971ImZY]	NR
$^{64}\mathrm{Zn}$	0.170(16)		3.11(22)		$\begin{array}{c c} \gamma \\ e \end{array}$	$^{64}\mathrm{Zn}$	150-225	EE	[19711ffiZ 1] [1970Af04]	INI
$^{64}\mathrm{Zn}$	0.170(10)				$\begin{vmatrix} \epsilon \\ \gamma \end{vmatrix}$	$^{64}\mathrm{Zn}$	U	GG	[1970A104] [1965Ta13]	
$^{64}\mathrm{Zn}$	0.162(10)				α	$^{64}\mathrm{Zn}$	3-10	CE	[1962St02]	
$^{64}\mathrm{Zn}$	0.110(22)				14 _N	$^{64}\mathrm{Zn}$	36	CE*	[1960An07]	
$^{64}\mathrm{Zn}$	0.110(22)				α	$^{64}\mathrm{Zn}$	<7	CE	[1956Te26]	
$^{66}\mathrm{Zn}$			2.5(1)		66 Zn	С	180	TDSA	[2006Le24]	
$^{66}\mathrm{Zn}$	0.144(9)				66 Zn	Pb	274.2	CE*	[2003Ko51]	
$^{66}\mathrm{Zn}$			2.43(5)		$^{66}\mathrm{Zn}$	Fe	160	TDSA	[2002Ke02]	
$^{66}\mathrm{Zn}$	0.135(8)				p	$^{66}\mathrm{Zn}$	2-4.5	CE^*	[1998Si25]	NR
$^{66}\mathrm{Zn}$			2.71(23)		γ	$^{66}\mathrm{Zn}$	1.65	GG	[1981Ca10]	
$^{66}\mathrm{Zn}$			2.0(10)		α	⁶³ Cu	16.7	TDSA	[1981Zh07]	
$^{66}\mathrm{Zn}$			2.70(20)		γ	⁶⁶ Zn	1.65	GG	[1977Ca14]	Su
$^{66}\mathrm{Zn}$	0.141(8)				e	⁶⁶ Zn	100-275	EE	[1977Ne05]	
$^{66}\mathrm{Zn}$			$2.5(^{+5}_{-2})$		α	⁶⁶ Zn	27,30	TDSA	[1977Mo20]	
$^{66}\mathrm{Zn}$	0.137(10)				e	66 Zn	40-112	EE	[1976Ne06]	
66 Zn	0.154(13)				α	⁶⁶ Zn	3-5	CE	[1975Th01]	
$^{66}\mathrm{Zn}$	0.180(15)				e	⁶⁶ Zn	225	EE	[1973Li24]	
$^{66}\mathrm{Zn}$	0.155(13)		2 2 (=)		³⁵ Cl	66 Zn	56-68	CE	[1973Fi15]	
$^{66}{ m Zn}$	0.150(31)		2.2(9)		α	⁶⁶ Zn	25	TDSA	[1972Yo01]	
$^{66}\mathrm{Zn}$	0.156(21)				γ	⁶⁶ Zn	1.037	GG	[1972Ka22]	
$^{66}{ m Zn}$	0.138(16)				γ	⁶⁶ Zn	U	GG	[1972ArZD]	
$^{66}\mathrm{Zn}$	0.145(15)				e	⁶⁶ Zn ⁶⁶ Zn	150-225	EE	[1970Af04]	
$^{66}\mathrm{Zn}$	0.15(6)				γ	^{66}Zn	U	GG	[1967Be39]	
$^{66}\mathrm{Zn}$	0.145(13)				$^{lpha}_{ m 14}{ m N}$	$^{66}\mathrm{Zn}$	3-10	CE*	[1962St02]	
	0.110(22)	I	1	1	1 - 1 N	Zn	36	CE^*	[1960An07]	
667									[10Kem-sel	
$^{66}\mathrm{Zn}$ $^{68}\mathrm{Zn}$	0.087(17)		2.34(4)		$\frac{\alpha}{^{68}\mathrm{Zn}}$	⁶⁶ Zn C	<7 180	CE TDSA	[1956Te26] [2005Le12,	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$(e^{\hat{2}}b^2)'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁶⁸ Zn	0.129(8)				⁶⁸ Zn	Pb	276	CE*	[2004Ko03]	
$^{68}\mathrm{Zn}$			2.32(7)		$^{68}\mathrm{Zn}$	Fe	161	TDSA	[2002 Ke02]	
$^{68}\mathrm{Zn}$	0.105(7)				p	68 Zn	2-4.5	CE^*	[1998Si25]	NR
$^{68}\mathrm{Zn}$			2.71(23)		γ	$^{68}\mathrm{Zn}$	1.65	GG	[1981Ca10]	
$^{68}\mathrm{Zn}$	0.125(11)				e	⁶⁸ Zn	100-275	$_{\rm EE}$	[1977Ne05]	
$^{68}\mathrm{Zn}$	0.105(8)				γ	$^{68}\mathrm{Zn}$	1.65	GG	[1977Ca14]	Su
$^{68}\mathrm{Zn}$	0.111(8)				e	$^{68}\mathrm{Zn}$	40-112	$_{ m EE}$	[1976Ne06]	
$^{68}\mathrm{Zn}$			1.3(3)		α	$^{68}\mathrm{Zn}$	13	TDSA	[1974Iv01]	
$^{68}\mathrm{Zn}$	0.126(13)				³⁵ Cl	$^{68}\mathrm{Zn}$	56-68	CE	[1973Fi15]	
$^{68}\mathrm{Zn}$	0.108(14)				e	$^{68}\mathrm{Zn}$	225	$_{ m EE}$	[1973Li24]	
$^{68}\mathrm{Zn}$	0.140(16)				γ	$^{68}\mathrm{Zn}$		GG	[1972ArZD]	
$^{68}\mathrm{Zn}$	0.125(11)				α	$^{68}\mathrm{Zn}$	3-10	CE	[1962St02]	
$^{68}\mathrm{Zn}$	0.110(22)				¹⁴ N	$^{68}\mathrm{Zn}$	36	CE^*	[1960An07]	
$^{70}\mathrm{Zn}$			5.3(17)		$^{72}\mathrm{Zn}$	$^{238}{ m U}$	< 540	RDM	[2013Lo04]	
$^{70}\mathrm{Zn}$			5.2(5)		238U	$^{72}\mathrm{Zn}$	6.76A	TDSA	[2013Ce01]	
$^{70}\mathrm{Zn}$	0.164(28)				$^{72}\mathrm{Zn}$	$^{58}\mathrm{Ni}$	4613	CE^*	[2002So03]	
$^{70}\mathrm{Zn}$			5.3(3)		$^{72}\mathrm{Zn}$	Fe	162	TDSA	[2002Ke02]	
$^{70}\mathrm{Zn}$	0.235(25)				p	$^{72}\mathrm{Zn}$	2-4.5	CE^*	[1998Si25]	NR
$^{70}{ m Zn}$	0.205(19)				e	$^{72}\mathrm{Zn}$	40-112	EE	[1976Ne06]	
$^{70}{ m Zn}$	0.160(14)				α	$^{72}\mathrm{Zn}$	3-10	CE	[1962St02]	
$^{72}\mathrm{Zn}$	0.200(22)		17.6 (14)		$^{72}\mathrm{Zn}$	$^{238}{ m U}$	<540	RDM	[2013Lo04]	
$^{72}\mathrm{Zn}$			19.4(55)		²³⁸ U	$^{72}\mathrm{Zn}$	6.76A	TDSA	[2013Ce01]	
$^{72}\mathrm{Zn}$			17.9(18)		$^{73}\mathrm{Zn}$	$^9\mathrm{Be}$	<60 A	RDM	[2012Ni09]	
$^{72}\mathrm{Zn}$	0.174(21)		11.0(10)		$^{72}\mathrm{Zn}$	Pb	2520	CE*	[2002Le17]	
$^{74}\mathrm{Zn}$	0.111(21)		28.5 (36)		$^{74}\mathrm{Zn}$	²³⁸ U	<540	RDM	[2013Lo04]	
$^{74}\mathrm{Zn}$			27.0(24)		$^{74}\mathrm{Zn}$	$^9\mathrm{Be}$	<60 A	RDM	[2013E004]	
$^{74}\mathrm{Zn}$	0.201(16)		21.0(24)		$^{74}\mathrm{Zn}$	¹⁰⁸ Pd,	212.38	CE*	[2007Va20,	
211	0.201(10)				211	$^{120}\mathrm{Sn}$	212.30	CE	2009Va01]	
$^{74}\mathrm{Zn}$	0.204(15)				$^{74}\mathrm{Zn}$	²⁰⁸ Pb	0.28c	CE*	[2006Pe13]	
$^{76}\mathrm{Zn}$	0.204(13)				$^{76}\mathrm{Zn}$	¹⁰⁸ Pd,	218.12	CE*	[2007Va20,	
ZII	0.145(16)				ZII	120Sn	210.12	CE	[2007 Va20, 2009Va01]	
$^{78}\mathrm{Zn}$	0.077(19)				$^{78}\mathrm{Zn}$	108Pd,	223.86	CE*	[2007Va20,	
ZII	0.077(19)				ZII	120Sn	223.80	CE.	1 5	
$^{80}\mathrm{Zn}$	0.079(0)				$^{80}\mathrm{Zn}$	¹⁰⁸ Pd,	200.6	CD*	2009Va01]	
° Zn	0.073(9)				Zn	¹²⁰ Sn	229.6	CE^*	[2007Va20,	
$^{64}\mathrm{Ge}$			0.0(5)		$^{64}\mathrm{Ge}$		4150 A	DDM	2009Va01]	
	0.1401(00)		3.3(5)			C	<150A	RDM	[2007St16]	
⁶⁶ Ge	0.1401(69)		0.0(%)		⁶⁶ Ge ¹⁰ B	¹⁹⁷ Au ⁵⁸ Ni	70 A	CE*	[2013Co23]	
⁶⁶ Ge			3.8(5)		10B	56 N1	28	RDM	[2012Lu03]	_
⁶⁶ Ge			5.3(10)		¹⁰ B ¹² C	⁵⁸ Ni	29	RDM	[1979Wa23]	Ex
⁶⁸ Ge			3.1(3)			⁵⁸ Ni	38	RDM	[2012Lu03]	
⁶⁸ Ge			3.1(2)		⁶⁴ Zn	¹² C	180	TDSA	[2005Le19]	
$^{68}\mathrm{Ge}$			2.6(3)		⁷ Li	⁶⁴ Zn	15-18	TDSA	[1982Pa03]	
$^{68}\mathrm{Ge}$			3(1)		¹² C	⁵⁸ Ni	39	TDSA	[1981De03]	
$^{68}\mathrm{Ge}$			$5(^{+3}_{-2})$		α	$^{66}\mathrm{Zn}$	30	TDSA	[1977Mo20]	
$^{68}\mathrm{Ge}$			2(1)		¹² C	$^{58}\mathrm{Ni}$	36	RDM	[1977Gu08]	
$^{70}{ m Ge}$			1.9(2)		$^{66}\mathrm{Zn}$	$^{12}\mathrm{C}$	180	TDSA	[2006Le31]	
$^{70}{ m Ge}$			1.9(5)		n	$^{70}{ m Ge}$	fast	TDSA	[1988DoZU]	NR
$^{70}{ m Ge}$			1.9(5)		α	$^{67}\mathrm{Zn}$	10-16	RDM	[1984Ef01]	
$^{70}{ m Ge}$	0.179(3)				⁶ Li, ¹⁶ O	$^{70}\mathrm{Ge}$	10.5, 29.9	CE	[1980Le16]	
$^{70}\mathrm{Ge}$. ,		$2.2 \binom{+2}{-1}$		α	$^{68}\mathrm{Zn}$	30	TDSA	[1977Mo20]	
$^{70}\mathrm{Ge}$			1.92(5)		¹⁸ O	$^{56}\mathrm{Fe}$	60	RDM	[1976He05]	Ex
$^{70}\mathrm{Ge}$		19.7(12)	1.02(0)		e	$^{70}\mathrm{Ge}$	84-120	EE	[1975Kl10]	LA
$^{70}{ m Ge}$	0.1790(30)	10.1(12)			α ; ¹⁸ O	$^{70}\mathrm{Ge}$	8.0,8.5;	CE	[1969Si15]	
ac	0.1730(50)				α, σ	de	32.8-40	CE	[15055110]	
$^{70}{ m Ge}$	0.150(30)						32.0-40	CE	[1962Ga19]	
$^{70}{ m Ge}$	0.18(6)				14N	$^{70}{ m Ge}$	36	CE*	[1962Ga13]	
$^{70}{ m Ge}$	0.180(27)				14N	$^{70}\mathrm{Ge}$	36	CE*	[1962Er05]	
⁷⁰ Ge						⁷⁰ Ge	6-8		[1962Er05] [1962St02]	
	$0.172 \begin{pmatrix} +21 \\ -15 \end{pmatrix}$				α			CE	1.	
$^{70}{ m Ge}$	0.098(20)				α	⁷⁰ Ge	7	CE	[1956Te26]	
$^{72}\mathrm{Ge}$	0.212(5)				⁷² Ge, ⁵⁸ Ni	²⁰⁸ Pb,	270, 155	CE^*	[1990Ko38]	
72 ~						⁷² Ge			[100-7	
$^{72}{ m Ge}$			5.2(4)		n	$^{72}\mathrm{Ge}$	fast	TDSA	[1988DoZU]	NR
72 Ge	0.208(3)				α , ¹⁶ O	72 Ge	7.0, 29.9	CE	[1980Le16]	
$^{72}{ m Ge}$			$4\binom{+3}{-1}$		α	$^{72}\mathrm{Zn}$	22-35	TDSA	[1979Mo01]	
$^{72}\mathrm{Ge}$			4.54(10)		¹⁸ O	$^{58}\mathrm{Fe}$	60	RDM	[1976He05]	Ex
	i .	1 00 0 (00)	1	1	1	172 ~	104 100	T.D.	I facertziaci	1
$^{72}\mathrm{Ge}$ $^{72}\mathrm{Ge}$		26.8(20)	4.6(8)		e	$^{72}\mathrm{Ge}$ $^{72}\mathrm{Ge}$	84-120	EE GG	[1975Kl10]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{72}\mathrm{Ge}$	0.18(2)				α	Ge	2.6, 3.0,	CE	[1972Sa27]	
							3.4, 3.6,			
$^{72}{ m Ge}$	$0.230 \binom{+28}{-21}$				α	$^{72}\mathrm{Ge}$	3.8, 4.0 4.5-8	CE	[1962St02]	
$^{72}\mathrm{Ge}$	$\begin{vmatrix} 0.230 & (-21) \\ 0.21(7) \end{vmatrix}$				^{14}N	$^{72}\mathrm{Ge}$	36	CE*	[1962Ga13]	
$^{72}\mathrm{Ge}$	0.21(7)				14N	$^{72}\mathrm{Ge}$	36	CE*	[1962Ga15] [1962Er05]	
$^{72}\mathrm{Ge}$	0.210(00)		4.6(12)		γ	$^{72}\mathrm{Ge}$	0.834	GG	[1956Me13]	
$^{72}\mathrm{Ge}$	0.160(32)				α	$^{72}\mathrm{Ge}$	7	CE	[1956Te26]	
$^{74}\mathrm{Ge}$	0.302(2)				$^{74}\mathrm{Ge}$	Pb	300	CE*	[2000To12]	NR
$^{74}\mathrm{Ge}$			$17.0(^{+16}_{15})$		n	$^{74}\mathrm{Ge}$	fast	TDSA	[1988DoZU]	NR
$^{74}\mathrm{Ge}$	0.305(3)				α , ¹⁶ O	74 Ge	7.0, 29.9	CE	[1980Le16]	
$^{74}\mathrm{Ge}$	0.29(2)				α	Ge	2.6, 3.0, 3.4, 3.6,	CE	[1972Sa27]	
$^{74}\mathrm{Ge}$	0.917(+38)					74.0	3.8, 4.0	CIE.	[10000,00]	
74Ge ⁷⁴ Ge	$0.317(^{+38}_{-29})$				$\frac{\alpha}{^{14}\mathrm{N}}$	⁷⁴ Ge ⁷⁴ Ge	3-10	CE	[1962St02]	
⁷⁴ Ge	0.32(3) $0.300(45)$				14N 14N	$^{74}\mathrm{Ge}$	36 36	CE* CE*	[1962Ga13] [1962Er05]	
$^{74}\mathrm{Ge}$	0.300(43)				d, p	$^{74}\mathrm{Ge}$	3.5-4	CE	[1962Er05]	
$^{74}\mathrm{Ge}$	0.52(5)		19(3)		$\begin{bmatrix} \alpha, p \\ \gamma \end{bmatrix}$	$^{74}\mathrm{Ge}$	0.834	GG	[1956Me13]	
$^{74}\mathrm{Ge}$	0.250(38)		10(0)		α	$^{74}\mathrm{Ge}$	7	CE	[1956Te26]	
$^{76}\mathrm{Ge}$			26.6(6)		76 Ge	$^{238}{ m U}$	<540	RDM	[2013Lo04]	
$^{76}\mathrm{Ge}$	0.299(27)		, ,		$^{76}\mathrm{Ge}$	²⁰⁸ Pb	60A	CE*	[2006Pe13]	
$^{76}\mathrm{Ge}$	0.2923(346)				$^{76}\mathrm{Ge}$	¹⁹⁷ Au	81 A	CE*	[2005Di05]	
$^{76}{ m Ge}$			26.3(30)		n 16.0	⁷⁶ Ge	fast	TDSA	[1988DoZU]	NR
⁷⁶ Ge	0.278(3)				α , ¹⁶ O	$^{76}\mathrm{Ge}$	7.0, 29.9	CE	[1980Le16]	
76 Ge	0.27(2)				α	Ge	2.6, 3.0, 3.4, 3.6, 3.8, 4.0	CE	[1972Sa27]	
$^{76}\mathrm{Ge}$	0.260(5)				α , ¹⁸ O	$^{76}\mathrm{Ge}$	5-11, 34.0	CE	[1969Si15]	
$^{76}\mathrm{Ge}$	$0.263 \binom{+32}{-24}$				α	$^{76}\mathrm{Ge}$	3-10	CE	[1962St02]	
$^{76}\mathrm{Ge}$	0.280(42)				¹⁴ N	$^{76}\mathrm{Ge}$	36	CE*	[1962Er05]	
$^{76}\mathrm{Ge}$	0.29(3)				d, p	$^{76}\mathrm{Ge}$	3.5-3.8	CE	[1960Wi18]	
$^{76}\mathrm{Ge}$	0.230(35)				$ \alpha $	$^{76}\mathrm{Ge}$	7	CE	[1956Te26]	
$^{78}\mathrm{Ge}$	0.222(14)				$^{78}\mathrm{Ge}$	C	2.24 A	CE*	[2005Pa23]	
$^{78}\mathrm{Ge}$	≈ 0.2				⁷⁸ Ge	Pb	40 A	CE*	[2005Iw03]	Ex
$^{78}{ m Ge}$	0.400(0=)		23(4)		80.0	78 Ga(β^-)		DC	[1993Ch05]	NR
$^{80}\mathrm{Ge}$	0.139(27)				⁸⁰ Ge ⁷⁸ Ge	C	2.24 A	CE*	[2005Pa23]	G
⁸² Ge	≈ 0.1 $0.128(22)$				⁸² Ge	Pb ¹⁹⁷ Au	40 A 89.4 A	CE* CE*	[2005Iw03] [2010Ga14]	Su
$^{82}\mathrm{Ge}$	0.128(22)				82Ge	⁴⁸ Ti	220	CE*	[2005Pa23]	
$^{82}\mathrm{Ge}$	≈0.1				$^{78}\mathrm{Ge}$	Pb	40 A	CE*	[2005Iw03]	Ex
$^{68}\mathrm{Se}$			4.60(82)		$^{68}\mathrm{Se}$	⁹ Be	<150 A	RDM	[2014Ni09]	
$^{68}\mathrm{Se}$	0.2158(290)		` ′		68 Se	$^{197}\mathrm{Au}$	92 A	CE^*	[2009Ob02]	
$^{70}\mathrm{Se}$			3.28(37)		$^{70}\mathrm{Se}$	⁹ Be	<150 A	RDM	[2014Ni09]	
$^{70}{\rm Se}$			3.2(2)		³⁶ Ar	⁴⁰ Ca	136	RDM	[2008Lj01]	_
⁷⁰ Se			1.5(3)		36 Ar and 14 N	⁴⁰ Ca, ⁵⁸ Ni	115 and 39	RDM	[1986He17]	Ex
$^{70}\mathrm{Se}$ $^{72}\mathrm{Se}$		22.9(16)	1.60(40)		^{14}N	⁵⁸ Ni	36	RDM GG	[1975GuYV]	Ex
$^{72}\mathrm{Se}$		22.9(16)	4.2(3)		$^{36}\mathrm{Ar}$	⁴⁰ Ca	136	RDM	[2011Mc01] [2008Lj01]	
$^{72}\mathrm{Se}$			4.2(3)		$^{24}\mathrm{Mg}$	54 Fe	104	RDM	[2003Ej01] [2001Pa03]	Ex
$^{72}\mathrm{Se}$			2.6(1)		$^{24}\mathrm{Mg}$	54 Fe	75, 80	TDSA	[1998Sk01]	Ex, NR
$^{72}\mathrm{Se}$			4.3(5)					TDSA	[1988MyZY]	, -
$^{72}\mathrm{Se}$			3.8(7)		36 Ar, 14 N	40 Ca, 60 Ni	115, 39	RDM	[1986He17]	
$^{72}\mathrm{Se}$			4.8(6)		¹⁶ O	⁵⁸ Ni	42	TDSA	[1979Ki17]	
⁷² Se			5.2(5)		¹⁶ O	⁵⁸ Ni	46, 48, 56, 58	RDM	[1978He13]	
$^{72}{\rm Se}$			5.7(12)		¹⁶ O	⁵⁸ Ni	46	TDSA	[1976Ha01]	NR
$^{72}{ m Se}$			3.1(6)		¹⁶ O ¹⁴ N, ¹² C	⁵⁸ Ni ^{58,60} Ni	40, 42, 45	RDM	[1975Lo08]	
$^{72}\mathrm{Se}$ $^{72}\mathrm{Se}$			5.1(6) 5.7(12)		14N, 12C	⁵⁸ Ni	36, 42 44-46	TDSA RDM	[1975GuYW] [1974SaZH]	Su
$^{74}\mathrm{Se}$	0.36(2)		0.1(12)		$^{70}\mathrm{Se}$	104Pd	206	CE*	[1974SaZH] [2007Hu03]	Su
$^{74}\mathrm{Se}$	0.50(2)		14(4)		α , ¹² C	⁷³ Ge, ⁶⁵ Cu	40, 42	RDM	[1989Ad01]	NR
$^{74}\mathrm{Se}$			10.6(8)		^{14}N	63Cu	50	TDSA	[1979Ki17]	
$^{74}\mathrm{Se}$	0.387(5)				α , ¹⁶ O	$^{74}\mathrm{Se}$	7.3, 33-34	CE	[1978Le22]	
$^{74}\mathrm{Se}$	0.370(15)				¹⁶ O	$^{74}\mathrm{Se}$	39.2	CE^*	[1974Ba80]	
$^{74}\mathrm{Se}$	0.42(13)				α	$^{74}\mathrm{Se}$	5	CE	[1970AgZV]	

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Table 1 H	Experimental l	$B(E2)\uparrow$ -, τ -	and β_2 -values	$\sin Z=2-10$	4 nuclei (cont	inued)				
Nuclide	$egin{array}{c} {\bf B(E2)} \\ (e^2b^2) \end{array}$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{74}\mathrm{Se}$	0.44(15)				α	$^{74}\mathrm{Se}$	8.5	CE	[1962Ga13]	
$^{74}\mathrm{Se}$	0.44(8)				^{14}N	$^{74}\mathrm{Se}$	18	CE	[1961An07]	
$^{74}\mathrm{Se}$	0.210(30)				α	$^{74}\mathrm{Se}$	7	$^{\mathrm{CE}}$	[1956Te26]	
$^{74}\mathrm{Se}$	0.210(00)		6(3)		a a	50	'	GG	[1955Me10]	
	0.410(49)		0(3)		⁴⁸ Ti,	$^{76}\mathrm{Se}$	100 094		1 .	
$^{76}\mathrm{Se}$	0.419(43)				208-7	· Se	186, 934	CE^*	[1995Ka29]	
					²⁰⁸ Pb					
$^{76}\mathrm{Se}$	0.425(9)				α	$^{74}\mathrm{Ge}$	18, 21, 24,	RDM/	[1984ZoZZ]	NR
							25.5	TDSA		
$^{76}\mathrm{Se}$	0.423(6)				$^{16}O, \alpha$	$^{76}\mathrm{Se}$	30.0, 6.6-	CE	[1977Le11]	
							7.3			
$^{76}\mathrm{Se}$	0.42(2)				$^{16}O, \alpha$	$^{76}\mathrm{Se}$	39.2, 6.6-	CE^*	[1974Ba80]	Su
se	0.42(2)				$0, \alpha$	se		CE	[1974Dao0]	Su
76.0	0.000(40)					76.0	7.3	G.D.	[40=0 4 5777]	
$^{76}\mathrm{Se}$	0.390(40)				α	$^{76}\mathrm{Se}$	5	CE	[1970AgZV]	
$^{76}\mathrm{Se}$			$15.5(^{+13}_{-19})$		γ	$^{76}\mathrm{Se}$	0.559	GG	[1963Pr04]	
$^{76}\mathrm{Se}$	0.45(4)		1 10		α	$^{76}\mathrm{Se}$	8.5	CE	[1962Ga13]	
$^{76}\mathrm{Se}$	0.480(43)				α	$^{76}\mathrm{Se}$	5-8	CE	[1962St02]	
$^{76}\mathrm{Se}$	0.42(8)				14N	$^{76}\mathrm{Se}$	16.3, 36.0	CE*	[1960An07]	
$^{76}\mathrm{Se}$	0.42(0)		13(2)			$^{76}\mathrm{Se}$	10.5, 50.0	GG	[1960De08]	
	0.49(0)		13(2)		γ		_		, ,	
$^{76}{ m Se}$	0.43(6)				α	$^{76}\mathrm{Se}$	7	CE	[1956Te26]	
$^{76}\mathrm{Se}$			33(22)					DC	[1955Co55]	
$^{78}\mathrm{Se}$	0.325(45)				$^{78}\mathrm{Se}$	Pb	320	CE^*	[2003Ha15]	
$^{78}\mathrm{Se}$			12(2)		α	$^{78}\mathrm{Se}$	16-27	RDM	[1987Sc07]	
$^{78}\mathrm{Se}$	0.327(7)				$^{16}O, \alpha$	$^{78}\mathrm{Se}$	33-34, 6.6-	CE	[1977Le11]	
	3.32.(.)				,		7.3	-	[
$^{78}\mathrm{Se}$	0.32(2)				$^{16}O, \alpha$	$^{78}\mathrm{Se}$	39.2, 6.6-	CE^*	[1974Ba80]	Su
se	0.32(2)				$0, \alpha$	se		CE	[1974Da60]	Su
79.0	0.07(0)				1427	79 a	7.3	OT:	[40000 40]	
$^{78}\mathrm{Se}$	0.35(3)				$^{14}N, \alpha$	⁷⁸ Se	36, 8.5	CE^*	[1962Ga13]	
$^{78}\mathrm{Se}$	0.385(35)				α	$^{78}\mathrm{Se}$	5-8	$^{\mathrm{CE}}$	[1962St02]	
$^{78}\mathrm{Se}$	0.36(6)				$^{14}\mathrm{N}$	$^{78}\mathrm{Se}$	36	CE^*	[1960An07]	
$^{78}\mathrm{Se}$	0.36(7)							CE	[1960Le07]	Su
$^{78}\mathrm{Se}$	0.36(5)				α	$^{78}\mathrm{Se}$	7	CE	[1956Te26]	
$^{80}\mathrm{Se}$	0.25(3)				⁸⁰ Se	Pb	40 A	CE*	[2005Iw03]	
$^{80}\mathrm{Se}$					⁴⁸ Ti, ¹⁶ O;	⁸⁰ Se;			1 .	
~ Se	$0.236 \left(^{+28}_{-24}\right)$				80Se	²⁰⁸ Pb	195, 34;	CE^*	[1995Ka29]	
80					oo'Se	200Pb	312			
$^{80}\mathrm{Se}$	0.252(4)				$^{16}O, \alpha$	$^{80}\mathrm{Se}$	33, 7.3	$^{\mathrm{CE}}$	[1977Le11]	
$^{80}\mathrm{Se}$			12.0(12)		$_{16}^{\gamma}$ O, α	$^{80}\mathrm{Se}$	0.667	GG	[1976KaYY]	NR
$^{80}\mathrm{Se}$	0.25(1)				$^{16}O, \alpha$	$^{80}\mathrm{Se}$	39.2, 6.6-	CE^*	[1974Ba80]	Su
							7.3			
$^{80}\mathrm{Se}$	0.240(30)				α	$^{80}\mathrm{Se}$	5	CE	[1970AgZV]	
$^{80}\mathrm{Se}$	0.283(25)				α	$^{80}\mathrm{Se}$	5-8	CE	[1962St02]	
$^{80}\mathrm{Se}$	0.26(2)				$^{14}N, \alpha$	$^{80}\mathrm{Se}$	36, 8.5	CE*	[1962Ga13]	
$^{80}\mathrm{Se}$	0.20(2)				14N	$^{80}\mathrm{Se}$	36	CE*	[1962Ga15] [1960An07]	
⁸⁰ Se						80 g				
	0.230(34)				α	⁸⁰ Se	7	CE	[1956Te26]	
$^{82}\mathrm{Se}$	0.17(3)				⁸² Se	Pb	40 A	CE*	[2005Iw03]	
$^{82}\mathrm{Se}$	0.179(19)				⁴⁸ Ti, ¹⁶ O;	⁸² Se;	195, 34;	CE^*	[1995Ka29]	
					82Se ,	²⁰⁸ Pb	312			
$^{82}\mathrm{Se}$	0.180(3)				$^{16}O, \alpha$	$^{82}\mathrm{Se}$	33, 7.3	CE	[1977Le11]	
$^{82}\mathrm{Se}$	0.175(9)				¹⁶ O	$^{82}\mathrm{Se}$	39.2	CE^*	[1974Ba80]	Su
$^{82}\mathrm{Se}$	0.170(40)				α	$^{82}\mathrm{Se}$	5	CE	[1970AgZV]	
$^{82}\mathrm{Se}$	0.19(7)				$^{14}N, \alpha$	$^{82}\mathrm{Se}$	36, 8.5	CE*	[1962Ga13]	
$^{82}\mathrm{Se}$	0.13(1)					$^{82}\mathrm{Se}$	5-8	CE	[1962St02]	
$^{82}\mathrm{Se}$					$\frac{\alpha}{^{14}N}$	$^{82}\mathrm{Se}$			1.	
	0.190(38)						36	CE*	[1960An07]	
$^{82}\mathrm{Se}$	0.056(9)				α	⁸⁰ Se	7	CE	[1956Te26]	
$^{84}\mathrm{Se}$	0.105(15)				$^{84}\mathrm{Se}$	$^{197}\mathrm{Au}$	95.4 A	CE^*	[2010Ga14]	
$^{72}{ m Kr}$			5.6(10)		$^{72}\mathrm{Kr}$	⁹ Be	0.37c	RDM	[2014Iw01]	
$^{72}{ m Kr}$	0.4997(647)		, ,		$^{72}\mathrm{Kr}$	$^{197}\mathrm{Au}$	57.4 A	CE^*	[2005Ga22]	
$^{74}{ m Kr}$			32.2(22)		$^{74}{ m Kr}$	⁹ Be	0.37c	RDM	[2014Iw01]	
$^{74}{ m Kr}$	0.61(1)		()		$^{74}\mathrm{Kr}$	²⁰⁸ Pb	4.4 A	CE*	[2007Cl02]	
$^{74}\mathrm{Kr}$	0.01(1)		33.8(5)		⁴⁰ Ca	$^{40}\mathrm{Ca}$	147	RDM	[2007Cl02] [2005Go43]	
$^{74}\mathrm{Kr}$			\ \ /		19 _F	⁵⁸ Ni				
			23.5(20)				62	RDM	[1990Ta12]	
$^{74}{ m Kr}$			28.8(57)		¹⁹ F	⁵⁸ Ni	56-68	RDM	[1984Ro01]	
$^{74}{ m Kr}$			14.0(43)		¹⁶ O	⁶⁰ Ni	42	RDM	[1976AlYY]	Ex, NR
$^{76}{ m Kr}$	0.72(1)				$^{76}\mathrm{Kr}$	$^{208}{\rm Pb}$	4.4 A	CE^*	[2007Cl02]	
$^{76}{ m Kr}$	1		41.5(8)		40 Ca	$^{40}\mathrm{Ca}$	147	RDM	[2005Go43]	
$^{76}{ m Kr}$			37.7(30)		$^{24}{ m Mg}$	⁵⁸ Ni	80, 85	RDM	[1990He04]	
$^{76}\mathrm{Kr}$			36(1)		16O	⁶³ Cu	49-58	RDM	[1984Wo10]	
$^{76}\mathrm{Kr}$			35(3)		¹⁹ F	⁶³ Cu	58	RDM	[1984W010] [1982Ke01]	
					¹⁶ O					F
$^{76}{ m Kr}$	I	I	53(7)	I	1 - 50	⁶² Ni	42	RDM	[1974No08]	Ex

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$(e^{\hat{2}}b^2)'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁷⁸ Kr	0.5951(481)				⁷⁸ Kr	⁹ Be	150 A	CE*	[2009Ob02]	
$^{78}{ m Kr}$	0.670(25)				$^{78}\mathrm{Kr}$	²⁶ Mg,	180, 200,	CE*	[2006Be18]	
						⁴⁸ Ti,	350			
7812	0.6944(590)				$^{72}\mathrm{Kr}$	²⁰⁸ Pb ⁷⁸ Kr		CD*	[acor C aci	
⁷⁸ Kr ⁷⁸ Kr	0.6244(738)		20.0(14)		¹² Kr ²⁷ Al	⁵⁸ Ni	57.4 A	CE*	[2005Ga22]	
⁷⁸ Kr			32.0(14)		78Kr	²⁶ Mg	115 220.5	TDSA TDSA	[2002Jo07]	
$^{78}\mathrm{Kr}$			27.5(25)		¹⁹ F	63Cu	70	RDM	[2001Me20] [1990Ga22]	
$^{78}\mathrm{Kr}$			30.4(13) 33(3)		12C	$^{68}\mathrm{Zn}$	36	RDM	[1985Wi01]	
$^{78}\mathrm{Kr}$			32.5(25)		$^{12}C, \alpha$	⁶⁸ Zn, ⁷⁶ Se	36, 27	TDSA	[1982An06]	Su, NR
$^{78}\mathrm{Kr}$	0.55(3)		32.3(23)		α	Kr Se	6-8	CE	[1981Ca01]	Su, Mit
$^{78}\mathrm{Kr}$	0.55(5)		32(2)		16 _O	$^{65}\mathrm{Cu}$	50, 58	RDM	[1979He07]	
$^{78}\mathrm{Kr}$			36.1(43)		16O	⁶⁴ Ni	42	RDM	[1974No08]	
$^{78}{ m Kr}$	0.51(13)		00.1(10)		α	$^{78}\mathrm{Kr}$	6.1, 6.6	CE	[1957He48]	
$^{80}\mathrm{Kr}$	0.01(10)		12.1(10)		19 _F	⁶⁵ Cu	74	TDSA	[2001Mu25]	Ex
$^{80}{ m Kr}$	0.4044(256)		12.1(10)		$^{80}\mathrm{Kr}$	$^{26}{ m Mg}$	246.7	TDSA	[2001Me20]	
$^{80}{ m Kr}$	0.39(2)				α	Kr	6-8	CE	[1981Ca01]	
$^{80}{ m Kr}$			12(1)		α , ¹⁸ O	⁷⁷ Se, ⁶⁵ Cu	13.5, 46	TDSA	[1981Fu03]	
$^{80}{ m Kr}$			12.7(7)		¹⁸ O	⁶⁵ Cu	52.5	RDM	[1975Fr04]	
$^{80}{ m Kr}$	0.34(9)				α	$^{78}{ m Kr}$	6.1, 6.6	CE	[1957He48]	
$^{82}{ m Kr}$			6.69(20)		$^{82}\mathrm{Kr}$	$^{26}{ m Mg}$	240.7	TDSA	[2001Me20]	
$^{82}{ m Kr}$			6.8(10)		$ \alpha $	$^{80}\mathrm{Se}$	21-27	RDM	[1984Ke10]	NR
$^{82}{ m Kr}$	0.225(9)				$^{82}\mathrm{Kr}$	Al, Zn, Ge	1.41 A	CE	[1982Ke01]	
$^{82}{ m Kr}$	0.24(1)				α	Kr	6-8	CE	[1981Ca01]	
$^{82}{ m Kr}$, ,		6.9(11)		γ	Kr	776	GG	[1966Be16]	
$^{82}{ m Kr}$	0.19(5)				α	$^{78}{ m Kr}$	6.1, 6.6	CE	[1957He48]	
$^{84}{ m Kr}$	0.120(15)				$^{84}{ m Kr}$	⁹⁸ Mo, Ta	250	CE*	[2002Os07]	
$^{84}{ m Kr}$			5.84(18)		$^{84}\mathrm{Kr}$	$^{26}{ m Mg}$	235.0	TDSA	[2001Me20]	
$^{84}{ m Kr}$			5(2)		α	$^{82}\mathrm{Se}$	<27	RDM	[1990Ro10]	NR
$^{84}{ m Kr}$	0.122(5)				$^{84}{ m Kr}$	Al, Zn, Ge	1.41 A	CE	[1982Ke01]	
$^{84}{ m Kr}$	0.13(1)				α	Kr	6-8	CE	[1981Ca01]	
$^{84}{ m Kr}$	0.16(4)				α	$^{78}\mathrm{Kr}$	6.1, 6.6	CE	[1957He48]	
$^{86}\mathrm{Kr}$			0.444(25)		$^{86}\mathrm{Kr}$	$^{26}\mathrm{Mg}$	261.1	TDSA	[2001Me20]	
⁸⁶ Kr	0.11(3)				$^{\alpha}_{16}$ O	Kr	6-8	CE	[1981Ca01]	
$^{86}\mathrm{Kr}$	0.128(10)	7.7 (0)			8817	⁸⁶ Kr	42-52	CE*	[1981Ji03]	
⁸⁸ Kr		7.7(8)			⁸⁸ Kr	¹² C	2.19 A	CE	[2009MuZU]	
$^{88}{ m Kr}$		~8.0	15(10)		⁸⁸ Kr	¹² C ²³⁵ U	1,1	CE	[2009MuZW]	Su
$^{92}{ m Kr}$		10.0(+28)	15(10)		$\frac{n}{92}$ Kr	196Pt	cold	TMC	[2014Re15]	
		$13.6(^{+28}_{-33})$			⁹² Kr	109 Ag	262.2	CE	[2013Al05]	
$^{92}{\rm Kr}$		16.9(5)			92Kr 92Kr	109 Ag	2.19 A	CE	[2009MuZU]	
$^{92}{\rm Kr}$	0.047(00)	~ 17.0			94Kr	¹⁰⁹ Ag ¹⁹⁶ Pt	267.0	CE	[2009MuZW]	Su
⁹⁴ Kr ⁹⁶ Kr	0.247(28) 0.436(93)				96Kr	194,196Pt	267.9 273.6	CE CE	[2012Al03] [2012Al03]	
$^{76}\mathrm{Sr}$	0.450(95)		296(36)		76 Rb	⁹ Be	104.5 A	DSA	[2012Al05]	
$^{78}\mathrm{Sr}$			276(39)		78 Rb	⁹ Be	104.5 A 101.6 A	DSA	[2012Le05] [2012Le05]	
$^{78}\mathrm{Sr}$			224(27)		$^{24}\mathrm{Mg}$	⁵⁸ Ni	101.6 A 100	RDM	[1982Li08]	
$^{80}\mathrm{Sr}$			49.4(18)		$^{24}\mathrm{Mg}$	⁵⁸ Ni	80, 85	RDM	[1990He04]	
$^{80}\mathrm{Sr}$			58(10)		⁶⁶ Zn, ⁷⁸ Kr	¹⁶ Ο, α	55, 28	RDM	[1982HiZT]	
$^{80}\mathrm{Sr}$			53.4(43)		$^{24}\mathrm{Mg}$	⁵⁸ Ni	100	RDM	[1982Li08]	
$^{80}\mathrm{Sr}$			63(9)		16O	$^{66}\mathrm{Zn}$	42	RDM	[1974No08]	
$^{82}\mathrm{Sr}$			15.4(31)		²⁷ Al	⁵⁸ Ni	90	RDM	[1996Jo05]	
$^{82}\mathrm{Sr}$			44(15)			$^{82}Y(\beta^{+})$		DC	[1982De36]	Ex, NR
$^{82}\mathrm{Sr}$			12.8(5)		$^{19}\mathrm{F}$	66 Zn	65	RDM	[1981DeYW]	
$^{84}\mathrm{Sr}$			4.2(2)		$^{84}\mathrm{Sr}$	$^{12}\mathrm{C}$	275	DSAM	[2012Ku14]	
$^{84}\mathrm{Sr}$			9(3)		$^{12}\mathrm{C}$	$^{76}\mathrm{Ge}$	60	RDM	[1994Ch28]	Ex, NR
$^{84}\mathrm{Sr}$			4.6(5)		$^{12}\mathrm{C}$	$^{76}\mathrm{Ge}$	60	RDM	[1982De05]	
$^{84}\mathrm{Sr}$			$6\binom{+4}{-2}$		α	$^{82}{ m Kr}$	14, 18	TDSA	[1980Ek03]	
$^{84}{ m Sr}$	0.16(5)		\ <u>-</u> 2'		N	$^{84}\mathrm{Sr}$	44	CE*	[1963Al31]	
$^{86}\mathrm{Sr}$	`´		2.0(1)		⁸⁶ Sr	$^{12}\mathrm{C}$	250	DSA	[2012Ku14]	
$^{86}\mathrm{Sr}$	0.121(5)		`´		e	$^{86}\mathrm{Sr}$	100-370	EE	[1992Ki20]	
$^{86}\mathrm{Sr}$	` ´		2.10(22)		$^{28}\mathrm{Si}$	$^{86}\mathrm{Sr}$	88	TDSA	[1988Ku01]	
$^{86}\mathrm{Sr}$	0.118(16)		' ′		¹⁶ O	$^{86}\mathrm{Sr}$	35-42	CE	[1964Sy01]	
$^{86}\mathrm{Sr}$	0.087(26)				N	$^{86}\mathrm{Sr}$	44	CE*	[1963Al31]	
$^{88}\mathrm{Sr}$	` ´		0.219(18)		⁸⁸ Sr	$^{12}\mathrm{C}$	270	DSA	[2012Ku14]	
$^{88}\mathrm{Sr}$			0.214(11)		n	$^{88}\mathrm{Sr}$	fast	TDSA	[2008Go25]	
$^{88}\mathrm{Sr}$			0.219(23)		²⁸ Si	⁸⁸ Sr	88	TDSA	[1988Ku01]	
$^{88}\mathrm{Sr}$			0.224(11)		$ \gamma $	$^{88}\mathrm{Sr}$	2.0-2.31	GG	[1977Me10]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$(e^{\grave{2}}b^2)'$	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
⁸⁸ Sr	0.0822(24)				e	⁸⁸ Sr	45-121	EE	[1974Fi05]	
$^{88}\mathrm{Sr}$	0.114(15)				¹⁶ O	$^{88}\mathrm{Sr}$	45-60	CE^*	[1973Ch13]	
$^{88}\mathrm{Sr}$	0.099(5)				e	$^{88}\mathrm{Sr}$	65,70	EE	[1968Pe02]	
$^{88}\mathrm{Sr}$	0.092(17)				¹⁶ O	$^{88}\mathrm{Sr}$	35-42	CE	[1964Sy01]	
$^{88}\mathrm{Sr}$	\		0.155(40)		γ	$^{88}\mathrm{Sr}$		GG	[1959Of14]	
$^{88}\mathrm{Sr}$	0.140(10)				é	$^{88}\mathrm{Sr}$	187	EE	[1956He83]	
$^{90}\mathrm{Sr}$	()		10(3)					DC	[1991Ma05]	
$^{92}\mathrm{Sr}$			12(5)					DC	[1991Ma05]	
$^{94}\mathrm{Sr}$			10(4)					DC	[1991Ma05]	
$^{96}\mathrm{Sr}$	0.2310(55)		10(1)		$96\mathrm{Sr}$	¹⁰⁹ Ag,	~4.5 A	CE*	[2011Cl03]	
$^{96}\mathrm{Sr}$	0.2510(55)					120Sn	1.0 11			
90Sr			7(4)					DC	[1991Ma05]	
98Sr			4040(110)					DC	[1989Ma38]	
$^{98}\mathrm{Sr}$			3952(173)					DC	[1987Oh05]	
$^{98}\mathrm{Sr}$			5800(1400)					DC	[1980Sc13]	
$^{98}\mathrm{Sr}$			4700(2200)					DC	[1980ChZM]	
$^{98}\mathrm{Sr}$			5200(600)					DC	[1979Az01]	
$^{100}\mathrm{Sr}$			5640(230)					DC	[1990Lh01]	
$^{100}\mathrm{Sr}$			7430(290)					DC	[1979Az01]	
$^{82}\mathrm{Zr}$			32(13)		²⁷ Al	⁵⁸ Ni	92	RDM	[1997Pa07]	
$^{82}{ m Zr}$			40(4)		²⁸ Si	⁵⁸ Ni	120-125	RDM	[1993Ch41]	
$^{84}{ m Zr}$			24(2)		²⁸ Si	59 Co	98	RDM	[1996Ch02]	NR
$^{84}{ m Zr}$			20.3(11)		²⁸ Si, ²⁹ Si	⁵⁸ Ni	95-110	RDM	[1983Pr08]	
$^{86}\mathrm{Zr}$			11.2(28)		32S	⁵⁸ Ni	130	RDM	[1998Ka19]	NR
$^{86}\mathrm{Zr}$			10.6(20)		16O	73Ge	52.0	RDM	[1978Av02]	1110
$^{88}\mathrm{Zr}$			3.6(4)		88Sr	¹² C	275	DSA	[2012Ku14]	
$^{88}\mathrm{Zr}$			1.33(43)		p	$^{90}\mathrm{Zr}$	7	TDSA	[1973BeYD]	Ex
$^{90}\mathrm{Zr}$			$0.125(^{+7}_{-6})$			$^{90}\mathrm{Zr}$	2.5	DSAM	1 .	LA
$^{90}\mathrm{Zr}$					n	89 Y			[2013Pe16]	
$^{90}\mathrm{Zr}$	0.0515(00)		0.121(20)		p	90 Zr	4	TDSA	[1993Sa38]	ND
90Zr	0.0517(88)				n		8, 10, 24	SCATT	[1990Wa13]	NR
$^{90}{ m Zr}$	0.0653(21)				e	⁹⁰ Zr	70-368	EE	[1984He02]	NR
$^{90}{ m Zr}$	0.067(6)				e	⁹⁰ Zr	53.75-112.2	EE	[1975Si21]	
$^{90}{ m Zr}$	0.060(6)				e	⁹⁰ Zr	50-100	EE	[1975DeXW]	
$^{90}{ m Zr}$	0.067(6)				e	$^{90}\mathrm{Zr}$	45-250	EE	[1974Si01]	Su
$^{90}\mathrm{Zr}$			0.135(8)		γ	$^{90}\mathrm{Zr}$	< 5.6	GG	[1974Me13]	
$^{90}{ m Zr}$			0.075(21)		p	$^{90}\mathrm{Zr}$	7	TDSA	[1973BeYD]	
$^{90}\mathrm{Zr}$			0.080(10)					TDSA	[1973RaWV]	
$^{90}{ m Zr}$			0.135(8)		γ	$^{90}\mathrm{Zr}$	2.186	GG	[1972Me04]	Su
$^{90}{ m Zr}$	0.0400(30)				e	$^{90}\mathrm{Zr}$		EE	[1971MiZK]	
$^{90}{ m Zr}$	0.0830(19)				e	$^{90}\mathrm{Zr}$	60	EE	[1970Be07]	
$^{90}{ m Zr}$	0.042(15)				e ¹⁴ N	$^{90}\mathrm{Zr}$	44	CE	[1965Ga05]	
$^{92}\mathrm{Zr}$	0.0762(28)				e	$^{92}\mathrm{Zr}$	63	EE	[2013Sc01]	
$^{92}\mathrm{Zr}$	\	6.4(6)	7.25(68)		γ	$^{92}\mathrm{Zr}$	<4.3	GG	[2002We15]	
$^{92}\mathrm{Zr}$	0.120(25)		` ′		n	$^{92}\mathrm{Zr}$	8, 10, 24	SCATT	[1990Wa13]	NR
$^{92}\mathrm{Zr}$	0.080(6)				¹⁶ O	$92{\rm Zr}$	46	CE*	[1981Yo07]	
$^{92}\mathrm{Zr}$	0.079(20)				$^{12}C, ^{14}N, \alpha$	$^{92}\mathrm{Zr}$	31-46, 12	CE*	[1969Ga25]	
$^{92}\mathrm{Zr}$	0.094(19)				N , I, I	$^{92}\mathrm{Zr}$	44	CE*	[1963Al31]	
$^{92}\mathrm{Zr}$	0.079(8)				α	$^{92}\mathrm{Zr}$	9	CE	[1958St32]	
$^{94}\mathrm{Zr}$	0.0.0(0)		10.47(61)		^{32}S	$^{94}\mathrm{Zr}$	105	RDM	[1993Ho12]	NR
$^{94}\mathrm{Zr}$	0.110(16)		10.17(01)		n	$^{94}\mathrm{Zr}$	8, 10, 24	SCATT	[1990Wa13]	NR
$^{94}\mathrm{Zr}$	0.056(14)				^{12}C , ^{14}N ; α	$^{94}\mathrm{Zr}$	31-46; 12	CE	[1969Ga25]	1110
$^{94}\mathrm{Zr}$	0.081(17)				N N	$^{94}\mathrm{Zr}$	44	CE*	[1963Al31]	
$^{94}\mathrm{Zr}$	0.031(17)				α	$^{94}\mathrm{Zr}$	9	CE	[1958St32]	
$^{96}\mathrm{Zr}$	0.013(0)		0.77(+18)			$^{96}\mathrm{Zr}$			1 -	
$^{96}\mathrm{Zr}$			$0.77(^{+18}_{-13})$		n ⁹⁶ Zr	$^{12}\mathrm{C}$	2.0	DSAM	[2013Pe16]	
96Zr	0.022(00)		0.82(10)		142x		274	TDSA	[2003Ku11]	
$^{96}{ m Zr}$	0.055(22)		1.0		^{14}N	$^{96}\mathrm{Zr}$	44	CE*	[1965Ga05]	
$^{98}\mathrm{Zr}$			<16					DC	[2010Be30]	
$^{98}{ m Zr}$			<30			252		DC	[1989Ma38]	_
$^{100}{ m Zr}$			928(75)			$^{252}\mathrm{Cf}(\mathrm{SF})$		RDM	[2002Sm10]	Ex
$^{100}\mathrm{Zr}$			780(60)					DC	[1989Oh06]	
$^{100}\mathrm{Zr}$			793(29)					DC	[1989Ma47]	
$^{100}{ m Zr}$		1	580(120)					DC	[1989Lh01]	
$^{100}\mathrm{Zr}$			286(46)					RDM	[1983MaYT]	
$^{100}{ m Zr}$		1	890(140)					DC	[1980ChZM]	
$^{100}\mathrm{Zr}$			1030(43)					DC	[1975JaYL,	NR
			` ´						1974JaZN]	
$^{100}\mathrm{Zr}$			4040(1300)					DC	[1972ClZN]	Ex, NR
	I	1	1 (1000)	1	T	Į.	1	1	[[]	1,

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$100 \mathrm{Zr}$	<u> </u>	1` ′	750(160)				<u> </u>	DC	[1970Ch11]	
$^{100}\mathrm{Zr}$			10100(2900)					DC	[1970Jo20]	Ex, NR
$^{102}\mathrm{Zr}$			3610(430)					DC	[2015Br03]	
$^{102}\mathrm{Zr}$			4300					DC	[2005Fo17]	Ex
$^{102}\mathrm{Zr}$			2470(200)					DC	[1980ChZM]	
$^{102}{ m Zr}$			3190(250)					DC	[1975JaYL,	NR
$^{102}{ m Zr}$									1974JaZN]	
$^{102}\mathrm{Zr}$ $^{102}\mathrm{Zr}$			1240(250)					DC	[1970Ch11]	Su
			2500(600)			106***(0)		DC	[1970Wa05]	
$^{104}{ m Zr}$			$2900(^{+250}_{-200})$			$^{106}Y(\beta^{-})$		DC	[2015BrP]	
			2885(435)					DC	[2006Hw01]	
$^{104}{ m Zr}$			3300			106**(0.)		DC	[2005Fo17]	Su
$^{106}{ m Zr}$			$2600(^{+200}_{-150})$			$^{106}Y(\beta^{-})$		DC	[2015BrP]	
⁹² Mo	0.109(5)		0.700(00)		e	⁹² Mo	100-380	EE	[1987MiZL]	NR
⁹² Mo			0.582(36)		γ	92 Mo	2.0-5.1	GG	[1977Me01]	
⁹² Mo			0.55(10)		p	92 Mo	7, 8, 8.8	TDSA	[1973DoZB]	
⁹² Mo	0.107(0)		$0.43(^{+22}_{-14})$		α	92 Mo	25	TDSA	[1971Yo02]	
$^{92}_{92}Mo$	0.107(6)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	92 Mo	8	CE	[1971WaZP]	Rad
	0.093(14)				14N	92 Mo	38-49	CE CE*	[1964St04]	
$^{92}{ m Mo}$ $^{94}{ m Mo}$	0.19(8)		4.15(0)		14N	$^{92}\mathrm{Mo}$	40	CE*	[1962Af02]	F
94Mo	0.1960(30)		4.15(6)		¹⁶ Ο, α	$^{94}\mathrm{Mo}$	36, 8	TDSA CE	[2002Kl07] [1976Pa13]	Ex
^{94}Mo	0.1900(50)		4.30(20)		³⁵ Cl	94 Mo	100	TDSA	[1970Pa13] [1972SiZP]	
^{94}Mo	0.218(11)		4.50(20)		16O	^{94}Mo	35-44.8	CE	[1972SiZi] [1971Ba59]	NR
^{94}Mo	0.216(11)		4.00(20)		³⁵ Cl	^{94}Mo	100	TDSA	[1971Ba59] [1971SiYA]	Su
^{94}Mo	0.208(12)		4.00(20)		α	94 Mo	8	CE	[1971S17A] [1971WaZP]	Rad
^{94}Mo	0.200(12)		2.0(5)			94 Mo		GG	[1966Be53]	Teac
$^{94}\mathrm{Mo}$	0.270(35)		2.0(0)		$\frac{\gamma}{^{14}\mathrm{N}}$	^{94}Mo	41	CE*	[1962Ga13]	
$^{94}\mathrm{Mo}$	0.230(40)				14N	⁹⁴ Mo	36	CE	[1962Er05]	
$^{94}\mathrm{Mo}$	0.265(21)				α	⁹⁴ Mo	2.4, 2.7, 3.0	CE	[1958St32]	
$^{94}\mathrm{Mo}$	0.290(44)				α	$^{94}\mathrm{Mo}$	7	CE	[1956Te26]	
$^{96}\mathrm{Mo}$	0.2700(40)				$^{16}O, \alpha$	$^{96}\mathrm{Mo}$	36, 8	CE	[1976Pa13]	
$^{96}\mathrm{Mo}$	` ′		5.00(20)		^{35}Cl	$^{96}\mathrm{Mo}$	100	TDSA	[1972SiZP]	
$^{96}\mathrm{Mo}$	0.284(14)		` ′		¹⁶ O	$^{96}\mathrm{Mo}$	35-44.8	CE	[1971Ba59]	NR
$^{96}\mathrm{Mo}$	0.288(16)						8	CE	[1971WaZP]	
$^{96}\mathrm{Mo}$, ,		5.60(20)		$^{35}\mathrm{Cl}$	$^{96}\mathrm{Mo}$	100	TDSA	[1971SiYA]	Su
$^{96}\mathrm{Mo}$	0.302(39)				^{14}N	$^{96}\mathrm{Mo}$	41	CE*	[1962Ga13]	
$^{96}\mathrm{Mo}$	0.240(40)				¹⁴ N	96 Mo	36	CE	[1962Er05]	
$^{96}\mathrm{Mo}$	0.302(22)				α	⁹⁶ Mo	2.4, 2.7, 3.0	CE	[1958St32]	
96 Mo	0.310(47)				α	⁹⁶ Mo	7	CE	[1956 Te 26]	
$^{98}\mathrm{Mo}$	0.277(8)				²⁰ Ne, ⁸⁴ Kr, ¹³⁶ Xe	⁹⁸ Mo	50, 250, 614	CE*	[2002Zi06]	Ex, Gos
$^{98}\mathrm{Mo}$	0.2670(40)				α , ¹⁶ O	⁹⁸ Mo	8, 36.5	CE	[1979Pa11]	
$^{98}\mathrm{Mo}$	0.2660(50)				$^{16}O, \alpha$	⁹⁸ Mo	36, 8	CE	[1976Pa13]	Su
$^{98}\mathrm{Mo}$			5.20(20)		³⁵ Cl	⁹⁸ Mo	100	TDSA	[1972SiZP]	
⁹⁸ Mo	0.286(14)				¹⁶ O	$^{98}\mathrm{Mo}$	35-44.8	CE	[1971Ba59]	NR
⁹⁸ Mo	0.275(15)				1.4	00	8	CE	[1971WaZP]	
⁹⁸ Mo	0.270(32)				¹⁴ N	98 Mo	41	CE*	[1962Ga13]	
98Mo	0.260(40)				^{14}N	98 Mo	36	CE	[1962Er05]	
98Mo	0.268(23)				α	98 Mo	2.4, 2.7, 3.0	CE	[1958St32]	
$^{98}{ m Mo}$ $^{100}{ m Mo}$	0.270(40)				$\begin{array}{c} \alpha \\ ^{16}O, \alpha \end{array}$	98 Mo	7	CE	[1956Te26]	
100 Mo 100 Mo	0.511(9)		10.6(10)		¹⁸ O, α	¹⁰⁰ Mo ¹⁰⁰ Mo	36, 8	CE	[1976Pa13]	
^{100}Mo	0.500(00)		19.6(10)		16O	100 Mo	20-61	RDM	[1975Bo39]	ND
$^{100}\mathrm{Mo}$	0.526(26) 0.61(6)				14N	100 Mo	35-44.8 41	CE CE*	[1971Ba59] [1962Ga13]	NR
$^{100}\mathrm{Mo}$	0.63(10)				14N	100 Mo	36	CE	[1962Ga13] [1962Er05]	
$^{100}\mathrm{Mo}$	0.63(10) 0.613(32)					100Mo	2.4, 2.7, 3.0	CE	[1952E105] [1958St32]	
$^{100}\mathrm{Mo}$	0.613(32) 0.66(10)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	100 Mo	7	CE	[1956St32] [1956Te26]	
$^{102}\mathrm{Mo}$	0.00(10)		180(6)		"	1410	'	DC	[1991Li39]	
$^{102}\mathrm{Mo}$			164(19)		18O	$^{100}\mathrm{Mo}$	20-61	RDM	[1975Bo39]	
$^{104}\mathrm{Mo}$			1396(112)			²⁵² Cf(SF)	20 01	RDM	[2002Sm10]	Ex
$^{104}\mathrm{Mo}$			1040(60)			OI(DI)		DC	[1991Li39]	
$^{104}\mathrm{Mo}$			1270(140)					DC	[1981L139] [1980ChZM]	
$^{104}\mathrm{Mo}$			1314(43)					DC	[1975JaYL,	NR
			1011(10)						1974JaZN]	
$^{104}\mathrm{Mo}$			650(130)					DC	[1970Ch11]	
$^{104}\mathrm{Mo}$			1200(200)					DC	[1970Wa05]	NR

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁰⁶ Mo	,	<u> </u>	1876(289)					DC	[2015Br03]	
¹⁰⁶ Mo			1730(140)					DC	[2006Hw01]	
¹⁰⁶ Mo			540(80)					RDM	[1983MaYT]	
¹⁰⁶ Mo			1930(140)					DC	[1980ChZM]	NID
$^{106}\mathrm{Mo}$			1803(43)					DC	[1975JaYL,	NR
$^{106}\mathrm{Mo}$			1080(220)					DC	[1974JaZN] [1970Ch11]	
$^{108}\mathrm{Mo}$			851(317)					DC	[2015Br03]	
$^{108}\mathrm{Mo}$			940(270)					DC	[1998LhZZ]	
$^{108}\mathrm{Mo}$			720(430)					DC	[1996Pe25]	
$^{96}\mathrm{Ru}$			4.5(2)		$^{96}\mathrm{Ru}$	$^{12}\mathrm{C}$	333	DSA	[2012To01]	
$^{96}\mathrm{Ru}$			4.3(1)			$^{96}{\rm Rh}(\beta^{+})$		TDSA	[2002Kl07]	
$^{96}\mathrm{Ru}$			5.1(5)		^{36}S	$^{65}\mathrm{Cu}$	142	CE*	[2000Kh02]	NR
$^{96}\mathrm{Ru}$	0.236(7)				α , ¹⁶ O	⁹⁶ Ru	8.5-9.5, 36- 48	CE	[1980La01]	
$^{96}\mathrm{Ru}$	0.266(26)				¹⁶ O	$^{96}\mathrm{Ru}$	44.8	CE	[1980La01]	
$^{96}\mathrm{Ru}$	0.260(10)				¹⁶ O	$^{96}\mathrm{Ru}$	37-48	CE	[1978Fa08]	
$^{96}\mathrm{Ru}$	0.268(32)				$^{16}O, \alpha$	$^{96}\mathrm{Ru}$	42-49, 10	CE	[1968Mc08]	
$^{96}\mathrm{Ru}$	0.254(41)				p, α	⁹⁶ Ru	1.5-3.3, 8-	CE	[1958St32]	
$^{98}\mathrm{Ru}$			8.36(29)		$^{98}\mathrm{Ru}$	$^{24}{ m Mg}$	300	RDM	[2012Ra03]	
$^{98}\mathrm{Ru}$			8.0(12)		36	65	142	RDM/	[2000Kh02]	NR
								TDSÁ	,	
$^{98}\mathrm{Ru}$	0.389(31)				¹⁶ O	⁹⁸ Ru	44.8	CE	[1980La01]	
$^{98}\mathrm{Ru}$	0.373(7)				α , ¹⁶ O	$^{98}\mathrm{Ru}$	8.5-9.5, 36-	CE	[1980La01]	
080	0.411(05)				160	087	48	CD	[1000] [00]	
⁹⁸ Ru	0.411(35)				$^{16}O, \alpha$	98Ru	42-49, 10	CE	[1968Mc08]	
$^{98}\mathrm{Ru}$	0.475(38)				p, α	⁹⁸ Ru	1.5-3.3, 8-	CE	[1958St32]	
$^{100}\mathrm{Ru}$	0.4930(40)				α , ¹⁶ O	$^{100}\mathrm{Ru}$	7.7-9, 35-39	CE	[1998Hi01]	
$^{100}\mathrm{Ru}$	0.4330(40) 0.471(14)				α , α	$^{100}\mathrm{Ru}$	9-17	CE*	[1996Go36]	
$^{100}\mathrm{Ru}$	0.494(6)				α , ¹⁶ O	100Ru	8.5-9.5, 36-	CE	[1980La01]	
	01202(0)						48		[]	
$^{100}\mathrm{Ru}$	0.482(26)				¹⁶ O	$^{100}\mathrm{Ru}$	44.8	CE	[1980La01]	
$^{100}\mathrm{Ru}$	0.4930(30)				α , ¹⁶ O	$^{100}\mathrm{Ru}$	8-9, 35-37	CE	[1980HiZV]	
100 Ru	0.520(44)				$^{16}O, \alpha$	¹⁰⁰ Ru	42-49, 10	CE	[1968Mc08]	
$^{100}\mathrm{Ru}$	0.572(40)				p, α	$^{100}\mathrm{Ru}$	1.5-3.3, 8-	CE	[1958St32]	
$^{100}\mathrm{Ru}$	0.30(6)					$^{100}\mathrm{Ru}$	$\begin{vmatrix} 10 \\ 7 \end{vmatrix}$	CE	[1956Te26]	
$^{102}\mathrm{Ru}$	0.614(5)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$^{102}\mathrm{Ru}$	7.7-9, 35-39	CE	[1998Hi01]	
$^{102}\mathrm{Ru}$	0.514(3) 0.585(16)				α , α	$^{102}\mathrm{Ru}$	9-17	CE	[1996Go36]	
$^{102}\mathrm{Ru}$	0.000(10)		26.40(10)		a	¹⁰⁰ Mo	17-27	TDSA	[1995Ef01]	
$^{102}\mathrm{Ru}$			26.0(14)		$^{40}\mathrm{Ar}$	$^{102}\mathrm{Ru}$	129	RDM	[1989Lo08]	
$^{102}\mathrm{Ru}$	0.640(6)				α , ¹⁶ O	$^{102}\mathrm{Ru}$	8.5-9.5, 36-	CE	[1980La01]	
102p	0.051(05)				160	1025	48	CD	[1000]	
¹⁰² Ru ¹⁰² Ru	0.651(35)				¹⁶ O	$^{102}\mathrm{Ru}$ $^{102}\mathrm{Ru}$	44.8	CE	[1980La01]	
	0.617(5)				α , ¹⁶ O	¹⁰² Ru	8.5,9.0, 38- 42	CE	[1979Bo28]	
$^{102}\mathrm{Ru}$	0.66(6)				$^{16}O, \alpha$	$^{102}\mathrm{Ru}$	42-49, 10	CE	[1968Mc08]	
$^{102}\mathrm{Ru}$, ,		17.6(29)		d	Ru		DC	[1963De21]	
$^{102}\mathrm{Ru}$	0.73(5)				p, α	$^{102}\mathrm{Ru}$	1.5-3.3, 8-	CE	[1958St32]	
$^{102}\mathrm{Ru}$	0.63(10)				α	$^{102}\mathrm{Ru}$	7	CE	[1956Te26]	
$^{104}\mathrm{Ru}$	0.840(45)				²⁰⁸ Pb.	$^{104}\mathrm{Ru}$	954, 525,	CE*	[2006Sr01]	
	` ′				¹³⁶ Xe,		165, 190		,	
					⁵⁸ Ni					
104 Ru	0.807(8)				α , ¹⁶ O	¹⁰⁴ Ru	7.7-9, 35-39	CE	[1998Hi01]	
¹⁰⁴ Ru	0.778(24)				α 16.0	¹⁰⁴ Ru	9-17	CE	[1996Go36]	
$^{104}\mathrm{Ru}$	0.834(7)				α , ¹⁶ O	$^{104}\mathrm{Ru}$	8.5-9.5, 36- 48	CE	[1980La01]	
$^{104}\mathrm{Ru}$	0.834(44)				¹⁶ O	$^{104}\mathrm{Ru}$	44.8	CE	[1980La01]	
$^{104}\mathrm{Ru}$	0.82(6)				$^{16}O, \alpha$	$^{104}\mathrm{Ru}$	42-49, 10	CE	[1968Mc08]	
$^{104}\mathrm{Ru}$	0.93(7)				p, α	$^{104}\mathrm{Ru}$	1.5-3.3, 8-	CE	[1958St32]	
	, ,						10		,	
104 Ru	1.04(16)				α	¹⁰⁴ Ru	7	CE	[1956Te26]	
$^{106}\mathrm{Ru}$			249(5)			$^{106}\mathrm{Tc}(\beta^+)$		Time-	[2008Sa05]	
$^{106}\mathrm{Ru}$			900/100)			²⁴⁹ Cf	41	Delayed	[10050 04]	
-~~Ku	I		380(100)	1	n	C1	thermal	DC	[1995Sc24]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁰⁸ Ru			590(100)		n	²⁴⁹ Cf	thermal	DC	[1995Sc24]	
$^{108}\mathrm{Ru}$			498(43)					DC	[1975JaYL, 1974JaZN]	NR
$^{108}\mathrm{Ru}$			320(70)			252 Cf(SF)		DC	[1970Ch11]	
$^{110}{ m Ru}$			720(120)		n	²⁴⁹ Cf	thermal	DC	[1995Sc24]	
$^{110}\mathrm{Ru}$			433(29)		111	²⁵⁴ Cf	oner mar	DC	[1980ChZM]	
$^{110}\mathrm{Ru}$			490(60)			O1		DC	[1975JaYL,	Su, NR
			100(00)					20	1974JaZN]	Su, 1110
$^{110}\mathrm{Ru}$			330(70)			252 Cf(SF)		DC	[1970Ch11]	
$^{112}\mathrm{Ru}$			690(90)			²⁵⁴ Cf		DC	[1980ChZM]	
$^{112}\mathrm{Ru}$			462(43)			O1		DC	[1975JaYL,	Su, NR
itu			402(45)					DC	[1974JaZN]	Su, Mit
$^{112}\mathrm{Ru}$			290(60)			²⁵² Cf(SF)		DC	[1970Ch11]	
98Pd			<16.3		¹⁰ B, ³ He	^{92}Mo ,	54, 12.5	RDM	[2009FrZZ]	
ı u			10.5		b, ne	96 Ru	04, 12.0	ILDM	[20091122]	
$^{100}\mathrm{Pd}$			13.3(9)		$80 \mathrm{Se}$	$^{24}\mathrm{Mg}$	268	RDM	[2011An04,	Ex
···ru			13.3(9)		- Se	wig	200	KDM	[2011All04, 2012An17]	EX
$^{100}\mathrm{Pd}$			9.0(4)		11B	$^{92}\mathrm{Mo}$	43	RDM	[2009Ra28]	
$^{102}\mathrm{Pd}$	0.460(20)		9.0(4)		16O	$^{102}\mathrm{Pd}$	1			
102Pd 102Pd	0.460(30)					102Pd 102Pd	44	CE CE*	[1980LuZT]	
¹⁰² Pd ¹⁰⁴ Pd	0.460(30)				P		8	CE*	[1977La16]	
	0.540(30)				e	¹⁰⁴ Pd	70-440	EE	[1991We15]	
¹⁰⁴ Pd	0.510(30)				¹⁶ O	¹⁰⁴ Pd	44	CE	[1980LuZT]	
¹⁰⁴ Pd	0.531(40)				α 16 -	¹⁰⁴ Pd	8	CE	[1971Bo08]	
¹⁰⁴ Pd	0.51(5)				α, ¹⁶ Ο	¹⁰⁴ Pd	8.5-10, 30- 42	CE	[1970Ch01]	
$^{104}\mathrm{Pd}$	0.55(5)				α , ¹⁶ O	¹⁰⁴ Pd	2.1,2.4,2.7, 45.5,49.0	CE	[1968MiZZ]	
$^{104}\mathrm{Pd}$	0.61(9)				^{14}N	$^{104}\mathrm{Pd}$	36	CE	[1962Er05]	
$^{104}\mathrm{Pd}$	0.547(38)				p, α	$^{104}\mathrm{Pd}$	1.5-3.3, 8- 10	CE	[1958St32]	
$^{104}\mathrm{Pd}$	0.46(7)				a	$^{104}\mathrm{Pd}$	<7	CE	[1956Te26]	
¹⁰⁶ Pd	0.10(1)	42(4)			¹⁶ O, ⁵⁸ Ni, ²⁰⁸ Pb	¹⁰⁶ Pd	48, 165.5, 878	CE*	[1995Sv01]	
$^{106}\mathrm{Pd}$	0.590(20)				e	¹⁰⁶ Pd	70-440	EE	[1991We15]	
$^{106}\mathrm{Pd}$	0.530(20)		17.8(11)		40 Ar	106Pd	129	RDM	[1989Lo08]	
$^{106}\mathrm{Pd}$	0.66(21)		17.6(11)			106Pd	0.511	GG	[1989L008]	
106Pd	0.00(21) 0.74(8)				γ	106Pd	183,250	EE	[1977Ga00] [1973Ho05]	
106Pd	\ \ /				е	¹⁰⁶ Pd	1		1 .	
106Pd	0.689(37)				α α , ¹⁶ O	106Pd	8	CE	[1971Bo08]	
- Pa	0.61(6)				α , 30	Pa	8.5-10, 30- 42	CE	[1970Ch01]	
$^{106}\mathrm{Pd}$	0.710(40)				α , ¹⁶ O	¹⁰⁶ Pd	9-10, 42-49	CE	[1969Ro05]	
¹⁰⁶ Pd	. ,				$^{\alpha,}_{^{14}\mathrm{N}}$	106Pd	/	CE	1 .	
	0.61(9)						36		[1962Er05]	
¹⁰⁶ Pd	0.646(45)				ρ, α	¹⁰⁶ Pd	1.5-3.3, 8-	CE	[1958St32]	
$^{106}\mathrm{Pd}$	0.59(9)				α	¹⁰⁶ Pd	<7	CE	[1956 Te 26]	
$^{108}\mathrm{Pd}$	0.76(9)	$50(^{+7}_{-5})$			¹⁶ O, ⁵⁸ Ni, ²⁰⁸ Pb	¹⁰⁸ Pd	48, 165.5, 878	CE*	[1995Sv01]	
$^{108}\mathrm{Pd}$	0.810(30)				e	$^{108}\mathrm{Pd}$	70-440	EE	[1991We15]	
$^{108}\mathrm{Pd}$	` ′		34.1(18)		$^{40}\mathrm{Ar}$	$^{108}\mathrm{Pd}$	129	RDM	[1989Lo08]	
$^{108}\mathrm{Pd}$	0.805(29)				e	$^{108}\mathrm{Pd}$	21-121	EE	[1978Ar07]	NR
$^{108}\mathrm{Pd}$	0.70(7)				α , ¹⁶ O	$^{108}\mathrm{Pd}$	7-10, 28-42	CE	[1971Ha08]	
$^{108}\mathrm{Pd}$	0.792(50)				α	$^{108}\mathrm{Pd}$	8	CE	[1971Bo08]	
$^{108}\mathrm{Pd}$	0.76(5)				α , ¹⁶ O	$^{108}\mathrm{Pd}$	9-10, 42-49	CE	[1969Ro05]	
$^{108}\mathrm{Pd}$	0.78(6)				16 _O	$^{108}\mathrm{Pd}$	40	CE	[1962Ec01]	
$^{108}\mathrm{Pd}$	0.82(12)				14N	$^{108}\mathrm{Pd}$	36	CE	[1962Ec01]	
$^{108}\mathrm{Pd}$	0.32(12) 0.74(5)					108Pd	1.5-3.3, 8-	CE	[1952E103]	
					p, α		10		,	
$^{108}\mathrm{Pd}$	0.78(12)				α	$^{108}\mathrm{Pd}$	<7	CE	[1956 Te 26]	
$^{110}\mathrm{Pd}$			67(8)		¹¹⁰ Pd	⁹ Be	66A	RDM/ TDSA	[2008De30]	
$^{110}\mathrm{Pd}$	0.870(30)				e	$^{110}\mathrm{Pd}$	70-440	EE	[1991We15]	
$^{110}\mathrm{Pd}$			65.6(25)		⁵⁸ Ni	¹¹⁰ Pd	190	RDM	[1989Ko40]	
$^{110}\mathrm{Pd}$	$0.85(^{+2}_{-7})$		00.0(20)		¹⁶ O, ⁵⁸ Ni,	¹¹⁰ Pd	48, 165.5,	CE*	[1989SvZZ]	Su, Gos,
	0.00(-7)				208Pb	1 u	954	OL.	[13030722]	NR Gos,
$^{110}\mathrm{Pd}$	0.80(7)				e	$^{110}\mathrm{Pd}$	40-110	EE	[1976Li19]	
$^{110}\mathrm{Pd}$	0.82(8)				α , ¹⁶ O	¹¹⁰ Pd	7-10, 28-42	CE	[1971Ha08]	
$^{110}\mathrm{Pd}$	0.88(6)				α	¹¹⁰ Pd	8	CE	[1971Bo08]	
$^{110}\mathrm{Pd}$	0.91(6)				α , ¹⁶ O	¹¹⁰ Pd	9-10, 42-49	CE	[1969Ro05]	
ru	0.01(0)	1	1	1	α , α	ı u	3-10, 42-49	OL:	[13031000]	1

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹¹⁰ Pd	0.78(12)				¹⁴ N	¹¹⁰ Pd	36	CE	[1962Er05]	
$^{110}\mathrm{Pd}$	0.91(7)				¹⁶ O	$^{110}\mathrm{Pd}$	40	CE	[1962Ec01]	
$^{110}\mathrm{Pd}$	0.86(6)				p, α	¹¹⁰ Pd	1.5-3.3, 8-	CE	[1958St32]	
$^{110}\mathrm{Pd}$	1.04(16)				α	$^{110}\mathrm{Pd}$	<7	CE	[1956Te26]	
$^{112}\mathrm{Pd}$	1.01(10)		121(20)		l a	²⁵² Cf(SF)	`'	RDM	[1986Ma22]	
$^{114}\mathrm{Pd}$			118(20)		¹¹⁴ Pd	⁹ Be	69A	RDM/	[2008De30]	
1 4			110(20)			20	0011	TDSA	[20002500]	
$^{114}\mathrm{Pd}$			500(100)			252 Cf(SF)		RDM	[1986Ma22]	
$^{114}\mathrm{Pd}$			290(90)			01(01)		DC	[1975JaYL,	Su, NR
									1974JaZN]	,
$^{116}\mathrm{Pd}$			153(43)					DC	[1975JaYL, 1974JaZN]	NR
$^{100}\mathrm{Cd}$	< 0.28				$^{100}\mathrm{Cd}$	$^{109}\mathrm{Ag}$	287	CE^*	[2009Ek01]	
$^{102}\mathrm{Cd}$	0.28(3)				$^{102}\mathrm{Cd}$	$^{64}\mathrm{Zn}$	292.7	CE^*	[2009Ek01]	
$^{102}\mathrm{Cd}$			5.9(5)		$^{12}\mathrm{C}$	$^{92}\mathrm{Mo}$	41	RDDS	[2007Bo17]	
$^{102}\mathrm{Cd}$			<8.1		$^{50}\mathrm{Cr}$	⁵⁸ Ni	205	RDM/	[2001Li24]	
								TDSA	,	
$^{104}\mathrm{Cd}$	0.33(2)				$^{104}\mathrm{Cd}$	$^{64}\mathrm{Zn}$	298.7	CE^*	[2009Ek01]	
$^{104}\mathrm{Cd}$	` ′		8.5(12)		^{12}C	$^{94}\mathrm{Mo}$	44	RDDS	[2007Bo17]	
$^{104}\mathrm{Cd}$			9.0(37)		$^{50}\mathrm{Cr}$	⁵⁸ Ni	200,205	TDSA	[2001Mu19]	
$^{104}\mathrm{Cd}$			8.8(25)		$^{12}\mathrm{C}$	$^{95}\mathrm{Mo}$	48	RDM	[1989VoZT]	
$^{106}\mathrm{Cd}$	0.384(5)				α , ¹⁶ O	$^{106}\mathrm{Cd}$	8-17, 40-44	CE	[1976Es02]	
$^{106}\mathrm{Cd}$	0.403(29)				α , ¹⁶ O, ³² S	$^{106}\mathrm{Cd}$	9, 35-40, 49-55	CE	[1970Kl12]	
$^{106}\mathrm{Cd}$	0.426(17)				$p, \alpha, {}^{16}O$	$^{106}\mathrm{Cd}$	2.7,3.0, 9- 11, 42-49	CE	[1969Mi07]	
$^{106}\mathrm{Cd}$	0.47(5)				p, α	$^{106}\mathrm{Cd}$	1.5-3.3, 8-	CE	[1958St32]	
$^{108}\mathrm{Cd}$			10.1(8)		$^{12}\mathrm{C}$	$^{100}\mathrm{Mo}$	54	RDM	[1994Th01]	
$^{108}\mathrm{Cd}$	0.406(5)		10.1(0)		α , ¹⁶ O	$^{108}\mathrm{Cd}$	8-17, 40-44	CE	[1976Es02]	
$^{108}\mathrm{Cd}$	0.400(3) $0.442(18)$				$p, \alpha, {}^{16}O$	$^{108}\mathrm{Cd}$	2.7,3.0, 9-	CE	[1969Mi07]	
	, ,				ρ, α, σ		11, 42-49			
$^{108}\mathrm{Cd}$	0.54(11)				p, α	¹⁰⁸ Cd	1.5-3.3, 8-	CE	[1958St32]	
$^{110}\mathrm{Cd}$			8.7(12)		^{13}C	$^{100}\mathrm{Mo}$	50	TDSA	[2001Ha09]	
$^{110}\mathrm{Cd}$			9.2(6)		$^{13}\mathrm{C}$	$^{100}\mathrm{Mo}$	44	RDM	[1993Pi16]	
$^{110}\mathrm{Cd}$	0.447(35)				e	$^{110}\mathrm{Cd}$	70-440	$_{ m EE}$	[1991We15]	
$^{110}\mathrm{Cd}$	0.415(6)				p	$^{110}\mathrm{Cd}$	2.7-4.2	CE	[1985Si01]	
$^{110}\mathrm{Cd}$	0.454(43)				e	$^{110}\mathrm{Cd}$	68,112	EE	[1977Gi13]	
$^{110}\mathrm{Cd}$	0.426(5)				α , ¹⁶ O	$^{110}\mathrm{Cd}$	8-17, 40-44	$^{\mathrm{CE}}$	[1976Es02]	
$^{110}\mathrm{Cd}$	0.432(6)				α , ¹⁶ O	$^{110}\mathrm{Cd}$	8-16, 36-45	$^{\mathrm{CE}}$	[1972Be66]	
$^{110}\mathrm{Cd}$	0.440(40)				α , ¹⁶ O	$^{110}\mathrm{Cd}$	7-10, 28-42	CE	[1971Ha08]	
$^{110}\mathrm{Cd}$	0.436(22)				α , 16 O,	$^{110}\mathrm{Cd}$	9-10, 38-40,	CE	[1970St17]	
110 ~ 1					$^{32}S, ^{40}Ar$	110 ~ 1	64, 101			
¹¹⁰ Cd	0.467(19)				p, α, ¹⁶ O	¹¹⁰ Cd	2.7,3.0, 9- 11, 42-49	CE	[1969Mi07]	
$^{110}{\rm Cd}$	0.459(54)				¹⁶ O	¹¹⁰ Cd	42-49	CE	[1965Mc05]	NR
¹¹⁰ Cd	0.504(40)				ρ, α	¹¹⁰ Cd	1.5-3.3, 8-	CE	[1958St32]	
$^{110}{\rm Cd}$	0.42(8)				p	¹¹⁰ Cd	<7	CE	[1958Sh01]	
¹¹⁰ Cd	0.41(6)				α	¹¹⁰ Cd	<7	CE	[1956Te26]	
¹¹² Cd	0.486(5)				p	¹¹² Cd	2.7-4.2	CE	[1985Si01]	
^{112}Cd	0.52(5)				e	¹¹² Cd	68,112	EE	[1977Gi13]	
¹¹² Cd	0.483(5)				α , ¹⁶ O	¹¹² Cd	8-17, 40-44	CE	[1976Es02]	
¹¹² Cd	0.486(8)				α 25	¹¹² Cd	8-17	CE	[1973WeYO]	
¹¹² Cd			10.20(40)		³⁵ Cl	¹¹² Cd	100	TDSA	[1972SiZP]	
¹¹² Cd	0.520(20)				^{32}S	$^{112}\mathrm{Cd}$	90,100	CE^*	[1971Ha47]	
¹¹² Cd			8.30(40)		10	110		RDM	[1971NoZT]	
$^{112}\mathrm{Cd}$	0.478(33)				α , 16 O, 32 S, 40 Ar	¹¹² Cd	9-10, 38-40,	CE	[1970St17]	
$^{112}\mathrm{Cd}$	0.524(21)				$p, \alpha, {}^{16}O$	$^{112}\mathrm{Cd}$	64, 101 2.7,3.0, 9-	CE	[1969Mi07]	
	, ,						11, 42-49			
$^{112}{\rm Cd}$	0.514(60)				¹⁶ O	¹¹² Cd	42-49	$^{\mathrm{CE}}$	[1965Mc05]	NR
$^{112}{\rm Cd}$	0.546(38)				¹⁶ O	¹¹² Cd	45	$^{\mathrm{CE}}$	[1962Ec03]	
$^{112}\mathrm{Cd}$	0.542(38)				p, α	$^{112}\mathrm{Cd}$	1.5-3.3, 8-	CE	[1958St32]	
$^{112}\mathrm{Cd}$	0.42(8)				p	$^{112}\mathrm{Cd}$	10 <7	CE	[1958Sh01]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$(e^{\hat{2}}b^2)'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹¹² Cd	0.46(7)				α	¹¹² Cd	<7	CE	[1956Te26]	
$^{114}\mathrm{Cd}$	0.510(30)				¹⁶ O, ⁴⁰ Ca, ⁵⁸ Ni, ²⁰⁸ Pb	¹¹⁴ Cd	45,122, 184,916	CE*	[1988Fa07]	
$^{114}\mathrm{Cd}$	0.574(18)				p	$^{114}\mathrm{Cd}$	2.7-4.2	CE	[1985Si01]	
$^{114}\mathrm{Cd}$	0.48(1)				α	$^{114}\mathrm{Cd}$	21	CE*	[1979Sa05]	Ex,MD,NR
$^{114}\mathrm{Cd}$	0.517(49)				e	$^{114}\mathrm{Cd}$	68,112	EE	[1977Gi13]	Ex,MD,M
$^{114}\mathrm{Cd}$	0.528(5)				α , ¹⁶ O	$^{114}\mathrm{Cd}$	8-17, 40-44	CE	[1976Es02]	
$^{114}\mathrm{Cd}$	0.575(48)				e, o	¹¹⁴ Cd	40-110	EE	[1976Li19]	
$^{114}\mathrm{Cd}$	0.553(18)				e	$^{114}\mathrm{Cd}$	30-60	EE	[1970E119] [1974Ye01]	
$^{114}\mathrm{Cd}$	0.333(18)					114Cd	183,250	EE	[1974 Teo1] [1973Ho05]	
$^{114}\mathrm{Cd}$	$0.47(3) \\ 0.512(6)$				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$^{114}\mathrm{Cd}$	8-16, 36-45	CE	[1973H003] [1972Be66]	
$^{114}\mathrm{Cd}$	0.512(0)				'	$^{114}\mathrm{Cd}$	8-18	CE	[1972Be00] [1970Wa04]	
$^{114}\mathrm{Cd}$	0.547(13)				α	$^{114}\mathrm{Cd}$	8-16	CE	[1970Wa04] [1970Pr07]	
$^{114}\mathrm{Cd}$	0.502(31)				$\begin{bmatrix} \alpha \\ \alpha, ^{16}O, ^{32}S \end{bmatrix}$	114Cd	9, 35-40, 49-55	CE	[1970Kl12]	
$^{114}\mathrm{Cd}$	0.560(17)				$^{16}O, \alpha$	$^{114}\mathrm{Cd}$	42, 8-13	CE	[1969Sa27]	
$^{114}\mathrm{Cd}$	0.576(23)				$p, \alpha, {}^{16}O$	¹¹⁴ Cd	2.7,3.0, 9- 11, 42-49	CE	[1969Mi07]	
$^{114}\mathrm{Cd}$	0.508(9)				α , ¹⁶ O	$^{114}\mathrm{Cd}$	8.5-10, 36.2	CE	[1968Si05]	
$^{114}\mathrm{Cd}$	0.503(13)				α , ¹² C, ¹⁶ O	$^{114}\mathrm{Cd}$	2-3A	CE	[1967St03]	
$^{114}\mathrm{Cd}$	0.48(5)				¹⁶ O, ³² S	¹¹⁴ Cd	19-27, 41- 54	CE	[1967Si03]	
$^{114}\mathrm{Cd}$	0.572(18)				¹⁶ O	$^{114}\mathrm{Cd}$	42	CE	[1967Gl02]	
$^{114}\mathrm{Cd}$	0.571(67)				16O	$^{114}\mathrm{Cd}$	42-49	CE	[1965Mc05]	NR
$^{114}\mathrm{Cd}$	0.011(01)		15.3(55)			¹¹⁴ Cd	12-13	GG	[1962Ak01]	NR
$^{114}\mathrm{Cd}$	0.523(37)		10.5(00)		$\frac{\gamma}{^{16}O}$	$^{114}\mathrm{Cd}$	45	CE	[1962Ec03]	1110
$^{114}\mathrm{Cd}$	0.584(41)				p, α	¹¹⁴ Cd	1.5-3.3, 8- 10	CE	[1958St32]	
$^{114}\mathrm{Cd}$	0.52(10)				p	$^{114}\mathrm{Cd}$	<7	CE	[1958Sh01]	
$^{114}\mathrm{Cd}$	0.55(8)				a	$^{114}\mathrm{Cd}$	<7	CE	[1956Te26]	
$^{116}\mathrm{Cd}$	0.608(30)				p	$^{116}\mathrm{Cd}$	2.7-4.2	CE	[1985Si01]	
$^{116}\mathrm{Cd}$	0.501(47)				e	$^{116}\mathrm{Cd}$	68,112	EE	[1977Gi13]	
$^{116}\mathrm{Cd}$	0.532(5)				α , ¹⁶ O	$^{116}\mathrm{Cd}$	8-17, 40-44	CE	[1976Es02]	
$^{116}\mathrm{Cd}$	0.533(8)				α	$^{116}\mathrm{Cd}$	8-17	CE	[1973WeYO]	
$^{116}\mathrm{Cd}$	0.653(35)				α , ¹⁶ O, ³² S, ⁴⁰ Ar	¹¹⁶ Cd	9-10, 38-40, 64, 101	CE	[1970St17]	
$^{116}\mathrm{Cd}$	0.581(23)				$p, \alpha, {}^{16}O$	$^{116}\mathrm{Cd}$	2.7,3.0, 9- 11, 42-49	CE	[1969Mi07]	
$^{116}\mathrm{Cd}$	0.62(5)				α , ¹² C, ¹⁶ O	$^{116}\mathrm{Cd}$	2-3A	CE	[1967St03]	
$^{116}\mathrm{Cd}$	0.580(68)				16 _O	$^{116}\mathrm{Cd}$	42-49	CE	[1965Mc05]	NR
$^{116}\mathrm{Cd}$	0.68(14)				p	$^{116}\mathrm{Cd}$	<7	CE	[1958Sh01]	1110
$^{116}\mathrm{Cd}$	0.600(42)				p, α	¹¹⁶ Cd	1.5-3.3, 8-	CE	[1958St32]	
$^{116}\mathrm{Cd}$	0.62(9)				α	$^{116}\mathrm{Cd}$	<7	CE	[1956Te26]	
^{118}Cd	0.578(44)					118 Ag(β^{-})		DC	[1989Ma33]	
$^{120}\mathrm{Cd}$	0.473(55)					$^{120}\mathrm{Ag}(\beta^-)$		\overline{DC}	[1989Ma33]	
$^{122}\mathrm{Cd}$	0.41(20)				$^{122}\mathrm{Cd}$	$^{108}\mathrm{Pd}$	347.7	CE*	[2014Il01]	
$^{122}\mathrm{Cd}$			15(7)			$^{122}Ag(\beta^{-})$		DC	[1995Za01]	
$^{124}\mathrm{Cd}$	0.35(19)				$^{124}\mathrm{Cd}$	$^{104} Pd, ^{64} Zn$	353.4 MeV	CE*	[2014Il01]	
$^{126}\mathrm{Cd}$	0.27(6)				$^{126}\mathrm{Cd}$	$^{64}\mathrm{Zn}$	359.1 MeV	CE*	[2014Il01]	
$^{126}\mathrm{Cd}$			$14.9(^{+16.8}_{-5.0})$		¹²⁴ Cd	⁶⁴ Zn?	359.1 MeV?	DSAM	[2014Il01]	
$^{104}\mathrm{Sn}$	0.180(37)				$^{104}\mathrm{Sn}$	¹⁹⁷ Au	67A	CE*	[2013Ba57]	
$^{104}\mathrm{Sn}$	0.160(37) 0.173(28)				$^{104}\mathrm{Sn}$	Pb	131A	CE	[2013Ba37] [2014Do19]	
$^{104}\mathrm{Sn}$	0.173(26)				$^{104}\mathrm{Sn}$	Pb	131A 131A	CE	[2014D019] [2013DoZY]	Su
$^{104}\mathrm{Sn}$	0.103(20) 0.10(4)				$^{104}\mathrm{Sn}$	¹⁹⁷ Au	140A	CE*	[2013D021]	Su
$^{106}\mathrm{Sn}$	0.10(4) 0.195(39)				106Sn	⁵⁸ Ni	2.8A	CE*	[2013Gu13] [2008Ek01]	~ "
$^{106}\mathrm{Sn}$	0.193(59)				106Sn	¹⁹⁷ Au	81A	CE*	[2007Va22]	
$^{108}\mathrm{Sn}$	0.240(38)				108Sn	⁵⁸ Ni	2.8A	CE*	[2007 Va22] [2008Ek01]	
$^{108}\mathrm{Sn}$	0.222(19)				108Sn	¹⁹⁷ Au	78A	CE*	[2007Va22]	
108Sn	0.230(59)				108Sn	¹⁹⁷ Au	142	CE	[2007 Va22] [2005Bb09]	
$^{110}\mathrm{Sn}$	$0.230(37) \\ 0.220(22)$				110Sn	⁵⁸ Ni	2.8A	CE*	[2005Bb09] [2008EkZZ]	
$^{110}\mathrm{Sn}$	0.220(22)				110Sn	⁵⁸ Ni	2.8A	CE*	[2007Ce02]	Su
$^{110}\mathrm{Sn}$					110Sn	¹⁹⁷ Au	2.8A 79A		[2007Ce02] [2007Va22]	Su
$^{110}\mathrm{Sn}$	0.240(32)	10.7(10)			110Sn 110Sn	⁵⁸ Ni		CE*	[2007 Va22] [2006Ek01]	
$^{110}\mathrm{Sn}$ $^{112}\mathrm{Sn}$		19.7(18)	0.65(4)		110Sn 112Sn		2.8A			
$^{112}\mathrm{Sn}$ $^{112}\mathrm{Sn}$	0.049(9)		0.65(4)			C,Gd,Cu	4A	TDSA	[2011Ju01]	
Sn	0.242(8)	1			⁵⁸ Ni	$^{112}\mathrm{Sn}$	175	CE	[2010Ku07]	1

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
112Sn	0.240(32)				$^{112}\mathrm{Sn}$	¹⁹⁷ Au	80A	CE*	[2007Va22]	
$^{112}\mathrm{Sn}$			$0.750(^{+150}_{-90})$		n	$^{112}\mathrm{Sn}$	1.7	TDSA	[2007Or04]	
$^{112}\mathrm{Sn}$	0.260(60)		(-90 /		16O	$^{112}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{112}\mathrm{Sn}$	0.229(5)				α	$^{112}\mathrm{Sn}$	10.0,10.5,	CE	[1975Gr30]	1110
Sii	0.223(0)				l a	511	10.6	CL	[13760130]	
$^{112}\mathrm{Sn}$	0.256(6)					$^{112}\mathrm{Sn}$	10.46	CE*	[1970St20]	
$^{112}\mathrm{Sn}$					α 20 Ne, 14 N	$^{112}\mathrm{Sn}$				
¹¹² Sn	0.33(6)				Ne, TAN	112Sn	16-26, 12-	CE	[1961An07]	
110 ~						110~	22, 36,53			
$^{112}{\rm Sn}$	0.180(40)				α	$^{112}\mathrm{Sn}$	14.5	CE*	[1957Al43]	
$^{114}\mathrm{Sn}$			0.60(4)		¹¹⁴ Sn	C,Gd,Cu	4A	TDSA	[2011Ju01]	
$^{114}\mathrm{Sn}$	0.232(8)				$^{114}\mathrm{Sn}$	58 Ni	3.4A	CE*	[2008Do19,	
									2011Ku05	
$^{114}\mathrm{Sn}$			0.56(11)		¹⁸ O	$^{100}{ m Mo}$	70	TDSA	[2001Ga52]	
$^{114}\mathrm{Sn}$			0.45(15)		α	$^{112}\mathrm{Cd}$	27	TDSA	[1991ViZW]	
$^{114}\mathrm{Sn}$	0.25(6)				16O	$^{114}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{114}\mathrm{Sn}$	0.25(5)				²⁰ Ne, ¹⁴ N	$^{114}\mathrm{Sn}$	16-26, 12-	CE	[1961An07]	
SII	0.20(0)				110, 11	SII	22,36,53	CL	[1301711101]	
$^{114}\mathrm{Sn}$	0.20(7)					$^{114}\mathrm{Sn}$	14.5	CE*	[1957Al43]	
116Sn	0.20(7)		0.00(4)		$\frac{\alpha}{^{116}\mathrm{Sn}}$				1 .	
			0.68(4)			C,Gd,Cu	4A	TDSA	[2011Ju01]	
$^{116}{\rm Sn}$	0.1883(171)				γ	¹¹⁶ Sn	4.1	GG	[2000Br05]	NR
$^{116}\mathrm{Sn}$	0.190(19)				γ	$^{116}\mathrm{Sn}$	4.1,10	GG	[1994Go25]	
$^{116}\mathrm{Sn}$			0.53(6)		$ \gamma $	$^{116}\mathrm{Sn}$	0.5-1.65	GG	[1981Ca10]	NR
$^{116}\mathrm{Sn}$	0.216(5)				$\frac{\gamma}{^{16}O}$	$^{116}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{116}\mathrm{Sn}$	0.215(24)				γ	$^{116}\mathrm{Sn}$?	GG	[1977Ca14]	Su
$^{116}\mathrm{Sn}$	0.229(15)				é	$^{116}\mathrm{Sn}$	40-110	EE	[1976Li19]	
$^{116}\mathrm{Sn}$	0.195(7)				α	$^{116}\mathrm{Sn}$	10.0, 10.5,	CE	[1975Gr30]	
SII	0.130(1)				a a	SII	10.6, 10.6,	CL	[13760130]	
$^{116}\mathrm{Sn}$	0.010(5)					$^{116}\mathrm{Sn}$		CD*	[10700400]	
	0.216(5)				α		10, 46	CE*	[1970St20]	
¹¹⁶ Sn	0.223(13)				α	¹¹⁶ Sn	2-2.5A	CE	[1970Kl06]	
$^{116}{\rm Sn}$	0.183(37)				e	¹¹⁶ Sn	60	EE	[1969Cu06]	
$^{116}\mathrm{Sn}$	0.145(21)				e	$^{116}\mathrm{Sn}$	150	EE	[1967Ba52]	
$^{116}\mathrm{Sn}$			0.48(10)		$ \gamma $	$^{116}\mathrm{Sn}$	1.3	GG	[1963Be14]	
$^{116}\mathrm{Sn}$			0.71(13)		γ	$^{116}\mathrm{Sn}$	1.3	GG	[1962Li10]	
$^{116}\mathrm{Sn}$			0.64(27)			$^{116}\mathrm{Sn}$	1.3	GG	[1962Ka28]	
$^{116}\mathrm{Sn}$	0.29(6)				$^{\gamma}_{^{20}\mathrm{Ne},~^{14}\mathrm{N}}$	$^{116}\mathrm{Sn}$	16-26, 12-	CE	[1961An07]	
	3123(3)				,		22, 36,53		[
$^{116}\mathrm{Sn}$	0.207(27)				n 0	$^{116}\mathrm{Sn}$	1.5-3.3, 8-	CE	[1958St32]	
511	0.201(21)				p, α	511	10	CE	[19965652]	
$^{116}\mathrm{Sn}$	0.10(0)					116g	_	CD*	[10554]40]	
110Sn	0.19(6)		(.)		α 119 α	¹¹⁶ Sn	14.5	CE*	[1957Al43]	
¹¹⁸ Sn			0.79(4)		¹¹⁸ Sn	C,Gd,Cu	4A	TDSA	[2011Ju01]	
¹¹⁸ Sn	0.2051(286)				γ	¹¹⁸ Sn	4.1	GG	[2000Br05]	NR
$^{118}\mathrm{Sn}$	0.198(5)				e	$^{118}\mathrm{Sn}$	252,376	EE	[1992Wi06]	
$^{118}\mathrm{Sn}$	0.156(6)				e	¹¹⁸ Sn	147.4-356	EE	[1991Pe07]	
$^{118}\mathrm{Sn}$	0.204(4)				^{12}C	$^{118}\mathrm{Sn}$	37-38	CE	[1989Sp03]	
$^{118}\mathrm{Sn}$			0.69(7)		$ \gamma $	$^{118}\mathrm{Sn}$	0.5-1.65	GG	[1981Ca10]	NR
$^{118}\mathrm{Sn}$	0.216(5)		(-)		$\frac{\gamma}{^{16}O}$	$^{118}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{118}\mathrm{Sn}$	0.212(22)				i .	$^{118}\mathrm{Sn}$	1.2	GG	[1977Ca14]	Su
$^{118}\mathrm{Sn}$	0.199(6)				$\frac{\gamma}{\alpha}$	$^{118}\mathrm{Sn}$	10.0, 10.5,	CE	[1975Gr30]) Su
511	0.199(0)				α	511	10.6, 10.5,	CE	[1975G150]	
$^{118}\mathrm{Sn}$	0.010(5)					¹¹⁸ Sn		CD*	[10700400]	
118G	0.216(5)				α	118Sn	10, 46	CE*	[1970St20]	
¹¹⁸ Sn	0.172(34)				е		60	EE	[1969Cu06]	
$^{118}{\rm Sn}$	0.230(20)				γ	¹¹⁸ Sn	1.2	GG	[1966Hr03]	
$^{118}\mathrm{Sn}$	0.240(40)				20 Ne, 14 N	$^{118}\mathrm{Sn}$	16-26, 12-	CE	[1961An07]	
							22, 36,53			
$^{118}\mathrm{Sn}$	0.228(27)				p, α	$^{118}\mathrm{Sn}$	1.5-3.3, 8-	CE	[1958St32]	
					1		10		,	
$^{118}\mathrm{Sn}$	0.19(5)				α	$^{118}\mathrm{Sn}$	14.5	CE*	[1957Al43]	
$^{120}\mathrm{Sn}$	3.13(0)		0.97(5)		$\frac{\alpha}{^{120}\mathrm{Sn}}$	C,Gd,Cu	4A	TDSA	[2011Ju01]	
$^{120}\mathrm{Sn}$	0.2521(299)		0.31(3)		i	120Sn	4.1	GG	[20113u01] [2000Br05]	NR
	\ ′				$^{\gamma}_{^{12}\mathrm{C}}$				1	1111
$^{120}{\rm Sn}$	0.194(3)		1 04(5)			¹²⁰ Sn	37-38	CE	[1989Sp03]	
$^{120}{ m Sn}$			1.04(9)		$\frac{\gamma}{^{16}O}$	¹²⁰ Sn	0.5-1.65	GG	[1981Ca10]	
$^{120}\mathrm{Sn}$	0.203(4)				16O	$^{120}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{120}\mathrm{Sn}$	0.179(16)				γ	$^{120}\mathrm{Sn}$	1.2	GG	[1977Ca14]	Su
$^{120}\mathrm{Sn}$	0.1970(40)				ά	$^{120}\mathrm{Sn}$	10.0, 10.5,	CE	[1975Gr30]	
	` '						10.6		'	
$^{120}\mathrm{Sn}$			0.95(6)		³⁵ Cl	$^{120}\mathrm{Sn}$	100	TDSA	[1972SiZP]	Su
$^{120}\mathrm{Sn}$			0.890(20)		³⁵ Cl	$^{120}\mathrm{Sn}$	100	TDSA	[1972SiZI]	~ "
$^{120}\mathrm{Sn}$	0.2030(40)		0.030(20)			¹²⁰ Sn		CE*	[1972St21] [1970St20]	
SII	0.2000(40)	I		I	α	SII	10, 46	OE	[13103620]	Į.

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Table 1 1	- xpermemar i	D(E2) -, 1-	and p2-varue	5 III Z=2-10	4 mucher (com	mueuj				
Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{120}\mathrm{Sn}$	0.173(35)	i i			е	$^{120}\mathrm{Sn}$	60	EE	[1969Cu06]	
$^{120}\mathrm{Sn}$	0.123(21)				e	$^{120}\mathrm{Sn}$	150	EE	[1967Ba52]	
$^{120}\mathrm{Sn}$	0.152(29)					$^{120}\mathrm{Sn}$	1.2	GG	[1966Hr03]	
					20Nt 14Nt			I .		
$^{120}\mathrm{Sn}$	0.26(5)				$^{\gamma}_{^{20}\mathrm{Ne},~^{14}\mathrm{N}}$	$^{120}\mathrm{Sn}$	16-26, 12- 22, 36, 53	CE	[1961An07]	
$^{120}\mathrm{Sn}$	0.220(22)				p, α	$^{120}\mathrm{Sn}$	1.5-3.3, 8-	CE	[1958St32]	
100						100	10			
$^{120}\mathrm{Sn}$	0.170(40)				α	$^{120}\mathrm{Sn}$	14.5	CE^*	[1957Al43]	
$^{122}\mathrm{Sn}$			1.29(8)		$^{122}\mathrm{Sn}$	C,Gd,Cu	4A	TDSA	[2011Ju01]	
$^{122}\mathrm{Sn}$	0.2328(333)				$ \gamma $	$^{122}\mathrm{Sn}$	4.1	GG	[2000Br05]	NR
$^{122}\mathrm{Sn}$	0.182(3)				$^{\gamma}_{^{12}\mathrm{C}}$	$^{122}\mathrm{Sn}$	37-38	CE	[1989Sp03]	
$^{122}\mathrm{Sn}$	0.196(4)				16O	$^{122}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{122}\mathrm{Sn}$						$^{122}\mathrm{Sn}$		CE		INIC
	0.1880(40)				α		10.0, 10.5, 10.6		[1975Gr30]	
$^{122}\mathrm{Sn}$	0.1960(40)				α	$^{122}\mathrm{Sn}$	10, 46	CE^*	[1970St20]	
$^{122}\mathrm{Sn}$	0.26(5)				²⁰ Ne, ¹⁴ N	$^{122}\mathrm{Sn}$	16-26, 12-	CE	[1961An07]	
$^{122}\mathrm{Sn}$	0.050(90)					$^{122}\mathrm{Sn}$	22, 36,53	CE	[10500,00]	
	0.252(30)				p, α	122Sn	1.5-3.3, 8-	CE	[1958St32]	
$^{122}\mathrm{Sn}$	0.150(30)					$^{122}\mathrm{Sn}$	14.5	CE*	[1957Al43]	
$^{124}\mathrm{Sn}$	0.100(00)		1 59(10)		$\frac{\alpha}{^{124}\mathrm{Sn}}$	$^{12}\mathrm{C}$			1 5	
$^{124}\mathrm{Sn}$	0.169(3)		1.58(10)				378	TDSA	[2012Ku24]	
124Sn	0.162(6)				¹²⁴ Sn	¹² C, ⁵⁰ Ti	3A	CE*	[2011Al25]	
$^{124}{\rm Sn}$			1.48(15)		$^{124}\mathrm{Sn}$	C,Gd,Cu	4A	TDSA	[2011Ju01]	
$^{124}\mathrm{Sn}$	0.1629(224)				γ	$^{124}\mathrm{Sn}$	4.1	GG	[2000Br05]	NR
$^{124}\mathrm{Sn}$	0.166(22)					$^{124}\mathrm{Sn}$	4.1,10	GG	[1994Go25]	
$^{124}\mathrm{Sn}$	0.161(4)				$\frac{\gamma}{^{16}O}$	$^{124}\mathrm{Sn}$	48	CE	[1981Jo03]	NR
$^{124}\mathrm{Sn}$	0.140(6)				α	$^{124}\mathrm{Sn}$	19.5	CE*	[1979Sa05]	Ex,MD,NR
$^{124}\mathrm{Sn}$	\ /				$^{3}_{\text{He}}$	$^{124}\mathrm{Sn}$	1		1 5	Ex,MD,NR
	0.140(3)						14.35	CE	[1979Sa05]	Ex,MD,NK
$^{124}\mathrm{Sn}$	0.1700(40)				α	$^{124}\mathrm{Sn}$	10.0, 10.5, 10.6	CE	[1975Gr30]	
$^{124}\mathrm{Sn}$	0.188(13)				α	$^{124}\mathrm{Sn}$	2-2.5A	CE	[1970Kl06]	
$^{124}\mathrm{Sn}$	0.1610(40)				α	$^{124}\mathrm{Sn}$	10, 46	CE*	[1970St20]	
$^{124}\mathrm{Sn}$	0.180(20)				^{14}N	$^{124}\mathrm{Sn}$	44, 48	CE*	[1968La26]	
$^{124}\mathrm{Sn}$						$^{124}\mathrm{Sn}$	150	EE	1.	
124g	0.133(22)				e 2027 1427		1		[1967Ba52]	
$^{124}\mathrm{Sn}$	0.220(40)				²⁰ Ne, ¹⁴ N	$^{124}\mathrm{Sn}$	16-26, 12- 22, 36, 53	CE	[1961An07]	
$^{124}\mathrm{Sn}$	0.213(24)				p, α	$^{124}\mathrm{Sn}$	1.5-3.3, 8- 10	CE	[1958St32]	
$^{124}\mathrm{Sn}$	0.140(30)				α	$^{124}\mathrm{Sn}$	14.5	CE*	[1957Al43]	
$^{126}\mathrm{Sn}$	0.110(00)		1.50(20)		$^{126}\mathrm{Sn}$	$^{12}\mathrm{C}$	378	TDSA	[2012Ku24]	
$^{126}\mathrm{Sn}$	0.107(0)		1.50(20)		$^{126}\mathrm{Sn}$	$^{12}{\rm C},^{50}{\rm Ti}$			1.	
	0.127(8)						3A	CE*	[2011Al25]	
$^{126}{\rm Sn}$	0.10(3)				126Sn	C	<3A	CE*	[2004Ra27]	
$^{128}\mathrm{Sn}$	0.080(5)				¹²⁸ Sn	$^{12}\mathrm{C},^{50}\mathrm{Ti}$	3A	CE*	[2011Al25]	
$^{128}\mathrm{Sn}$	0.073(6)				¹²⁸ Sn	\mathbf{C}	<3A	CE^*	[2004Ra27]	
$^{130}\mathrm{Sn}$	0.023(5)				$^{130}\mathrm{Sn}$	C	<3A	CE^*	[2004Ra27]	
$^{132}\mathrm{Sn}$	0.11(3)				$^{132}\mathrm{Sn}$	$^{48}\mathrm{Ti}$	470-495	CE*	[2005Va31]	
$^{132}\mathrm{Sn}$	0.14(5)				$^{132}\mathrm{Sn}$	С	<3A	CE*	[2004Ra27]	
$^{134}\mathrm{Sn}$	0.029(5)				$^{134}\mathrm{Sn}$	$^{90}\mathrm{Zr}$	400	CE*	[2005Va31]	
$^{134}\mathrm{Sn}$					134Sn	C	<3A	CE*	[2003 Va31] [2004Ra27]	
108Te	0.029(5)		11.0/19)			54 Fe			1.	
110-Te			11.0(13)		⁵⁸ Ni		245	RDM	[2011Ba37]	
¹¹² Te			5.7(5)		⁵⁸ Ni	⁵⁸ Ni	250	RDM	[2015Do04]	
$^{114}\mathrm{Te}$			4.09(33)		$^{24}{ m Mg}$	$^{93}\mathrm{Nb}$	90	TDSA	[2005Mo20]	
$^{118}{ m Te}$			8.8(14)		¹³ C	109 Ag	54	TDSA	[2002Pa19]	
$^{120}{ m Te}$	0.666(20)		` ′		⁵⁸ Ni	$^{120}{ m Te}$	175	CE	[2014Sa49]	
$^{120}\mathrm{Te}$			10.4(2)		¹²⁰ Te	С	300	RDM	[2010We12]	
$^{120}\mathrm{Te}$	0.77(16)		10.1(2)			$^{120}\mathrm{Te}$	 	CE	[2010We12] [1956Te26]	
¹²² Te	0.11(10)		10.70(7)		α	¹²² Te	1.72-3.35		1 .	
			10.70(7)		n 16 o 22 o			TDSA	[2005Hi04]	
$^{122}\mathrm{Te}$	0.75(3)				$^{16}O,^{32}S$	¹²² Te	48,100	CE	[1989SvZZ]	Ex, Gos,
$^{122}\mathrm{Te}$	0.53(2)				³ He	$^{122}\mathrm{Te}$	19.52	CE*	[1979Sa05]	Ex,MD,NR
¹²² Te					1/2-	¹²² Te	1		1 .	אוו,עוניגנים ו
1e	0.6650(30)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	1e	8-10, 32-37,	CE	[1978Be10]	
					0, 100		30.5-42, 34- 35			
$^{122}\mathrm{Te}$	0.664(20)				α	$^{122}\mathrm{Te}$	8-18	CE*	[1977Sa04]	
$^{122}\mathrm{Te}$	0.658(4)				α , α , α , α	$^{122}\mathrm{Te}$	10-11, 30-	CE	[19775a04] [1976Bo12]	
re	0.000(4)				α, σ	16	1 '	OE	[1910D012]	
$^{122}\mathrm{Te}$	0.000(12)				160	122m	54	CE	[10545 15]	
Te Te	0.666(12)				α , ¹⁶ O	$^{122}\mathrm{Te}$	8,10,	CE	[1974Ba45]	
							42,44.8			

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Table 1 1		D(LLZ) -, 1-	and p2-values	5 III Z=Z-10	4 nuclei (cont	inded)				
Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
	0.610(30)	(***:a:)			¹⁴ N	¹²² Te	48	CE*	[1970LaZM]	
$^{122}\mathrm{Te}$	0.010(30)		10 7(10)			¹²² Te				
			10.5(16)		γ		0.56	GG	[1964Pa17]	
$^{122}\mathrm{Te}$	0.57(14)				γ	¹²² Te	0.56	GG	[1963Zi02]	
$^{122}{ m Te}$	0.63(16)				γ	$^{122}{ m Te}$	0.56	GG	[1963Sh17]	
$^{122}{ m Te}$	0.65(6)				α	$^{122}{ m Te}$	8,9,10	CE	[1961St02]	
$^{122}\mathrm{Te}$	0.47(10)				α	$^{122}\mathrm{Te}$	<7	CE	[1956Te26]	
$^{124}\mathrm{Te}$	\ /					¹²⁴ Te			1 .	E- MD ND
	0.48(1)				α		19.3*	CE	[1979Sa05]	Ex,MD,NR
$^{124}{ m Te}$	0.46(2)				³ He	$^{124}{ m Te}$	19.52*	CE	[1979Sa05]	Ex,MD,NR
$^{124}{ m Te}$	0.48(2)				³ He	$^{124}{ m Te}$	12.5-21.0*	CE	[1979Sa05]	Ex,MD,NR
$^{124}{ m Te}$	0.561(24)				α	$^{124}{ m Te}$	8-18	CE	[1977Sa04]	, ,
$^{124}\mathrm{Te}$	0.567(6)				α , ¹⁶ O	¹²⁴ Te	8.5-17, 39- 44	CE	[1975Kl07]	
$^{124}\mathrm{Te}$	0.569(12)				α , ¹⁶ O	¹²⁴ Te	9,10, 42,44.8	CE	[1974Ba45]	
$^{124}{ m Te}$	0.470(40)				d, α	$^{124}{ m Te}$	12, 14	CE	[1970Ch14]	
$^{124}{ m Te}$	0.710(40)				14N	¹²⁴ Te	48	CE*	[1970LaZM]	
	0.710(40)		0 = (=)							
$^{124}\mathrm{Te}$			9.5(5)		γ	¹²⁴ Te	0.6	GG	[1968Sc13]	
$^{124}{ m Te}$	0.83(5)				$ \gamma $	$^{124}{ m Te}$	0.6	GG	[1963Zi02]	
$^{124}{ m Te}$	0.61(20)				$\frac{\gamma}{^{14}\mathrm{N}}$	$^{124}{ m Te}$	36-53	CE*	[1962Ga13]	
$^{124}\mathrm{Te}$	0.75(10)					¹²⁴ Te	0.6	GG	[1961Ak02]	
$^{124}\mathrm{Te}$	\ /				γ	¹²⁴ Te			1.	
	0.39(8)				α	124 Te	<7	CE	[1956Te26]	
¹²⁶ Te	0.475				n	^{239–241} Pu	thermal	Fission- Corr	[2001Ge07]	
$^{126}{ m Te}$	0.457(14)				α	$^{126}{ m Te}$	8-18	CE	[1977Sa04]	
$^{126}\mathrm{Te}$	0.466(8)				α , ¹⁶ O	¹²⁶ Te	8.5-17, 39- 44	CE	[1975Kl07]	
$^{126}\mathrm{Te}$	0.479(12)				α , ¹⁶ O	¹²⁶ Te	9,10, 42,44.8	CE	[1974Ba45]	
$^{126}\mathrm{Te}$	0.510(25)				^{14}N	$^{126}{ m Te}$	48, 46	CE^*	[1970LaZM]	
$^{126}\mathrm{Te}$	0.420(40)				14N	¹²⁶ Te		CE*	[1968La26]	
	\ /						44, 48			
$^{126}\mathrm{Te}$	0.487(35)				α , ¹⁶ O	¹²⁶ Te	2-3A	CE	[1967St16]	
$^{126}{ m Te}$	0.532(37)				p	$^{126}{ m Te}$	1.5-3.3	CE	[1958St32]	
$^{126}{ m Te}$	0.32(6)				α	$^{126}{ m Te}$	<7	CE	[1956Te26]	
$^{128}\mathrm{Te}$	· ' /				¹²⁸ Te	C	350, 396	CE*	1 .	
¹²⁸ Te	0.346(26) 0.383				n n	^{239–241} Pu	thermal	Fission-	[2002Ra21] [2001Ge07]	
$^{128}\mathrm{Te}$	0.3760(30)				α , ¹⁴ N, ¹⁶ O, ¹⁸ O	¹²⁸ Te	8-10, 32-37,	Corr CE	[1978Be10]	
129 m	0.000(0)				,	128 m	30.5-42, 34-35	GT.	[40==0 04]	
$^{128}\mathrm{Te}$	0.380(9)				α	¹²⁸ Te	8-18	CE*	[1977Sa04]	
¹²⁸ Te	0.378(7)				α , ¹⁶ O	¹²⁸ Te	8.5-17, 39- 44	CE*	[1975Kl07]	
$^{128}\mathrm{Te}$	0.387(11)				α , ¹⁶ O	¹²⁸ Te	9,10, 42, 44.8	CE	[1974Ba45]	
$^{128}\mathrm{Te}$	0.390(20)				^{14}N	$^{128}{ m Te}$	48	CE^*	[1970LaZM]	
$^{128}{ m Te}$	0.390(29)				α , ¹⁶ O	$^{128}{ m Te}$	2-3A	CE	[1967St16]	
$^{128}\mathrm{Te}$	0.412(33)					¹²⁸ Te	1.5-3.3	CE	[1958St32]	
$^{128}\mathrm{Te}$					P	¹²⁸ Te				
	0.28(6)				α		<7	CE	[1956Te26]	
$^{130}{ m Te}$	0.291(10)				$^{130}\mathrm{Te}$	С	342.8, 390	CE*	[2013St24]	
¹³⁰ Te	0.295				n	^{239–241} Pu	thermal	Fission- Corr	[2001Ge07]	
$^{130}\mathrm{Te}$	0.295(7)				α	¹³⁰ Te	10-11, 30- 54	CE*	[1976Bo12]	
¹³⁰ Te	0.290(11)				α , ¹⁶ O	¹³⁰ Te	9,10, 42, 44.8	CE*	[1974Ba45]	
$^{130}{ m Te}$	0.302(16)				^{14}N	$^{130}{ m Te}$	46, 48.5	CE*	[1970LaZM]	
$^{130}\mathrm{Te}$	0.300(30)				α	¹³⁰ Te	8.5-10, 30- 42	CE*	[1970Ch01]	
$^{130}\mathrm{Te}$	0.340(30)				¹⁴ N	¹³⁰ Te	36-53	CE*	[1069Ce19]	NB
	0.340(30)						1		[1962Ga13]	NR
$^{130}{\rm Te}$	0.340(31)				p	¹³⁰ Te	1.5-3.3	CE	[1958St32]	
$^{130}{ m Te}$	0.26(5)				α	$^{130}{ m Te}$	<7	CE	[1956Te26]	
$^{132}{ m Te}$	0.19(3)				$^{132}{ m Te}$	С	350	CE*	[2003Ba01]	
$^{132}\mathrm{Te}$	0.216(21)				¹³² Te	C	350, 396	CE*	[2003Ba01]	
re	0.210(21)				16		350, 380	OE	1 .	
$^{132}\mathrm{Te}$	0.143				n	^{239–241} Pu	thermal	Fission-	[2011Da21] [2001Ge07]	
$^{134}\mathrm{Te}$	0.104(4)				¹³⁴ Te	C	200	Corr	[90196494]	
124=	0.104(4)				124E	C	390	CE*	[2013St24]	
$^{134}\mathrm{Te}$	0.13(4)				$^{134}\mathrm{Te}$	C	350	CE*	[2003Ba01]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹³⁴ Te	0.114(13)				¹³⁴ Te	С	350, 396	CE*	[2002Ra21,	
100					100				2011Da21]	
$^{136}\mathrm{Te}$	0.122(18)				¹³⁶ Te	C	350, 396	CE*	[2002Ra21,	
$^{114}\mathrm{Xe}$	1 0000 (000)				⁵⁸ Ni	⁵⁸ Ni	210	DDM/	2011Da21]	
¹¹⁴ Xe	1.0330(666)				36 N1	38 N1	210	RDM/ TDSA	[2002De26]	
$^{114}\mathrm{Xe}$			23.8(16)		⁵⁸ Ni	$^{58}\mathrm{Ni}$	215	RDM	[1998De29]	
$^{116}\mathrm{Xe}$			35.1(13)		60Ni	58Ni	215	RDM	[1998De29]	
$^{118}\mathrm{Xe}$			65(4)		²⁹ Si	93Nb	135	RDM	[2002Go36]	
$^{118}\mathrm{Xe}$			63(6)			$^{118}\text{Cs}(\beta^{+})$		DC	[1992MaZR]	
$^{118}\mathrm{Xe}$			65.0(30)		¹⁴ N	$^{107}\mathrm{Ag}$	60	RDM	[1980KaZT]	
$^{118}\mathrm{Xe}$			69(5)		^{14}N	$^{107}\mathrm{Ag}$	50-85	RDM	[1977BeYM]	
$^{120}\mathrm{Xe}$			64.0(40)			$^{120}\mathrm{Cs}(\beta^+)$		DC	[1996Ma16]	
¹²⁰ Xe			64(5)		¹⁸ O	¹⁰⁶ Pd	70	RDM	[1995Wa25]	
¹²⁰ Xe			75(7)		19F	1045		RDM	[1990DeZN]	
$^{120}{ m Xe}$ $^{120}{ m Xe}$			89		19 F 14 N	^{104}Pd ^{109}Ag	81	RDM	[1985ChZY]	Ex, NR
¹²⁰ Xe			122(12)		16 _O	108 Ag 108 Pd	60	RDM RDM	[1980KaZT]	Ex
¹²⁰ Xe			124(15) 72.0(40)		16O	110Pd	75,80 66	RDM	[1972Ku14] [1998Go03]	Ex
$^{122}\mathrm{Xe}$			70.0(20)		18O	108Pd	76	RDM	[1998G003] [1994Pe02]	
$^{122}\mathrm{Xe}$			75(5)			1 4	10	RDM	[1993SaZT]	
$^{122}\mathrm{Xe}$			$51(^{+10}_{-6})$		18O	$^{107}\mathrm{Ag}$	78	RDM	[1992Dr05]	
$^{122}\mathrm{Xe}$			89.3(81)		16O	110Pd	75,80	RDM	[1972Ku14]	
$^{124}\mathrm{Xe}$			$64(^{+10}_{-8})$		¹²⁴ Xe	$^{93}\mathrm{Nb}$	55A	RDM	[2006Ch26]	
$^{124}\mathrm{Xe}$	$1.12(^{+12}_{-9})$		01(-8)		$^{124}\mathrm{Xe}$	⁵⁸ Ni	550-580	CE*	[2006Mu04]	
$^{124}\mathrm{Xe}$	1.12(_9)		67.5(17)		18O	110Pd	80	TDSA/	[2004Sa47]	
710			01.0(11)			1 4		RDM	[20045441]	
$^{124}\mathrm{Xe}$			82.0(40)		¹⁶ O	$^{110}\mathrm{Pd}$	66	RDM	[1998Go03]	
$^{124}\mathrm{Xe}$			60(5)					RDM	[1990DeZN]	
$^{124}\mathrm{Xe}$			48(3)		α	$^{122}\mathrm{Te}$	23-27.2	Conversion e	[1982GaZH]	NR
$^{124}\mathrm{Xe}$	0.90(7)				16O	$^{124}\mathrm{Xe}$	36,42	CE	[1975Go18]	
$^{126}\mathrm{Xe}$	$1.02(^{+13}_{-6})$				¹²⁴ Xe	⁵⁸ Ni	550-580	CE*	[2006Mu04]	
$^{126}\mathrm{Xe}$	1.06(3)				α	$^{123}\mathrm{Te}$	15.5	Fusion	[2000Ga08]	NR
	-100(0)							evapora-	[2000 0.000]	
$^{126}\mathrm{Xe}$	0.762(25)				16O	¹²⁶ Xe	36	tion CE	[1977Ar19]	
¹²⁶ Xe	0.762(23) 0.79(6)				16O	¹²⁶ Xe	36,42	CE	[1977AF19] [1975Go18]	
$^{126}\mathrm{Xe}$	0.79(0)		59.6(20)			$^{126}I(\beta^{-})$	30,42	DC	[1973G018] [1963De21]	
$^{128}\mathrm{Xe}$			26(6)		¹²⁸ Xe	Fe I(B)	525	RDM	[2011Ro53]	
$^{128}\mathrm{Xe}$	$0.825(^{+11}_{-12})$		20(0)		¹²⁸ Xe	⁵⁸ Ni	550-580	CE*	[2006Mu04]	
$^{128}\mathrm{Xe}$	0.90(10)				¹²⁸ Xe	Pb	4.3 A	CE*	[1993Sr01]	NR
$^{128}{ m Xe}$	0.767(32)				¹⁶ O	$^{128}\mathrm{Xe}$	36	CE	[1977Ar19]	
$^{128}\mathrm{Xe}$	0.79(4)				α	$^{128}\mathrm{Xe}$	10-13	CE	[1975EdZÝ]	NR
$^{128}{ m Xe}$	0.69(5)				¹⁶ O	$^{128}\mathrm{Xe}$	36,42	CE	[1975Go18]	
$^{128}\mathrm{Xe}$	0.89(23)				α	$^{128}\mathrm{Xe}$	6.45	CE	[1958Pi05]	NR
$^{130}\mathrm{Xe}$	$0.585(^{+9}_{-6})$				¹³⁰ Xe	⁵⁸ Ni	550-580	CE*	[2006Mu04]	
$^{130}{ m Xe}$		37.1(17)			¹³⁰ Xe	Ti	485-508	CE	[2002Ja02]	
¹³⁰ Xe	0.635(48)				¹⁶ O	¹³⁰ Xe	36	CE	[1977Ar19]	
¹³⁰ Xe	0.58(5)				α	¹³⁰ Xe	10-13	CE	[1975EdZY]	NR
$^{130}{ m Xe}$ $^{130}{ m Xe}$	1.00(8)		10.0(90)		¹⁶ O	¹³⁰ Xe	36,42	CE	[1975Go18]	
¹³⁰ Xe	0.60(15)		12.0(30)			$^{130}_{130}I(\beta^{-})$	0.200.0.520	DC	[1974Bu13]	
130Xe	$0.69(15) \\ 0.64$				$\begin{vmatrix} \gamma \\ \alpha \end{vmatrix}$	130Xe	0.390-0.530 6.45	GG CE	[1970Ke15] [1958Pi05]	NR
$^{132}\mathrm{Xe}$	$0.499(^{+36}_{-32})$				132 Xe	⁵⁸ Ni	550-580	CE*	[2006Mu04]	INIC
$^{132}\mathrm{Xe}$	0.499(-32)	23.7(6)			132 Xe	Ti	485-508	CE	[2000Mu04] [2002Ja02]	
$^{132}\mathrm{Xe}$	0.473(29)	20.7(0)			16O	$^{11}_{132}$ Xe	36	CE	[2002Ja02] [1977Ar19]	
$^{132}\mathrm{Xe}$	0.440(30)				16O	132 Xe	36,42	CE	[1977A119] [1975Go18]	
$^{132}\mathrm{Xe}$	0.35(11)					$^{132}\mathrm{Xe}$	0.673	GG	[1961Ha36]	
$^{134}\mathrm{Xe}$	$0.322(^{+41}_{-16})$				$\frac{\gamma}{^{134}\text{Xe}}$	⁵⁸ Ni	550-580	CE*	[2006Mu04]	
$^{134}\mathrm{Xe}$	(-16)	14.7(1)			$^{134}\mathrm{Xe}$	Ti	485-508	CE	[2000Ja02]	
$^{134}\mathrm{Xe}$		10.3(4)			¹³⁴ Xe	Ti	485-508	CE	[2002Ja02]	
$^{134}\mathrm{Xe}$	0.34(6)				α	$^{134}\mathrm{Xe}$	10-13	CE	[1975EdZY]	
	\ /	I		1	¹³⁶ Xe	Ti	485	DC	[2002Ja02]	
$^{136}\mathrm{Xe}$	0.2139(83)				710	11	100			
¹³⁶ Xe ¹³⁶ Xe ¹³⁶ Xe	0.2139(83)		0.30(5)		^{32}S	¹³⁶ Xe ¹³⁶ Xe	100 10-13	TDSA CE	[1993Sp01] [1975EdZY]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹³⁸ Xe	0.38(10)				$^{138}\mathrm{Xe}$	⁹⁶ Mo	2.84A	CE*	[2007Kr19,	
140**	0.70(10)				140**	⁹⁶ Mo		an*	2008KrZZ]	
$^{140}\mathrm{Xe}$	0.52(10)				¹⁴⁰ Xe	³⁰ Мо	2.84A	CE*	[2007Kr19, 2008KrZZ]	
$^{140}\mathrm{Xe}$			101.0(72)			$^{140}I(\beta^{-})$		DC	[1999Li18]	NR
$^{140}\mathrm{Xe}$			163(7)			²⁵⁴ Cf(SF)		DC	[1980ChZM]	Ex
$^{142}\mathrm{Xe}$	0.69(10)		(.)		$^{142}\mathrm{Xe}$	⁹⁶ Mo	2.84A	CE*	[2007Kr19,	
	, ,								2008KrZZ]	
$^{144}\mathrm{Xe}$	0.726(174)?								[2008KrZZ,	
$^{122}\mathrm{Ba}$			F2C(20)		¹⁶ O, ¹³ C	¹⁰⁸ Cd,	CO CE EO	DDM	2007Kr12]	
122Ba			536(30)		100, 100	¹⁰⁰ Cd, ¹¹² Sn	62-65, 59	RDM	[2010Bi11]	
$^{122}\mathrm{Ba}$			430(39)			$^{122}\text{La}(\beta^+)$		DC	[1992Mo13]	
$^{124}\mathrm{Ba}$			275(12)		¹⁹ F	109Ag	75	RDM	[1998Uc01]	
$^{124}\mathrm{Ba}$			286(6)			8		RDM	[1993SaZT]	
$^{124}\mathrm{Ba}$			245(18)		²⁸ Si	$^{100}\mathrm{Mo}$	115	RDM	[1992De60]	
124 Ba			428(38)			$^{124}\text{La}(\beta^{+})$		DC	[1992Mo13]	
¹²⁶ Ba			204(6)		$^{30}\mathrm{Si}$	100 Mo	130	RDM	[1996De50]	
$^{126}{ m Ba}$ $^{126}{ m Ba}$			203(20)		$_{ m ^{30}Si}$	$^{126}\text{La}(\beta^+)$ ^{100}Mo	120	DC	[1992Mo13]	
126 Ba			170(13)		16O	$^{114}\mathrm{Cd}$	130 80	RDM	[1989Sc06]	
126 Ba			$ \begin{array}{c c} 188 \binom{+10}{-30} \\ 173 (28) \end{array} $		16O	114Cd	75-80	RDM RDM	[1979Se03] [1972Ku14]	
$^{126}\mathrm{Ba}$			270(50)		^{14}N	^{115}In	3.7-7.5A	RDM	[1972Ku14] [1967Cl02]	
$^{128}\mathrm{Ba}$			152(13)		16O	$^{116}\mathrm{Cd}$	76	RDM	[2000Pe20]	NR
$^{128}\mathrm{Ba}$			144(+4)		¹⁸ O	$^{114}\mathrm{Cd}$	76	RDM	[1992Pe06]	
$^{128}\mathrm{Ba}$			140(30)		¹⁶ O	$^{116}\mathrm{Cd}$	75-80	RDM	[1972Ku14]	
$^{130}\mathrm{Ba}$			62.3(7)		¹⁸ O	$^{116}\mathrm{Cd}$	76	RDM	[2000St07]	NR
130 Ba			62.0(14)		¹⁸ O	¹¹⁶ Cd	76	RDM	[1998StZX]	Su
$^{130}\mathrm{Ba}$	1.163(16)				α , ¹² C, ¹⁶ O	¹³⁰ Ba	10.8-11.8, 32-38, 43-49	CE	[1989Bu07]	
$^{130}\mathrm{Ba}$			56(5)				45-45	RDM	[1985VoZY]	
130 Ba	1.21(38)				α^{40} Ca, α^{32} S,	¹³⁰ Ba	85, 70, 80, 10.5	CE	[1973ToXW]	
$^{130}\mathrm{Ba}$	1.36(14)				16O	$^{130}\mathrm{Ba}$	19-27	CE	[1967Si03]	
$^{130}\mathrm{Ba}$	0.75(18)				α	$^{130}\mathrm{Ba}$	< 5.6	CE	[1958Fa01]	
132 Ba	0.86(6)				$^{12}\mathrm{C}$	132 Ba	38-42	CE	[1985Bu01]	
¹³² Ba	0.73(18)				α 12 α 16 α	¹³² Ba	< 5.6	CE	[1958Fa01]	
134 Ba	0.655(6)				α , ¹² C, ¹⁶ O	¹³⁴ Ba	10.8-11.8, 32-38, 43-49	CE	[1989Bu07]	
134 Ba	0.671(18)				^{12}C	134 Ba	38-42	CE	[1985Bu01]	
$^{134}\mathrm{Ba}$	0.700(15)				α , ¹² C,	$^{134}\mathrm{Ba}$	11.3, 35,	CE	[1977Kl05]	
					¹⁸ O, ¹⁶ O		52.5, 48- 52.5			
134 Ba	0.50(7)				⁴⁰ Ca, ³² S	¹³⁴ Ba	85, 70, 80	CE	[1973ToXW]	
¹³⁴ Ba	0.672(16)				¹⁶ O	¹³⁴ Ba	42, 47, 50	CE CE*	[1972Ke16]	
$^{134}{ m Ba}$ $^{136}{ m Ba}$	0.75(25) 0.46(4)				N_{136} Ba	¹³⁴ Ba C	52 350, 396	CE* CE*	[1963Al31] [2002Ra21]	
136 Ba	0.40(4)				α , ⁷ Li, ¹⁶ O	136 Ba	11-11.8,	CE	[2002Ra21] [1986Ro15]	
Ба	0.410(0)				α, Ει, Ο	Da	15,16, 45-49	CE	[13001013]	
$^{136}\mathrm{Ba}$	0.3990(30)				α	136Be	42-44.5	CE*	[1984Be20]	
136 Ba			3.14(44)		³⁵ Cl	136 Ba	56-68	TDSA	[1973Fi15]	
136Ba	0.418(11)				¹⁶ O	¹³⁶ Ba	42, 47, 50	CE	[1972Ke16]	
¹³⁶ Ba	0.53(16)		0.005(00)		N	¹³⁶ Ba	52	CE*	[1963Al31]	ND
¹³⁸ Ba ¹³⁸ Ba			0.265(29)		γ	¹³⁸ Ba ¹³⁸ Ba	4.1	GG	[1995He25]	NR
¹³⁸ Ba	0.241(6)		$0.280(^{+180}_{-90})$		$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	¹³⁸ Ba	1.75 10.8-11.8,	TDSA CE	[1993Be03]	
	0.241(6)				α, υ,υ	ъзъра	10.8-11.8, 32-38, 43-49	CE	[1989Bu07]	
$^{138}\mathrm{Ba}$	0.236(11)				$^{12}\mathrm{C}$	138 Ba	38-42	CE*	[1985Bu01]	
$^{138}\mathrm{Ba}$	0.2170(30)				α	$^{138}\mathrm{Ba}$	12.15-12.40	CE	[1978Ki09]	
138 Ba	0.238(17)				$\frac{\gamma}{^{16}\mathrm{O}}$	¹³⁸ Ba	1.5-5.1	GG	[1977Sw03]	
¹³⁸ Ba	0.221(9)					¹³⁸ Ba	42, 47, 50	CE	[1972Ke16]	
$^{138}{ m Ba}$ $^{138}{ m Ba}$	0.249(13)				e N	¹³⁸ Ba ¹³⁸ Ba	40,60	EE CE*	[1972LeYB]	
ьова	0.27(9)				N	Ba	52	CE^*	[1963Al31]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹³⁸ Ba	0.38(11)				²⁰ Ne, ¹⁴ N	¹³⁸ Ba	16-26, 12- 22,36,53	CE	[1961An07]	
$^{140}\mathrm{Ba}$	$0.484 \binom{+38}{-101}$				140 Ba	$^{96}\mathrm{Mo}$	392	CE*	[2012Ba40]	
$^{140}\mathrm{Ba}$	0.101 (-101)		$10.4\binom{+22}{-8}$		$^{140}\mathrm{Ba}$	⁹⁶ Mo	392	TDSA	[2012Ba40]	
$^{140}\mathrm{Ba}$	0.4564		10.1(-8)		140 Ba	1110	~2.85A	CE*	[2008KrZZ,	Ex
									2007Kr12]	
$^{140}\mathrm{Ba}$			14(6)			$^{140}{\rm Cs}(\beta^{-})$		DC	[1989Ma38]	
$^{142}\mathrm{Ba}$			119(12)			252 Cf(SF)		TDSA	[2005Bi02]	
$^{142}\mathrm{Ba}$			94(3)			$^{142}\mathrm{Cs}(\beta^-)$		DC	[1990Ma25]	NR
$^{142}{\rm Ba}$			95.0(30)			$^{142}\mathrm{Cs}(\beta^-)$		DC	[1989Mo06]	Su
142 Ba			86(6)			²⁵² Cf(SF)		RDM	[1986Ma22]	
$^{142}{ m Ba}$ $^{142}{ m Ba}$			114(9)			254 Cf(SF)		DC DC	[1980ChZM]	G ND
Ba			100(60)					DC	[1975JaYL, 1974JaZN]	Su, NR
$^{144}\mathrm{Ba}$			1140(70)			²⁵² Cf(SF)		TDSA	[2005Bi02]	
$^{144}\mathrm{Ba}$			1025(40)			$^{144}\mathrm{Cs}(\beta^-)$		DC	[1990Ma25]	NR
¹⁴⁴ Ba			1475(597)			252 Cf(SF)		RDM	[1986Ma22]	
144 Ba			971(156)			252 Cf(SF)		RDM	[1983MaYT]	
$^{144}\mathrm{Ba}$			1010(100)			254 Cf(SF)		DC	[1980ChZM]	
144 Ba			1230(220)			$^{144}\mathrm{Cs}(\beta^{-})$		DC	[1976MoZB]	
$^{144}\mathrm{Ba}$			1010(43)					DC	[1975JaYL,	Su, NR
$^{144}\mathrm{Ba}$			1.440(200)			²⁵² Cf(SF)		DC	1974JaZN]	
146 Ba			1440(290) 1240(42)			$^{146}\mathrm{Cs}(\beta^-)$		DC DC	[1970Wa05] [1990Ma25]	NR
$^{146}\mathrm{Ba}$			1330(170)			254 Cf(SF)		DC	[1980ChZM]	INIC
$^{146}\mathrm{Ba}$			1240(90)			OI(BI)		DC	[1975JaYL,	Su, NR
			()						1974JaZN]	3 4, 1111
$^{124}\mathrm{Ce}$			1270(280)		³⁵ Cl	$^{92}\mathrm{Mo}$	145	RDM	[1995Ma96]	
$^{126}\mathrm{Ce}$			560(110)		³⁷ Cl	92 Mo	145	RDM	[1995Ma96]	
$^{126}\mathrm{Ce}$			949(53)		⁴⁰ Ca	⁹² Mo	150-200	RDM	[1988Mo08]	Ex
¹²⁶ Ce			949(53)		³⁵ Cl	94Mo	150	RDM	[1987IsZX]	NR
$^{128}{\rm Ce}$ $^{128}{\rm Ce}$			385(31)		40 Ca 40 Ar	92 Mo	150-200	RDM	[1988Mo08]	
¹³⁰ Ce			$427(^{+38}_{-34})$		²⁸ Si	⁹² Zr ¹¹⁰ Pd	159	RDM RDM	[1984We17]	ND
¹³⁰ Ce			181.3(70) 180(15)		16O	$^{117}\mathrm{Sn}$	125 76.5	RDM RDM	[1999Kl11] [1984To10]	NR
¹³⁰ Ce			209(15)		16O	118Sn	76.5	RDM	[1977Hu10]	
$^{130}\mathrm{Ce}$			211(9)		16O	$^{118}\mathrm{Sn}$	82	RDM	[1975Bu08]	
$^{130}\mathrm{Ce}$			225(20)		¹⁶ O	$^{118}\mathrm{Sn}$	68-76	RDM	[1974De12]	
$^{132}\mathrm{Ce}$			70.1(32)		²⁸ Si	$^{110}\mathrm{Pd}$	125	RDM	[1999Kl11]	NR
$^{132}{\rm Ce}$			58(9)		36S	$^{100}\mathrm{Mo}$	145	RDM	[1989Ki01]	
¹³² Ce			57(4)		16O	¹²⁰ Sn	76	RDM	[1977Hu10]	
$^{132}{\rm Ce}$ $^{134}{\rm Ce}$			68(10)		16 O 16 O	¹²⁰ Sn ¹²² Sn	68-76	RDM	[1974De12]	
¹³⁴ Ce			32.7(28)		16O	¹²² Sn ¹²² Sn	76 68-76	RDM RDM	[1977Hu10] [1974De12]	
¹³⁶ Ce	0.814(90)		36(8)			136Ce	3	CE*	[1974De12] [1989Ga24]	NR
$^{138}\mathrm{Ce}$	0.014(30)		2.84(6)		р ¹³⁸ Се	$^{24}{ m Mg}$	480	CE*	[2014Na15]	1110
$^{138}\mathrm{Ce}$	0.461(50)		2.01(0)		p	¹³⁸ Ce	3	CE*	[1989Ga24]	NR
$^{138}\mathrm{Ce}$	0.450(30)				α	$^{138}\mathrm{Ce}$	9, 10	CE	[1989Lo01]	
$^{140}\mathrm{Ce}$. ,		0.131(10)		γ	$^{140}\mathrm{Ce}$	4.1	GG	[1995He25]	NR
$^{140}\mathrm{Ce}$			$0.110(^{+40}_{-30})$		n	Ce	1.75	TDSA	[1993Be03]	
$^{140}\mathrm{Ce}$	0.304(8)				e	$^{140}\mathrm{Ce}$	190	EE	[1992Ki10]	NR
$^{140}{ m Ce}$			0.129(4)		$^{32}\mathrm{S}$	Ce	110	TDSA	[1991Ba38]	
¹⁴⁰ Ce	0.2950(40)				α	¹⁴⁰ Ce ¹⁴⁰ Ce	12.5-12.8	CE	[1978Ki09]	
$^{140}{ m Ce}$ $^{140}{ m Ce}$	0.280(37)				e 16O	¹⁴⁰ Ce ¹⁴⁰ Ce	50, 65	EE	[1973Pi04]	
¹⁴⁰ Ce	0.27(5)		0.216(87)			¹⁴⁰ Ce	31-45	CE GG	[1966Ec02] [1964Be25]	NR
¹⁴⁰ Ce	0.27(5)		0.210(01)		$^{\gamma}_{^{14}N, \alpha}$	Ce	52.5, 15	CE*	[1964Be25] [1961An07]	1111
$^{140}\mathrm{Ce}$	3.21(3)		4.8(19)		μ, α		02.0, 10	GG	[1961Ano7] [1960Dz03]	Ex, NR
$^{140}\mathrm{Ce}$	0.31				α	Се	17	CE	[1960Na13]	Ex, NR
$^{140}\mathrm{Ce}$			0.110(15)		1			GG	[1959Of14]	'
$^{142}\mathrm{Ce}$			8.19(9)		$_{142}^{\gamma}$ Ce	$^{24}{ m Mg}$	494	CE*	[2014Na15]	
$^{142}{\rm Ce}$									[1995Va25]	Ex
¹⁴² Ce	0.461(21)				e	¹⁴² Ce	100-370 MeV	EE	[1991Ki13]	NR
$^{142}\mathrm{Ce}$ $^{142}\mathrm{Ce}$	0.480(6)		8.20(100)		$\alpha^{32}S$ $\alpha^{12}C, {}^{16}O$	Ce ¹⁴² Ce	110 10-12, 32- 35, 45-49	TDSA CE	[1991Ba38] [1989Sp07]	Un

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁴² Ce			14(7)					DC	[1989Mo06]	
$^{142}\mathrm{Ce}$	0.480(6)				α , ¹² C, ¹⁶ O	¹⁴² Ce	10-12, 31-	CE	[1988Ve08]	Su
$^{142}\mathrm{Ce}$	0.65(20)					¹⁴² Ce	38, 44-50	EE	[1072D:04]	
¹⁴² Ce	0.65(20) 0.459(6)				e 16O	¹⁴² Ce	50, 65 42	EE CE	[1973Pi04] [1970En01]	
$^{142}\mathrm{Ce}$	0.439(0)				16O	¹⁴² Ce	31-45	CE	[1970En01] [1966Ec02]	
$^{142}\mathrm{Ce}$	0.41(8)				$^{14}N, \alpha$	Ce	52.5, 15	CE*	[1960Ec02]	
$^{142}\mathrm{Ce}$	0.59				α	Ce	17	CE	[1960Na13]	Ex, NR
$^{144}\mathrm{Ce}$			42(10)					DC	[1989Ma38]	
$^{144}{ m Ce}$			51(5), 43(8)					DC	[1989Mo06]	Su
¹⁴⁶ Ce			273(15)					DC	[1989Ma38]	
$^{146}{ m Ce}$ $^{146}{ m Ce}$			346(43)					DC	[1980ChZM]	ND
110Ce			380(70)					DC	[1975JaYL, 1974JaZN]	NR
$^{148}\mathrm{Ce}$			1300(430)					DC	[2006Hw01]	
$^{148}\mathrm{Ce}$			1370(120)					DC	[1980ChZM]	
$^{148}\mathrm{Ce}$			1530(120)					DC	[1975JaYL,	NR
			, ,						1974JaZN]	
$^{148}\mathrm{Ce}$			1880(290)					DC	[1970Wa05]	
$^{150}\mathrm{Ce}$			4400(800)					DC	[1980ChZM]	
$^{150}\mathrm{Ce}$			5200(1400)					DC	[1975JaYL,	NR
$^{152}\mathrm{Ce}$			9607 5 (7015)					DC	1974JaZN]	
$^{132}\mathrm{Ce}$ $^{130}\mathrm{Nd}$			3607.5(7215) 864(355)		$^{40}\mathrm{Ca}$	⁹⁶ Ru	180	DC RDM	[2005Fo17] [1989Mo10]	
$^{132}\mathrm{Nd}$			192(11)		^{32}S	$^{107}\mathrm{Ag}$	170	RDM	[1995Ma96]	
$^{132}\mathrm{Nd}$			268(19)		40 Ca	96 Ru	180	RDM	[1989Mo10]	
$^{132}\mathrm{Nd}$			350(30)		⁹² Mo	⁴⁶ Ti, ⁵⁰ Cr	210, 230	RDM	[1987Wa02]	Ex
$^{132}\mathrm{Nd}$			317(29)		^{32}S	$^{107}\mathrm{Ag}$	160	RDM	[1986Ma39]	Su
$^{134}\mathrm{Nd}$			94.4(30)		²⁸ Si	$^{110}\mathrm{Pd}$	125	RDM	[1999Kl11]	NR
$^{134}{\rm Nd}$			80(10)		³² S	¹⁰⁷ Ag	170	RDM	[1995Ma96]	
¹³⁴ Nd			92(6)		²⁸ Si	¹¹⁰ Pd	120-125	RDM	[1987Bi13]	_
¹³⁴ Nd ¹³⁶ Nd	1.00(00)	00/11)	150(12)		⁴⁶ Ti, ⁵⁰ Cr ¹³⁶ Nd	⁹² Mo	210, 230	RDM	[1987Wa02]	Ex
$^{140}\mathrm{Nd}$	$\begin{vmatrix} 1.66(23) \\ 0.72(5) \end{vmatrix}$	80(11)			140 Nd	Au ⁴⁸ Ti, ⁶⁴ Zn	126 A 399	CE* CE*	[2008Sa35] [2013Ba38]	
$^{142}\mathrm{Nd}$	0.72(3)		$0.130(^{+50}_{-30})$		n	Nd	1.75	TDSA	[2013Ba38] [1993Be03]	
$^{142}\mathrm{Nd}$			$0.150(_{-30})$ 0.159(16)		$^{11}_{32}$ S	$^{142}\mathrm{Nd}$	110-116	TDSA	[1991Ba38]	Un
$^{142}\mathrm{Nd}$			$0.1687(^{+572}_{-344})$		γ	$^{142}\mathrm{Nd}$	4.1	GG	[1990Pi04]	NR
$^{142}\mathrm{Nd}$	0.265(4)		3447		α	$^{142}\mathrm{Nd}$	13.05-13.20	CE	[1978Ki09]	1110
$^{142}\mathrm{Nd}$			0.165(12)		γ	$^{142}\mathrm{Nd}$	1.85-5.0	GG	[1978Me16]	
$^{142}\mathrm{Nd}$	0.437(37)		, ,		e	$^{142}\mathrm{Nd}$	40, 60, 80	EE	[1974MaYP]	
$^{142}\mathrm{Nd}$	0.27(3)				¹⁶ O	¹⁴² Nd	54-72	CE	[1973Ch13]	
¹⁴² Nd	0.289(8)				e	¹⁴² Nd	40, 60	EE	[1971Ma27]	
142Nd	0.57(17)				¹⁶ O ¹⁶ O	142Nd	50, 55, 60	CE	[1967BuZX]	
$^{142}{ m Nd}$ $^{142}{ m Nd}$	$\begin{vmatrix} 0.42(7) \\ 0.34 \end{vmatrix}$					¹⁴² Nd Nd	43.81 17	CE CE	[1966Ec02] [1960Na13]	Ex, NR
$^{144}\mathrm{Nd}$	0.460(40)				$\begin{vmatrix} \alpha \\ e \end{vmatrix}$	144Nd	112-400	EE	[1900Na13] [1993Pe10]	Ex, NIC
$^{144}\mathrm{Nd}$	0.491(5)				α , ¹² C, ¹⁶ O	$^{144}\mathrm{Nd}$	10.5-12.7,	CE	[1989Sp07]	
					, ,		32-36,		' '	
							44-49			
$^{144}\mathrm{Nd}$	0.580(10)				α	$^{144}\mathrm{Nd}$	10.5, 11	CE	[1988Ah01]	
144Nd	0.56(6)				16.0	144273	10	CE	[1980FaZW]	
¹⁴⁴ Nd ¹⁴⁴ Nd	0.510(16)				¹⁶ O ¹⁶ O	¹⁴⁴ Nd ¹⁴⁴ Nd	42	CE	[1971Cr01]	
$^{144}\mathrm{Nd}$	0.48(8) 0.44(5)				16O	144Nd	50, 55, 60 35-39	CE CE	[1967BuZX] [1966Ec02]	
$^{144}\mathrm{Nd}$	$0.44(5) \\ 0.23(5)$					Nu	30-39	CE	[1960Le02]	
$^{144}\mathrm{Nd}$	0.44				α	Nd	17	CE	[1960Na13]	Ex, NR
$^{146}\mathrm{Nd}$			33(7)					DC	[1989Mo06]	
$^{146}\mathrm{Nd}$	0.780(10)				α	$^{146}\mathrm{Nd}$	10.5, 11	CE	[1988Ah01]	
$^{146}\mathrm{Nd}$	0.81(7)					110		CE	[1980FaZW]	
$^{146}{\rm Nd}$	0.616(28)				e	¹⁴⁶ Nd	40, 60, 80	EE	[1974MaYP]	
146 Nd	0.705(34)				e 16.0	146Nd	40, 60	EE	[1971Ma27]	
$^{146}{ m Nd}$ $^{146}{ m Nd}$	0.760(22)				¹⁶ O	¹⁴⁶ Nd ¹⁴⁶ Nd	42	CE	[1971Cr01]	
PN	0.71(0)				α	PNI _{OE}	12, 14	CE	[1970Ch14]	I
146 N.J	0.71(6)				160				1.	
$^{146}\mathrm{Nd}$	0.68(10)				¹⁶ O	$^{146}\mathrm{Nd}$	50, 55, 60	CE	[1967BuZX]	
146 Nd 146 Nd 146 Nd	\ /				16 O 16 O α				1.	Ex

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	$egin{array}{c} {\bf B(E2)} \ (e^2b^2) \end{array}$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{148}\mathrm{Nd}$		<u> </u>	115(4)		⁵⁸ Ni	$^{148}\mathrm{Nd}$	220	RDM	[1991Ib01]	
$^{148}\mathrm{Nd}$	1.390(20)				α	$^{148}\mathrm{Nd}$	10.5, 11	CE	[1988Ah01]	
$^{148}\mathrm{Nd}$	1.42(5)							CE	[1980FaZW]	
$^{148}\mathrm{Nd}$	1.36(3)				¹⁶ O	$^{148}\mathrm{Nd}$	42	CE	[1971Cr01]	
$^{148}\mathrm{Nd}$	1.05(16)				¹⁶ O	$^{148}\mathrm{Nd}$	50, 55, 60	CE	[1967BuZX]	
$^{148}\mathrm{Nd}$	0.96(10)				¹⁶ O	$^{148}\mathrm{Nd}$	35-39	CE	[1966Ec02]	
$^{148}\mathrm{Nd}$	1.58(47)				α	$^{148}\mathrm{Nd}$	6	CE	[1955He64]	Ex
$^{148}\mathrm{Nd}$			260(90)		p	Nd	0-3.4	CE	[1955Si12]	
$^{150}\mathrm{Nd}$	2.82(4)				e	$^{150}\mathrm{Nd}$	112-450	EE	[1993Sa06]	Ex
$^{150}\mathrm{Nd}$	2.816(35)				α	$^{150}\mathrm{Nd}$	10.5, 11	CE	[1988Ah01]	
$^{150}\mathrm{Nd}$			2080(100)		40 Ar	$^{150}\mathrm{Nd}$	149	RDM	[1978Ya02]	
$^{150}\mathrm{Nd}$	2.720(40)				α	$^{150}\mathrm{Nd}$	11.5	CE	[1977Wo02]	
$^{150}\mathrm{Nd}$	1.49(13)				e	$^{150}\mathrm{Nd}$	40, 60, 80	EE	[1974MaYP]	
$^{150}\mathrm{Nd}$	2.75(8)				^{32}S	150Nd	86.95, 96.7, 102.0, 110.0	CE	[1973FrZN]	
$^{150}\mathrm{Nd}$	1.49(10)					$^{150}\mathrm{Nd}$		EE	[1971Ma27]	
$^{150}\mathrm{Nd}$	2.64(8)		2240(80)		е	Nd	40, 60	MuonicX- ray	[1971Ma27] [1970Hi03]	Ex
$^{150}\mathrm{Nd}$	2.72(6)				$^{16}O, \alpha$	$^{150}\mathrm{Nd}$		CE	[1969KeZX]	
$^{150}\mathrm{Nd}$	22(0)		2140(60)		p	$^{150}\mathrm{Nd}$	3.5	PB	[1968Ri09]	
$^{150}\mathrm{Nd}$			2191(34)		p	$^{150}\mathrm{Nd}$	3.3	PB	[1967Ku07]	
$^{150}\mathrm{Nd}$	2.67(10)		2101(01)		p, d	$^{150}\mathrm{Nd}$	4	CE	[1963Bj04]	
$^{150}\mathrm{Nd}$	2.01(10)		2200(100)		p	$^{150}\mathrm{Nd}$	2.8	PB	[1959Bi10]	
$^{150}\mathrm{Nd}$			7000(2300)		p	Nd	0-3.4	CE	[1955Si12]	
$^{150}\mathrm{Nd}$	2.3(8)		1000(2500)		α	$^{150}\mathrm{Nd}$	6	CE	[1955He64]	Ex
$^{152}\mathrm{Nd}$	2.9(0)		5760(320)		l a	114		DC	[1999To04]	LA
$^{152}\mathrm{Nd}$			6420(370)					DC	[1991He03]	
$^{154}\mathrm{Nd}$			11111(2886)			²⁵² Cf(SF)		DC	[1974JaZN]	NR
$^{134}\mathrm{Sm}$			605(50)		$^{92}\mathrm{Mo}$	⁴⁶ Ti, ⁵⁰ Cr	210, 230	RDM	[1987Wa02]	1110
$^{136}\mathrm{Sm}$			128(12)		32S	107Ag	125-150	RDM	[1988So06]	
$^{136}\mathrm{Sm}$			190(15)		^{92}Mo	⁴⁶ Ti, ⁵⁰ Cr	210, 230	RDM	[1985Wa02]	Ex
$^{136}\mathrm{Sm}$			187(14)		32S	107Ag	160	RDM	[1986Ma39]	Ex
$^{138}\mathrm{Sm}$			65(9)		³⁵ Cl	$^{107}\mathrm{Ag}$	155	RDM	[1986Ma39]	LX
138Sm			48(10)		32S	108Pd, 109Ag, 110,112Cd	120-170	RDM	[1985Lu06]	
$^{140}\mathrm{Sm}$			0.1(0)		$^{20}\mathrm{Ne}$	¹²⁴ Te	00	DDM	[0015D 05]	
$^{142}\mathrm{Sm}$	0.70(0)	20(4)	9.1(6)		142Sm	⁴⁸ Ti, ⁹⁴ Mo,	82	RDM	[2015Be25]	
142Sm	0.70(9)	32(4)	(+30)				405	CE	[2015St08]	
$^{144}{ m Sm}$			$0.55(^{+30}_{-15})$		n	¹⁴⁴ Sm	2-4.5	TDSA	[1993Ga16]	NR
$^{144}{ m Sm}$			0.124(5)		$^{32}\mathrm{S}$	¹⁴⁴ Sm	110-116	TDSA	[1991Ba38]	
$^{144}\mathrm{Sm}$			0.129(30)		γ	¹⁴⁴ Sm	< 5.2	GG	[1978Me08]	
$^{144}{ m Sm}$	0.262(6)				α	¹⁴⁴ Sm	12.15-12.40	CE	[1978Ki09]	
$^{144}{\rm Sm}$	0.25(5)				¹⁶ O	¹⁴⁴ Sm	44.29	CE	[1966Ec02]	
$^{144}\mathrm{Sm}$	0.39(12)		1.20		N	¹⁴⁴ Sm	52	CE	[1963Al31]	
$^{146}\mathrm{Sm}$			$7.3(^{+30}_{-73})$		$^{11}\mathrm{B}$	$^{139}\mathrm{La}$	54	RDM	[1982Ro05]	NR
$^{148}\mathrm{Sm}$			11.14(112)		$^{32}\mathrm{S}$	$^{148}\mathrm{Sm}$	110-116	TDSA	[1991Ba38]	Un
$^{148}{ m Sm}$	0.725(25)				α , ¹⁶ O, ³² S	¹⁴⁸ Sm		CE	[1973ClZF]	
$^{148}\mathrm{Sm}$	0.811(37)				e	¹⁴⁸ Sm	40, 60	EE	[1972LeYB]	
$^{148}\mathrm{Sm}$			10.6(6)		$^{40}\mathrm{Ar}$	$^{148}\mathrm{Sm}$		RDM	[1971Di02]	
¹⁴⁸ Sm	0.705(25)				α , ¹⁶ O	148Sm	10-13, 34- 50	CE	[1970Ge07]	
$^{148}{ m Sm}$	0.65(5)				α	¹⁴⁸ Sm	15	CE	[1968Ve01]	
$^{148}{\rm Sm}$	0.63(5)				¹⁶ O	¹⁴⁸ Sm	49	CE	[1968Ke04]	
¹⁴⁸ Sm	0.79(8)				¹⁶ O, ³² S	148Sm	19-27, 41- 54	CE	[1967Si03]	
¹⁴⁸ Sm	0.70(8)				¹⁶ O	¹⁴⁸ Sm	35.85, 39.21	CE	[1966Ec02]	
$^{150}\mathrm{Sm}$	$ \begin{array}{c c} 0.89(10) \\ 1.47(9) \end{array} $				p, d		4.5	CE MuonicX- ray	[1960El07] [1978Ya11]	Ex
$^{150}\mathrm{Sm}$	1.36(10)				16O	$^{150}\mathrm{Sm}$	46	CE	[1977Ho10]	
$^{150}\mathrm{Sm}$	1.43(5)				α , ¹⁶ O, ³² S	$^{150}\mathrm{Sm}$	10	CE	[1973ClZF]	
$^{150}\mathrm{Sm}$	1.32(8)				$\begin{bmatrix} \alpha, & 0, & 5 \\ e & & \end{bmatrix}$	$^{150}\mathrm{Sm}$	40, 60	EE	[1973CiZF]	
$^{150}\mathrm{Sm}$	1.02(0)		69.4(25)		$^{6}_{40}$ Ar	$^{150}\mathrm{Sm}$	10,00	RDM	[1972Di02]	
	I .	1	100.1(20)	1	1 ***				1.	I
$150 \mathrm{Sm}$	1.33(3)				α	$^{150}\mathrm{Sm}$	9. 10	CE	[1971Ca35]	
$^{150}{ m Sm}$ $^{150}{ m Sm}$	1.33(3) 1.29(7)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	¹⁵⁰ Sm ¹⁵⁰ Sm	9, 10 15	CE CE	[1971Ca35] [1968Ve01]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$\begin{array}{c} \mathbf{B(E2)} \\ (e^2b^2) \end{array}$	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{150}\mathrm{Sm}$	1.44(15)	<u> </u>			¹⁶ O, ³² S	¹⁵⁰ Sm	19-27, 41- 54	CE	[1967Si03]	
$^{150}\mathrm{Sm}$	1.31(21)				¹⁶ O	$^{150}\mathrm{Sm}$	49	CE	[1966Se06]	
$^{150}\mathrm{Sm}$	1.37(15)				16O	$^{150}\mathrm{Sm}$	31.09, 39.21	CE	[1966Ec02]	
$^{150}\mathrm{Sm}$	1.32(6)					$^{150}\mathrm{Sm}$	4.5	CE	[1960El07]	
$^{152}\mathrm{Sm}$	1.32(0)		2043(16)		p, d ¹³⁶ Xe	$^{152}\mathrm{Sm}$	5.09 A	DC	1.	
$^{152}\mathrm{Sm}$			2045(16) 2020(29)		Ae Ae	Sili	5.09 A		[2014Pl01]	
$^{152}\mathrm{Sm}$								DC	[1992De29]	
$^{152}\mathrm{Sm}$			2128(50)					DC	[1991He03]	
$^{152}\mathrm{Sm}$			2014(9)					DC DC	[1988Ka21]	
$^{152}\mathrm{Sm}$	3.457(9)		1980(70)			$^{152}\mathrm{Sm}$		MuonicX-	[1981Is14]	Ex
					μ			ray	[1978Ya11]	EX
$^{152}\mathrm{Sm}$	3.43(4)				α	$^{152}\mathrm{Sm}$	11.25-12.00	CE	[1977Fi01]	
$^{152}\mathrm{Sm}$	3.45(6)				e	$^{152}\mathrm{Sm}$	251.5	EE	[1977Na01]	
$^{152}\mathrm{Sm}$	3.28(7)				μ	$^{152}\mathrm{Sm}$		MuonicX-	[1975Ba72,	Ex, NR
								ray	1979Po04]	
$^{152}\mathrm{Sm}$	3.47(7)				α	$^{152}\mathrm{Sm}$	12	CE	[1974Wo01]	
$^{152}\mathrm{Sm}$	3.46(5)				α	$^{152}\mathrm{Sm}$	8-17	CE	[1974Sh12]	
$^{152}\mathrm{Sm}$	3.46(11)				α	$^{152}\mathrm{Sm}$	11-18	CE	[1973Br02]	
$^{152}\mathrm{Sm}$	3.39(3)				α	$^{152}\mathrm{Sm}$	10.5-12	CE	[1972Sa42]	
$^{152}\mathrm{Sm}$	3.35(20)				e	$^{152}\mathrm{Sm}$	40, 60	EE	[1972LeYB]	
$^{152}\mathrm{Sm}$			1950(70)				'	DC	[1972El20]	
$^{152}\mathrm{Sm}$	3.31(4)				¹⁶ O	$^{152}\mathrm{Sm}$	23-35	CE	[1970KaZK]	
$^{152}\mathrm{Sm}$	3.32(8)							MuonicX-	[1970Hi03]	Ex
								ray	,	
$^{152}\mathrm{Sm}$	3.45(28)				α	$^{152}\mathrm{Sm}$	7, 8, 9, 10	CĚ	[1970Sa09]	
$^{152}\mathrm{Sm}$			2030(60)				1, 1, 1, 1	DC	[1968Ku03]	
$^{152}\mathrm{Sm}$	3.1(5)				α	$^{152}\mathrm{Sm}$	16	CE	[1968Ve01]	
$^{152}\mathrm{Sm}$	0.2(0)		2077(43)		p	$^{152}\mathrm{Sm}$	3.5	PB	[1968Ri09]	
$^{152}\mathrm{Sm}$			2120(70)		p	$^{152}\mathrm{Sm}$		PB	[1967Wo06]	
$^{152}\mathrm{Sm}$			2060(60)		P	211		DC	[1967Ba27]	
$^{152}\mathrm{Sm}$			1960(90)					DC	[1966Mc07]	
$^{152}\mathrm{Sm}$			2040(80)		16O	$^{152}\mathrm{Sm}$	35	RDM	[1966As03]	
$^{152}\mathrm{Sm}$			2060(60)					DC	[1965Hu02]	
$^{152}\mathrm{Sm}$	3.4(2)		2000(00)		14N	$^{152}\mathrm{Sm}$	11.0	CE	[1964Ho25]	
$^{152}\mathrm{Sm}$	3.67(25)				16O	$^{152}\mathrm{Sm}$	14-50	CE	[1963Gr04]	
$^{152}\mathrm{Sm}$	3.0.(20)		1980(60)			211	1100	DC	[1963Fo02]	
$^{152}\mathrm{Sm}$			2050(70)					DC	[1962Ba38]	
$^{152}\mathrm{Sm}$			2120(220)					DC	[1961Sa21]	
$^{152}\mathrm{Sm}$	3.53(10)		2120(220)		p, d, α	$^{152}\mathrm{Sm}$	≈4	CE	[1961Be43]	
$^{152}\mathrm{Sm}$	3.40(15)				p, d, a	$^{152}\mathrm{Sm}$	4.5	CE	[1960El07]	
$^{152}\mathrm{Sm}$	0.10(10)		2090(80)		p	$^{152}\mathrm{Sm}$	2.8	PB	[1959Bi10]	
$^{152}\mathrm{Sm}$	3.20(36)		2000(00)		p	Sm	7	CE	[1958Sh01]	
$^{152}\mathrm{Sm}$	0.20(00)		1876		P	SIII	'	DC	[1956Be54]	Ex, NR
$^{152}\mathrm{Sm}$	3.3(8)		10.0					CE	[1956Hu49]	231, 1,10
$^{152}\mathrm{Sm}$	3.3(10)				α	$^{152}\mathrm{Sm}$	6	CE	[1955He64]	
$^{152}\mathrm{Sm}$	0.0(10)		2020(140)		a			DC	[1955Su64]	
$^{154}\mathrm{Sm}$			2020(110)	0.328(8)	μ	$^{154}\mathrm{Sm}$		MuonicX-	[1979Po04]	Ex, NR
				0.020(0)				ray	, ,	
$^{154}\mathrm{Sm}$	4.45(39)				e	$^{154}\mathrm{Sm}$	80-300	EE	[1977HoZF]	
$^{154}\mathrm{Sm}$	4.49(5)				α	$^{154}\mathrm{Sm}$	11.25-12.00	CE	[1977Fi01]	
$^{154}\mathrm{Sm}$	4.37(7)				α	$^{154}\mathrm{Sm}$	8-17	CE	[1974Sh12]	
$^{154}\mathrm{Sm}$	4.39(9)				α	$^{154}\mathrm{Sm}$	11-20	CE	[1974Br31]	
$^{154}\mathrm{Sm}$	4.29(4)				α	$^{154}\mathrm{Sm}$	12	CE	[1974Wo01]	
$^{154}\mathrm{Sm}$	4.26(7)				α	$^{154}\mathrm{Sm}$	11-19	CE	[1973Be40,	
$^{154}\mathrm{Sm}$	4.30(7)					$^{154}\mathrm{Sm}$	10.5-12	CE	1975Le22] [1972Sa42]	
$^{154}\mathrm{Sm}$	4.46(8)				$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$^{154}\mathrm{Sm}$	10.5-12	CE	[1972Sa42] [1972BrYV]	
$^{154}\mathrm{Sm}$					1	$^{154}\mathrm{Sm}$	16	CE	[1968Ve01]	
$^{154}\mathrm{Sm}$	4.2(6)		4330(90)		α	$^{154}\mathrm{Sm}$	3.5	PB	[1968 Ve01] [1968Ri09]	
$^{154}\mathrm{Sm}$			4330(90)		p	$^{154}\mathrm{Sm}$	3.0	PB PB	[1968R109] [1967Wo06]	
$^{154}\mathrm{Sm}$	5.1(4)		4510(10)		p 14N	$^{154}\mathrm{Sm}$	11.0	CE	1.	
$^{154}\mathrm{Sm}$	3.1(4) 4.53(35)					$^{154}\mathrm{Sm}$	3	CE	[1964Ho25] [1963Gr04]	
$^{154}\mathrm{Sm}$					р 16О	$^{154}\mathrm{Sm}$			1.	
$^{154}\mathrm{Sm}$ $^{154}\mathrm{Sm}$	4.38(30)					$^{154}\mathrm{Sm}$ $^{154}\mathrm{Sm}$	14-50	CE	[1963Gr04]	
$^{154}\mathrm{Sm}$ $^{154}\mathrm{Sm}$	3.5(5)				p J	$^{154}\mathrm{Sm}$ $^{154}\mathrm{Sm}$	3.18, 1.8	CE	[1961Go09]	
154g	4.61(20)		2050(250)		p, d	154g	4.5	CE	[1960El07]	
$^{154}\mathrm{Sm}$	l	1	3950(350)	1	P	$^{154}\mathrm{Sm}$	2.8	PB	[1959Bi10]	

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	$(e^{\hat{2}}b^2)'$	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁵⁴ Sm	3.45(40)	T			р	Sm	7	CE	[1958Sh01]	
$^{154}\mathrm{Sm}$	6.8(17)							CE	[1956Hu49]	
$^{154}\mathrm{Sm}$	4.7(14)				α	$^{154}\mathrm{Sm}$	6	CE	[1955He64]	Ex
$^{156}\mathrm{Sm}$			>3000					DC	[1970ChZH]	NR
$^{138}\mathrm{Gd}$			308(17)		$^{36}\mathrm{Ar}$	$^{106}\mathrm{Cd}$	190	RDM	[2011Pr10]	
$^{138}\mathrm{Gd}$			305(30)		$^{50}\mathrm{Cr}$	$^{92}\mathrm{Mo}$	230	RDM	[1988Bi03]	NR
$^{146}\mathrm{Gd}$			<1		α	$^{144}\mathrm{Sm}$	22-25	DSAM	[1978Og03]	NR
$^{148}\mathrm{Gd}$			6.0(19)		^{11}B	$^{141}\mathrm{Pr}$	49	RDM	[2003Po02]	
$^{152}\mathrm{Gd}$			52(7)					DC	[1993Se08]	
$^{152}\mathrm{Gd}$			49.3(22)		$^{40}\mathrm{Ar}$	$^{152}\mathrm{Gd}$	147.2	RDM	[1982Jo04]	
$^{152}\mathrm{Gd}$			53(10)					DC	[1974El03]	
$^{152}\mathrm{Gd}$	1.97(13)				α	$^{152}\mathrm{Gd}$	10	CE	[1970Be36]	
$^{152}\mathrm{Gd}$			40(14)					DC	[1967Ab06]	
$^{152}\mathrm{Gd}$			76(13)					DC	[1961Bu17]	
$^{152}\mathrm{Gd}$			<144.3					DC	[1956Be54]	Ex, NR
$^{154}\mathrm{Gd}$			1708(7)					DC	[1995Ma03]	
$^{154}\mathrm{Gd}$	3.36				^{32}S , ^{48}Ti ,	$^{154}\mathrm{Gd}$	118, 178,	CE	[1993Su16]	Ex, Gos,
					⁵⁸ Ni		228		,	NR
$^{154}\mathrm{Gd}$	3.87(6)				e^{-}	$^{154}\mathrm{Gd}$	78-380	EE	[1986He09,	NR
	3131(3)						1.0.000		1983He21]	
$^{154}\mathrm{Gd}$	3.81(15)				$\mid \mu \mid$	$^{154}\mathrm{Gd}$		MuonicX-	[1983La08]	Ex
	0.01(10)				~			ray	[10002400]	
$^{154}\mathrm{Gd}$	3.83(5)				α	$^{154}\mathrm{Gd}$	11.5	CE	[1977Wo02]	
$^{154}\mathrm{Gd}$	3.90(6)				α	$^{154}\mathrm{Gd}$	11.8	CE	[1977Sc33]	
$^{154}\mathrm{Gd}$	3.85(8)				α	$^{154}\mathrm{Gd}$	11-17	CE	[1977Ro08,	NR
Gu	3.65(6)				α	Gu	11-11	CE	1977Ro26]	INIC
$^{154}\mathrm{Gd}$			1700(70)					DC	[1973GrXX]	
$^{154}\mathrm{Gd}$			1700(60)					DC	[1973GIAA]	
$^{154}\mathrm{Gd}$			1750(60)					DC	[1968Ku03]	
$^{154}\mathrm{Gd}$			1702(43)					DC	[1968Ku03]	
$^{154}\mathrm{Gd}$			1670(70)					DC	[1963F002]	
$^{154}\mathrm{Gd}$			\ /					DC	1 .	
$^{154}\mathrm{Gd}$			1659(43)						[1961Na06]	
$^{154}\mathrm{Gd}$	9.49(90)		1700(50)		,	$^{154}\mathrm{Gd}$	1.5	DC	[1961St04]	
$^{154}\mathrm{Gd}$	3.43(30)		1500(150)		p, d	¹⁵⁴ Gd	4.5	CE	[1960El07]	
	0.4(±5)		1780(150)		p		2.8	PB	[1959Bi10]	
$^{154}{ m Gd}$	$3.4(^{+5}_{-3})$				p, d	$^{154}\mathrm{Gd}$	4	CE	[1958Ra12]	
¹⁵⁴ Gd	()		1587					DC	[1956Be54]	Ex, NR
$^{154}{ m Gd}$	2.8(42)							CE	[1956Hu49]	Ex, NR
$^{154}{\rm Gd}$			1730(140)			154		DC	[1955Su64]	_
$^{154}{\rm Gd}$	5.1(15)				α	¹⁵⁴ Gd	6	CE	[1955He64]	Ex
$^{156}\mathrm{Gd}$	4.16				$^{32}\mathrm{S}$	$^{156}\mathrm{Gd}$	118	CE	[1993Su16]	Ex,Gos,
150						150				NR
$^{156}\mathrm{Gd}$	4.48(50)				e	$^{156}{ m Gd}$	25-56	EE	[1985Bo31]	
$^{156}\mathrm{Gd}$	4.58(18)				$\mid \mu \mid$	$^{156}\mathrm{Gd}$		MuonicX-	[1983La08]	Ex
								ray		
$^{156}\mathrm{Gd}$	4.57(5)				α	$^{156}\mathrm{Gd}$	11-17	CE	[1977Ro08,	NR
									1977Ro26]	
$^{156}\mathrm{Gd}$	4.63(5)				α	$^{156}\mathrm{Gd}$	11.25-12.00	CE	[1977Fi01]	
$^{156}\mathrm{Gd}$	4.59(9)				α	$^{156}\mathrm{Gd}$	11.5	CE	[1977Wo02]	
$^{156}\mathrm{Gd}$			3190(90)					DC	[1968Ku03]	
$^{156}\mathrm{Gd}$			3247(722)					DC	[1968Wa08]	NR
$^{156}\mathrm{Gd}$			3290(80)		p	$^{156}\mathrm{Gd}$		PB	[1967Wo06]	
$^{156}\mathrm{Gd}$			3200(120)		1			DC	[1966Mc07]	
$^{156}\mathrm{Gd}$			3130(70)					DC	[1965Me08]	
$^{156}\mathrm{Gd}$			3120(90)					DC	[1963Fo02]	
$^{156}\mathrm{Gd}$			3200(80)					DC	[1962Ba38]	
$^{156}\mathrm{Gd}$	3.6(5)				p	$^{156}\mathrm{Gd}$	3.18, 1.8	CE	[1961Go09]	
$^{156}\mathrm{Gd}$	4.57(25)				p, d	$^{156}\mathrm{Gd}$	4.5	CE	[1960El07]	
$^{156}\mathrm{Gd}$			2960(150)		p, d	$^{156}\mathrm{Gd}$	2.8	PB	[1959Bi10]	
$^{156}\mathrm{Gd}$			3160(100)			Ju	12.0	DC	[1959Be57]	
$^{156}\mathrm{Gd}$			2740(140)					DC	[1958Na01]	
$^{156}\mathrm{Gd}$	4.50(25)		2,10(140)		n	$^{156}\mathrm{Gd}$	4	CE	[1958Ra12]	
$^{156}\mathrm{Gd}$	$\begin{array}{c c} 4.50(25) \\ 7.7(19) \end{array}$				p	Gu	4	CE	[1956Hu49]	
$^{156}\mathrm{Gd}$	9.3(29)					$^{156}\mathrm{Gd}$	6	CE	[1956Hu49] [1955He64]	Ex
$^{158}\mathrm{Gd}$	5.07				$\frac{\alpha}{^{32}\mathrm{S}}$	$^{158}\mathrm{Gd}$	118	CE	[1993Su16]	Ex,Gos,
Gu	3.07				"	Gu	110	OE:	[1335Su10]	NR
$^{158}\mathrm{Gd}$	1 18(5)					$^{158}\mathrm{Gd}$	25-56	EE	[1985Bo31]	1111
Gu	4.48(5)	1	I	I	e	Gu	20-00	בובו	[1900D091]	I

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$egin{array}{c} {\bf B(E2)} \ (e^2b^2) \end{array}$	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{-158}\mathrm{Gd}$	4.94(20)				μ	¹⁵⁸ Gd		MuonicX-	[1983La08]	Ex
$^{158}\mathrm{Gd}$	4.97(5)				α	$^{158}\mathrm{Gd}$	11-17	ray CE	[1977Ro08, 1977Ro26]	NR
$^{158}\mathrm{Gd}$	5.00(7)				α	$^{158}\mathrm{Gd}$	11-13	CE	[1974Sh12]	
$^{158}\mathrm{Gd}$	5.03(8)				α	$^{158}\mathrm{Gd}$	12	CE	[1974Wo01]	
$^{158}\mathrm{Gd}$	4.97(14)				α	$^{158}\mathrm{Gd}$	11-13	CE	[1972Er04]	
$^{158}\mathrm{Gd}$	\		3740(170)		¹⁶ O	$^{158}\mathrm{Gd}$	30	DC	[1969Av01]	
$^{158}\mathrm{Gd}$			3740(240)					DC	[1968Sc04]	
$^{158}\mathrm{Gd}$			3640(120)					DC	[1968Ku03]	
$^{158}\mathrm{Gd}$			3690(80)		p	$^{158}\mathrm{Gd}$		PB	[1967Wo06]	
$^{158}\mathrm{Gd}$			3560(140)					DC	[1966Fu03]	
$^{158}\mathrm{Gd}$			3370(150)		p	$^{158}\mathrm{Gd}$	2.8	PB	[1962Bi05]	
$^{158}\mathrm{Gd}$	4.5(7)				p	$^{158}\mathrm{Gd}$	3.18, 1.8	CE	[1961Go09]	
$^{158}{ m Gd}$	5.44(25)				p, d	$^{158}{ m Gd}$	4.5	CE	[1960El07]	
¹⁵⁸ Gd			4030(350)		p	¹⁵⁸ Gd	2.8	PB	[1959Bi10]	Su
¹⁵⁸ Gd	5.36(25)				p	$^{158}\mathrm{Gd}$	4	CE	[1958Ra12]	
$^{158}{ m Gd}$ $^{158}{ m Gd}$	6.5(16)					158 (2.1		CE	[1956Hu49]	Ex, NR
$^{160}\mathrm{Gd}$	12.2(37)		2040(120)		α	$^{158}\mathrm{Gd}$	6	CE	[1955He64]	Ex
$^{160}\mathrm{Gd}$	4.69		3940(120)		$^{58}\mathrm{Ni}$	$^{160}\mathrm{Gd}$	005	DC CE*	[2010NaZY]	E- C-
	4.63				l so N1		225		[1993Su16]	Ex,Gos, NR
$^{160}\mathrm{Gd}$	5.24(21)				μ	$^{160}\mathrm{Gd}$		MuonicX- ray	[1983La08]	Ex
$^{160}\mathrm{Gd}$	5.15(6)				α	$^{160}\mathrm{Gd}$	11-17	CE	[1977Ro08, 1977Ro26]	NR
$^{160}\mathrm{Gd}$	5.23(8)				α	$^{160}\mathrm{Gd}$	11-13	CE	[1974Sh12]	
$^{160}\mathrm{Gd}$	5.24(10)				α	$^{160}\mathrm{Gd}$	11-13	CE	[1972Er04]	
$^{160}\mathrm{Gd}$			3920(10)		α	$^{160}\mathrm{Gd}$	4-4.5	PB	[1971Sp06]	
$^{160}\mathrm{Gd}$			3880(80)		¹⁶ O	$^{160}\mathrm{Gd}$	30	DC	[1969Av01]	
$^{160}{ m Gd}$			3870(90)		p	$^{160}{\rm Gd}$	3.5	PB	[1968Ri09]	
¹⁶⁰ Gd			3920(80)		p	¹⁶⁰ Gd		PB	[1967Wo06]	
¹⁶⁰ Gd	5.43(40)				¹⁶ O	¹⁶⁰ Gd	14-50	CE	[1963Gr04]	
$^{160}{ m Gd}$	5.80(25)		2040(200)		p, d	¹⁶⁰ Gd ¹⁶⁰ Gd	4.5	CE	[1960El07]	
$^{160}\mathrm{Gd}$	F 71/0F)		3640(200)		p	¹⁶⁰ Gd	2.8	PB	[1959Bi10]	
$^{160}\mathrm{Gd}$	5.71(25)				P	100Ga	4	CE	[1958Ra12]	E- ND
$^{162}\mathrm{Gd}$	6.4(16)		3980(80)					CE DC	[1956Hu49] [2010NaZY]	Ex, NR
$^{164}\mathrm{Gd}$			4000(200)					DC	[2010NaZY]	
$^{152}\mathrm{Dy}$			15(8)		$^{12}\mathrm{C}$	$^{144}\mathrm{Nd}$	70	RDM	[2010NaZ1] [1979DuZY]	
$^{154}\mathrm{Dy}$			37.4(15)		34S	$^{124}\mathrm{Sn}$	160	RDM	[1985Az02]	
$^{154}\mathrm{Dy}$			42.3(27)		¹³⁴ Xe	$^{25}{ m Mg}$	686	RDM	[1985Az02]	
$^{154}\mathrm{Dy}$			37.4(15)		$^{34}\mathrm{S}$	¹²⁴ Sn	145-165	RDM	[1982Pa10]	
$^{154}\mathrm{Dy}$			58(29)		12°C	$^{146}\mathrm{Nd}$	60	RDM	[1978DuZY]	
$^{156}\mathrm{Dv}$			1060(150)		^{36}S	$^{124}\mathrm{Sn}$	155	RDM	[2006Mo22]	
$^{156}\mathrm{Dy}$	3.72(3)		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		α	$^{156}\mathrm{Dy}$	12-13	CE	[1977Ro27]	
$^{156}\mathrm{Dv}$			1300(120)					DC	[1970Mo39]	
$^{156}\mathrm{Dy}$			1180(70)					DC	[1966Ab02]	
$^{156}\mathrm{Dy}$	3.79(30)				p, d	$^{156}\mathrm{Dy}$	4	CE	[1963Bj04]	
$^{158}{ m Dy}$	4.67(4)				α	$^{158}\mathrm{Dy}$	12-13	CE	[1977Ro27]	
$^{158}{\rm Dy}$			2350(120)					DC	[1970Mo39]	
¹⁵⁸ Dy			2540(140)					DC	[1968Sc04]	
158 Dy			2370(120)					DC	[1966Fu03]	
158 Dy	/>		2450(140)			150-		DC	[1966Ab02]	
158 Dy	4.67(40)		01.00(1.00)		p, d	¹⁵⁸ Dy	4	CE	[1963Bj04]	
160 Dy			3160(120)					DC	[1981Is14]	
¹⁶⁰ Dy ¹⁶⁰ Dy			2929(29)					DC	[1972Lo01]	
160 Dy 160 Dy			2840(60)					DC	[1971Ab05]	
160 Dy 160 Dy			2540(120)					DC	[1970Mo39]	
160 Dy 160 Dy			$\begin{vmatrix} 2890(170) \\ 2900(70) \end{vmatrix}$					DC DC	[1969Fo08] [1968Ku03]	
160 Dy 160 Dy			2900(70)					DC	[1968Ku03] [1966Fu03]	
160 Dy 160 Dy			2890(60)					DC	[1965Me08]	
160 Dy			2890(60)					DC	[1965Gu02]	
160 Dy			2730(70)					DC	[1964Do06]	
$^{160}\mathrm{Dy}$			2971(23)		d	Gd		DC	[1964D606] [1963De21]	
⊥ .y	1				u	Gu				
¹⁶⁰ Dy ¹⁶⁰ Dy			2870(70)					DC	[1963Li04]	1

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	$ \begin{array}{c c} \mathbf{B(E2)} \\ (e^2b^2) \end{array} $	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁶⁰ Dy			3230(90)					DC	[1962Ri07]	
$^{160}\mathrm{Dy}$			2450(140)					DC	[1962Be46]	
160 Dy	4.46(30)				p, d	¹⁶⁰ Dy	4.5	CE	[1960El07]	
¹⁶⁰ Dy			2600(290)			160-		DC	[1952Mc03]	
162 Dy	5.2(3)				d	$^{162}\mathrm{Dy}$	12	CE*	[1974ThZG]	NR
$^{162}{ m Dy}_{162}{ m Dy}$	F 90/F)		3050(200)			1625	11 10	DC	[1973Ch28]	
¹⁶² Dy	5.38(5)				α	¹⁶² Dy	11-13	CE	[1972Er04]	
102 Ду	5.39(10)							MuonicX-	[1970Hi03]	Ex
$^{162}\mathrm{Dy}$			3160(50)			¹⁶² Dy		ray PB	[1967Ku07]	
$^{162}\mathrm{Dy}$			2900(300)		р ¹⁶ О	$^{162}\mathrm{Dy}$	35	RDM	[1967As03]	
$^{162}\mathrm{Dy}$	4.80(35)		2900(300)		p	$^{162}\mathrm{Dy}$	3	CE	[1967As05]	
$^{162}\mathrm{Dy}$	4.00(00)		3250(100)		P	Dy	0	DC	[1963Li04]	
$^{162}\mathrm{Dy}$	4.68(35)		0200(100)		¹⁶ O	$^{162}\mathrm{Dv}$	8-50	CE	[1963Gr04]	
$^{162}\mathrm{Dy}$	5.0(8)				p, d	$^{162}\mathrm{Dy}$	3.18, 1.8	CE	[1961Go09]	
$^{162}\mathrm{Dv}$	5.11(15)				p, d	$^{162}\mathrm{Dy}$	4.5	CE	[1960El07]	
$^{162}\mathrm{Dv}$	()		3200(200)		p, d	$^{162}\mathrm{Dy}$	2.8	PB	[1959Bi10]	
$^{162}\mathrm{Dv}$	6.1(15)				'			CE	[1956Hu49]	Ex, NR
$^{164}\mathrm{Dy}$	$5.6\dot{6}(6)$				α	$^{164}\mathrm{Dy}$	12	CE	[1974Wo01]	
$^{164}\mathrm{Dy}$	5.59(12)				α	$^{164}\mathrm{Dy}$	11-13	CE	[1974Sh12]	
$^{164}\mathrm{Dy}$	5.55(9)				α	$^{164}\mathrm{Dy}$		CE	[1973Gr05]	Su
$^{164}\mathrm{Dy}$	5.57(5)				α	$^{164}\mathrm{Dy}$	11-13	CE	[1972Er04]	
$^{164}\mathrm{Dy}$	5.48(10)							MuonicX-	[1970Hi03]	Ex
104					10	104		ray		
¹⁶⁴ Dy			3460(110)		¹⁶ O	¹⁶⁴ Dy	30	DC	[1969Av01]	
164 Dy			3444(54)		p	164 Dy		PB	[1967Ku07]	
164 Dy	5.64(25)				p, d	164Dy	4.5	CE	[1960El07]	
164 Dy	0.4(4.5)		3490(350)		p, d	¹⁶⁴ Dy	2.8	PB	[1959Bi10]	_
$^{164}{ m Dy}$ $^{156}{ m Er}$	6.1(15)		40.9(99)		³⁷ Cl	¹²³ Sb	150 166	CE	[1956Hu49]	Ex
$^{156}\mathrm{Er}$			48.3(23)		40Ar	120Sb 120Sn	158,166	RDM	[1985AzZY]	NR
$^{156}{ m Er}$			50.1(18)		40Ar	120Sn	140-200	RDM RDM	[1979Bo29] [1969Di02]	
$^{158}\mathrm{Er}$			47.9(25) 341(10)		^{40}Ar	$^{122}\mathrm{Sn}$	185	RDM	[2002Sh09]	
$^{158}\mathrm{Er}$			371(20)		34S	¹²⁸ Te	155	RDM	[1986Os02]	
$^{158}\mathrm{Er}$			433(22)		$^{40}\mathrm{Ar}$	$^{122}\mathrm{Sn}$	100	RDM	[1969Di02]	
$^{160}\mathrm{Er}$			1326(45)		$^{40}\mathrm{Ar}$	$^{124}\mathrm{Sn}$	140-200	RDM	[1979Bo29]	
$^{160}{ m Er}$			1230(220)					DC	[1978Ad03]	
$^{160}\mathrm{Er}$			1310(200)		$^{40}\mathrm{Ar}$	$^{124}\mathrm{Sn}$		RDM	[1972Bo04]	
$^{160}\mathrm{Er}$			1330(70)		$^{40}\mathrm{Ar}$	$^{124}\mathrm{Sn}$		RDM	[1969Di02]	
$^{162}\mathrm{Er}$			2200(400)			$^{162}\mathrm{Tm}(\beta^+)$		DC	[2003Ca03]	
$^{162}\mathrm{Er}$	5.01(3)				α	$^{162}\mathrm{Er}$	12-13	CE	[1977Ro27]	
$^{162}\mathrm{Er}$			1690(140)			100		DC	[1970Mo39]	
$^{162}{\rm Er}$	4.89(25)				p, d	¹⁶² Er	4	CE	[1963Bj04]	
164Er	5.48(4)				α	$^{164}{ m Er}$	12-13	CE	[1977Ro27]	
164Er			2140(120)					DC	[1970Mo39]	
$^{164}{ m Er}$			2190(90)					DC	[1968Se02]	
$^{164}\mathrm{Er}$			2060(70)			$^{164}\text{Ho}(\beta^{-})$		DC DC	[1963Fo02]	
$^{164}{ m Er}$	5.04(35)		2499(46)		n d	164Er	4.5	CE	[1963De21] [1960El07]	
$^{164}\mathrm{Er}$	3.04(33)		2020(720)		p, d	Er	4.0	DC	[1954Br96]	
$^{166}\mathrm{Er}$	5.2(5)		2020(120)		³² S, ⁵⁸ Ni	$^{166}{ m Er}$	115,221	CE*	[1992Fa01]	NR
$^{166}\mathrm{Er}$	5.91(6)				α	$^{166}\mathrm{Er}$	11.25-12.00	CE	[1977Fi01]	1110
$^{166}\mathrm{Er}$	5.80(6)				α	$^{166}\mathrm{Er}$	11-13	CE	[1974Sh12]	
$^{166}\mathrm{Er}$	5.85(5)				α	$^{166}\mathrm{Er}$	12	CE	[1974Wo01]	
$^{166}\mathrm{Er}$	"""		3000(140)					DC	[1973GrXX]	
$^{166}{ m Er}$	5.65(6)		, ,		α	$^{166}\mathrm{Er}$	12.5-19.5	CE	[1973Be40,	
									1975Le22]	
$^{166}\mathrm{Er}$	6.04(6)				α	$^{166}\mathrm{Er}$		CE	[1972GrYQ]	
$^{166}\mathrm{Er}$	5.76(10)				α	$^{166}\mathrm{Er}$	11-13	CE	[1972Er04]	
$^{166}\mathrm{Er}$	5.69(16)				¹⁶ O	$^{166}\mathrm{Er}$	23-35	CE	[1970KaZK]	
¹⁶⁶ Er			2870(130)					DC	[1970Mo39]	
¹⁶⁶ Er			2640(70)		16.0	1665	0.5	DC	[1968Ku03]	
$^{166}{ m Er}$			2680(150)		¹⁶ O	166Er	35	RDM	[1967As03]	
$^{166}\mathrm{Er}$			2696(42)		p	$^{166}\mathrm{Er}$		PB	[1967Ku07]	
$^{166}\mathrm{Er}$			2640(90) 2600(70)					DC DC	[1963Li04] [1963Fo02]	
$^{166}\mathrm{Er}$			2532(75)			$^{166}{\rm Ho}(\beta^{-})$		DC	[1963F602] [1963De21]	
$^{166}\mathrm{Er}$			2740(140)			Πο(ρ)		DC	[1963De21] [1962Ba30]	
	1	I	1 (-10)	1	I	1	ı	-	11 - 322 200]	I

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{166}\mathrm{Er}$. /	1` ′	2860(300)				<u> </u>	DC	[1961Bo05]	
$^{166}{ m Er}$	6.9(12)		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		p	$^{166}{ m Er}$	3.18, 1.8	CE	[1961Go09]	
$^{166}{ m Er}$, ,		2810(100)					DC	[1961Ge14]	
$^{166}{ m Er}$	5.66(25)				p, d	$^{166}{ m Er}$	4.5	CE	[1960El07]	
$^{166}{ m Er}$	' '		2890(290)					DC	[1960Be28]	
$^{166}{ m Er}$			2610(250)		p	$^{166}{ m Er}$	2.8	PB	[1959Bi10]	
$^{166}{ m Er}$			2886		-			DC	[1956Be54]	Ex, NR
$^{166}{ m Er}$			2630(90)					DC	[1955Gr07]	
$^{166}{ m Er}$			2450(290)					DC	[1950Mc79]	
$^{168}{ m Er}$	5.90(34)				²⁰⁸ Pb, ⁵⁸ Ni	$^{168}\mathrm{Er}$	950, 220	CE*	[1990Ko30]	Ex, Gos,
$^{168}{ m Er}$	5.90(10)				1	168Er	10 5 10 5	CE	[1077] -00]	NR
168Er	\ /				α	168Er	12.5-19.5	CE CE	[1975Le22] [1974Sh12]	
168Er	6.00(13)		0.400(00)		α	- Er	11-13	DC	1.	
$^{168}{ m Er}$	5 7C(10)		2480(90)			$^{168}\mathrm{Er}$	11-13	CE	[1974Aw03] [1972Er04]	
168Er	5.76(10)		9770(90)		α	- Er	11-13	DC		
$^{168}{ m Er}$	C 00(10)		2770(29)					-	[1972BeVM]	
Er	6.00(12)							MuonicX- ray	[1970Hi03]	Ex
$^{168}{ m Er}$			2710(70)					m DC	[1968Ku03]	
$^{168}{ m Er}$			2664(42)		p	$^{168}{ m Er}$		PB	[1967Ku07]	
$^{168}\mathrm{Er}$			2740(140)		F			DC	[1964Ja09]	
$^{168}\mathrm{Er}$			2740(90)					DC	[1963Li04]	
$^{168}\mathrm{Er}$			2770(60)					DC	[1962Bo18]	
$^{168}\mathrm{Er}$	7.2(12)		2110(00)		p	$^{168}\mathrm{Er}$	3.18, 1.8	CE	[1961Go09]	
$^{168}\mathrm{Er}$	5.72(20)				p, d	$^{168}\mathrm{Er}$	4.5	CE	[1960El07]	
$^{168}\mathrm{Er}$	0.12(20)		2650(250)		p, d	$^{168}\mathrm{Er}$	2.8	PB	[1959Bi10]	
$^{168}\mathrm{Er}$			2600(430)		P	Li Li	2.0	DC	[1959Be73]	
$^{170}\mathrm{Er}$	$6.71(^{+26}_{-47})$		2000(400)		^{32}S	$^{170}\mathrm{Er}$	117	CE	[2011Di07]	Ex,Gos,NR
$^{170}\mathrm{Er}$	$\begin{bmatrix} 0.71(-47) \\ 5.81(10) \end{bmatrix}$					$^{170}\mathrm{Er}$	11-13	CE	[2011D107] [1972Er04]	Ex,Gos,Nit
$^{170}\mathrm{Er}$	\ /				α	110Er	11-13			
Er	5.97(20)							MuonicX-	[1970Hi03]	Ex
$^{170}{ m Er}$			2810(110)		16O	$^{170}\mathrm{Er}$	30	ray DC	[1969Av01]	
$^{170}\mathrm{Er}$			2710(70)			170Er	3.5	PB	[1969Av01] [1968Ri09]	
$^{170}\mathrm{Er}$					p	$^{170}\mathrm{Er}$	3.0	PB	1.	
$^{170}\mathrm{Er}$	C 19(4F)		2734(42)		р 16О	$^{170}\mathrm{Er}$	14.50		[1967Ku07]	
$^{170}\mathrm{Er}$	6.13(45)					$^{170}\mathrm{Er}$	14-50	CE CE	[1963Gr04]	
158Yb	5.44(15)		20 1 (42)		p, d ¹⁶ O	$^{144}\mathrm{Sm}$	4.5 73		[1960El07]	
160 Y b			36.1(43)		116Cd.	48Ti,	1	RDM RDM	[1975Tr08]	
			159(9)		48Ti	¹¹⁶ Cd	205, 495	KDM	[1988Fe01]	
$^{160}\mathrm{Yb}$			182(6)		$^{40}\mathrm{Ar}$	$^{124}\mathrm{Te}$	170-190	RDM	[1976Bo27]	
$^{162}\mathrm{Yb}$			618(19)			162 Lu(β^{+})		\overline{DC}	[2003Ca03]	
$^{162}\mathrm{Yb}$			577(19)		⁵⁰ Ti	116Cd	215	RDM	[1992Mc02]	
$^{162}\mathrm{Yb}$			613(14)		16O	$^{152}\mathrm{Sm}$	95	RSM	[1979Ri06]	
$^{162}\mathrm{Vb}$			633(53)		16O	$^{152}\mathrm{Sm}$	90	RDM	[1978Ba16]	
$^{162}\mathrm{Yb}$			578(85)		$^{40}\mathrm{Ar}$	$^{126}\mathrm{Te}$	170-190	RDM	[1976Bo27]	
$^{164}\mathrm{Yb}$			1380(100)		16O	$^{152}\mathrm{Sm}$	95	RSM	[1979Ri06]	
$^{164}\mathrm{Yb}$			1401(45)		16 O	$^{152}\mathrm{Sm}$	90	RSM	[1978Ba16]	
$^{164}\mathrm{Yb}$			1272(50)		$^{40}\mathrm{Ar}$	$^{128}\mathrm{Te}$	170-190	RDM	[1976Bo27]	
$^{166}\mathrm{Yb}$			1760(100)		16O	$^{152}\mathrm{Sm}$	95	RSM	[1979Ri06]	
$^{166}\mathrm{Yb}$			1789(90)		$^{40}\mathrm{Ar}$	$^{130}\mathrm{Te}$	170-190	RDM	[1976Bo27]	
$^{168}\mathrm{Yb}$			2114(43)		7 11	10	110-130	DC	[2015Pa14]	
$^{168}\mathrm{Yb}$			2240(100)		¹⁶ O	$^{152}\mathrm{Sm}$	95	RSM	[1979Ri06]	
$^{168}\mathrm{Yb}$	5.77(4)		2240(100)		α	168Yb	12-13	CE	[1977Ro27]	
$^{168}\mathrm{Yb}$	5.7(9)				^α 16Ο	168Yb	60	CE	[1977RiZJ]	
$^{168}\mathrm{Yb}$	5.43(25)				1	168Yb	4	CE	[1963Bj04]	
$^{170}\mathrm{Yb}$	0.45(20)		2337(29)		p, d	10	4	DC	[1903BJ04] [1972Gu03]	
$^{170}\mathrm{Yb}$			2308(29)					DC	[1972Gt05]	
$^{170}\mathrm{Yb}$			` ′							
170Yb			2279(43)					DC DC	[1967Ba27]	
			2250(120)						[1966Fu03]	
¹⁷⁰ Yb ¹⁷⁰ Yb			2310(70)	1				DC	[1966Ra04]	
170 Y b 170 Y b			2370(70)			¹⁷⁰ Yb		DC	[1965Me08]	
170 Y b 170 Y b			2280(70)		p	1.0 Y D		PB	[1965Ti02]	
			2250(70)					DC	[1965Ro17]	
¹⁷⁰ Yb			2120(60)			17032	0.4	DC	[1963Fo02]	
¹⁷⁰ Yb			2160(290)		γ	$^{170}\mathrm{Yb}$	84	GG	[1962Wa19]	
¹⁷⁰ Yb			2320(90)					DC	[1962El03]	
¹⁷⁰ Yb			2340(100)		,	170***	1	DC	[1961Go24]	
$^{170}\mathrm{Yb}$	5.53(25)				p, d	$^{170}\mathrm{Yb}$	4.5	$^{\mathrm{CE}}$	[1960El07]	

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁷⁰ Yb			2310(100)					DC	[1959Si74]	
$^{170}{ m Yb}$			2310(140)					DC	[1956De57]	
¹⁷⁰ Yb			2270(70)		16 - 20 -	170		DC	[1952Gr18]	
$^{172}\mathrm{Yb}$	6.0(6)				¹⁶ O, ³² S,	$^{172}\mathrm{Yb}$	57, 115,	CE^*	[1992Fa05]	
172 - 1					⁵⁸ Ni	1727 7	224	3.6	[4 O WOLL OO]	
$^{172}\mathrm{Yb}$	6.702				$\mid \mu \mid$	$^{172}\mathrm{Yb}$		MuonicX-	[1979Ho23]	Ex,NR
$^{172}\mathrm{Yb}$	0.00(0)					1727 7		ray	[4.0==**** 0.0]	
¹⁷² Yb ¹⁷² Yb	6.03(6)		2000(50)		α	$^{172}\mathrm{Yb}$	13	CE	[1975Wo08]	
¹⁷² Yb	F 05(40)		2600(70)			¹⁷² Yb	7 0 0 10	DC	[1970Ra18]	
$^{172}\mathrm{Yb}$	5.95(48)		2280(90)		α	112 Y B	7, 8, 9, 10	CE	[1970Sa09] [1969Be34]	
$^{172}\mathrm{Yb}$			2440(60)					DC DC	[1969Be34] [1969FuZX]	
$^{172}\mathrm{Yb}$			2310(160)			$^{172}\mathrm{Tm}(\beta^{-})$		DC	[1969FuZA]	
$^{172}\mathrm{Yb}$			2410(115)			$^{172}\mathrm{Lu}(\beta^+)$		DC	[1969F007]	
$^{172}\mathrm{Yb}$			2300(600)			Lu(p·)		DC	[1968Ka01]	
$^{172}\mathrm{Yb}$			2460(70)		n	$^{172}\mathrm{Yb}$		PB	[1966Ti01]	
$^{172}\mathrm{Yb}$			2270(60)		p	1.0		DC	[1964Gu01]	
$^{172}\mathrm{Yb}$			2160(140)					DC	[1963He01]	
$^{172}\mathrm{Yb}$			2400(200)		α	$^{172}\mathrm{Yb}$	3	PB	[1962Bi05]	
$^{172}\mathrm{Yb}$	5.89(20)		2100(200)		p, d	$^{172}\mathrm{Yb}$	4.5	CE	[1960El07]	
$^{174}\mathrm{Yb}$	5.95(6)				α	¹⁷⁴ Yb	13	CE	[1975Wo08]	
$^{174}\mathrm{Yb}$	5.97(6)				α	¹⁷⁴ Yb	11-13	CE	[1974Sh12]	
$^{174}\mathrm{Yb}$	5.89(47)				α	¹⁷⁴ Yb	7, 8, 9, 10	CE	[1970Sa09]	
$^{174}\mathrm{Yb}$	0.00(11)		2597(144)			¹⁷⁴ Lu(EC)	1, 0, 0, 10	DC	[1966Ja16]	NR
$^{174}\mathrm{Yb}$			2590(70)		p	174Yb		PB	[1966Ti01]	1.10
$^{174}\mathrm{Yb}$			2510(130)		r			DC	[1966Fu03]	
$^{174}\mathrm{Yb}$			2600(140)					$\overline{\mathrm{DC}}$	[1964Ja09]	
$^{174}\mathrm{Yb}$	5.54(30)				p, d	$^{174}\mathrm{Yb}$	4	CE	[1963Bj04]	
$^{174}\mathrm{Yb}$			2750(300)		α	$^{174}\mathrm{Yb}$	3	PB	[1962Bi05]	
$^{174}\mathrm{Yb}$	5.89(20)				p, d	$^{174}\mathrm{Yb}$	4.5	CE	[1960El07]	
$^{176}\mathrm{Yb}$	5.41(9)				α	¹⁷⁶ Yb	13	CE	[1975Wo08]	
$^{176}\mathrm{Yb}$			2720(50)		α	$^{176}\mathrm{Yb}$	4-4.5	PB	[1971Sp06]	
$^{176}\mathrm{Yb}$	5.35(43)		` ´		α	$^{176}\mathrm{Yb}$	7, 8, 9, 10	CE	[1970Sa09]	
$^{176}\mathrm{Yb}$, ,		2540(70)		p	$^{176}\mathrm{Yb}$		PB	[1966Ti01]	
$^{176}\mathrm{Yb}$	5.28(40)				р 16О	$^{176}\mathrm{Yb}$	14-50	CE	[1963Gr04]	
$^{176}\mathrm{Yb}$			2900(200)		α	176 Yb	3	PB	[1962Bi05]	
$^{176}\mathrm{Yb}$	5.2(8)				р	176 Yb	3.18, 1.8	CE	[1961Go09]	
$^{176}\mathrm{Yb}$	5.78(20)				p, d	$^{176}\mathrm{Yb}$	4.5	CE	[1960El07]	
$^{162}\mathrm{Hf}$			148(11)		⁴⁰ Ca	¹²⁶ Te	175	RDM	[1998We02]	
$^{164}{ m Hf}$			497(29)		⁴⁰ Ca	¹²⁸ Te	175	RDM	[1998We02]	
$^{164}{ m Hf}$			370(30)		²⁰ Ne	¹⁴⁸ Sm	117	RDM	[1989Mu13]	
$^{166}{ m Hf}$			717(33)		⁴⁸ Ti	$^{122}\mathrm{Sn}$	195	RDM	[1977Bo14]	
¹⁶⁸ Hf			1237(10)		40-	104-		DC	[2011We08]	
¹⁶⁸ Hf			1278(54)		⁴⁸ Ti	¹²⁴ Sn	195	RDM	[1977Bo14]	
¹⁷⁰ Hf			1740(60)		¹⁶ O	¹⁵⁸ Gd	80	PB	[2006Co20]	
¹⁷⁰ Hf ¹⁷² Hf			1771(396)		$^{50}\mathrm{Ti}$	$^{124}\mathrm{Sn}$	198	RDM	[1977Bo14]	
¹⁷² Hf			1803(58)					DC	[2015Ru03]	
¹⁷² Hf			1700(20)					DC DC	[2011ReZZ]	IF
¹⁷² Hf			2655(79)						[2010We12]	Ex
174Hf			2240(140)					DC DC	[1967Ab06]	Ex
¹⁷⁴ Hf			1847(58) 1797(10)			¹⁷² Yb	27	DC	[2015Ru03] [2009Re20]	
¹⁷⁴ Hf	5.35(35)		1191(10)		$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	¹⁷⁴ Hf	15	CE	[2009Re20] [1971Ej01]	
$^{174}\mathrm{Hf}$	0.55(55)		2420(120)		α	111	10	DC	[1971EJ01] [1971Ch26]	
$^{174}\mathrm{Hf}$			2370(140)					DC	[1971Ch20] [1965Ab02]	
$^{174}{ m Hf}$	5.26(35)		2570(140)		p, d	$^{174}\mathrm{Hf}$	4	CE	[1963Bj04]	
$^{176}\mathrm{Hf}$	5.29(10)				$\begin{bmatrix} p, \alpha \\ \mu \end{bmatrix}$	176Hf	120 MeV/c	MuonicX-	[1984Ta10]	Ex
111	0.23(10)				[#]	111	120 1/10 / (ray	[13041410]	LX
$^{176}\mathrm{Hf}$	5.19(5)				α	$^{176}{ m Hf}$	11-17	CE	[1977Ro08,	NR
111	3.10(3)					111		<u> </u>	1977Ro26]	1110
$^{176}\mathrm{Hf}$	5.78(23)				α	$^{176}\mathrm{Hf}$	15	CE	[1973Ha07]	
$^{176}{ m Hf}$			2010(60)				"	DC	[1963Fo02]	
$^{176}\mathrm{Hf}$			2121(87)					DC	[2015Ru03]	
$^{176}\mathrm{Hf}$	5.27(25)				p, d	$^{176}\mathrm{Hf}$	4.5	CE	[1961Ha21]	
$^{178}\mathrm{Hf}$	4.91(10)				μ	¹⁷⁸ Hf	120 MeV/c	MuonicX-	[1984Ta10]	Ex
	(30)				'			ray		
		1	1	1	I	178 TTC	11 17		[1077D - 00	NID
$^{178}\mathrm{Hf}$	4.86(5)				α	¹⁷⁸ Hf	11-17	CE	[1977Ro08,	NR

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁷⁸ Hf			2160(140)					DC	[1967Ab06]	
$^{178}\mathrm{Hf}$	4.51(20)				p, d	¹⁷⁸ Hf	4	CE	[1963Bj04]	
¹⁷⁸ Hf			2120(90)					DC	[1963Fo02]	
$^{178}{ m Hf}$			2164(43)					DC	[1962Ka14]	
¹⁷⁸ Hf			2150(70)					DC	[1962Bo13]	
¹⁷⁸ Hf	4.3(7)				p	Hf	3.18, 1.8	CE	[1961Go09]	
¹⁷⁸ Hf	/>		1800(120)			179		DC	[1961Ga05]	
¹⁷⁸ Hf	4.66(25)		2=00(4=0)		p, d	¹⁷⁸ Hf	4.5	CE*	[1961Ha21]	NR
¹⁷⁸ Hf			2700(150)		p	¹⁷⁸ Hf	2.8	PB	[1959Bi10]	
¹⁸⁰ Hf ¹⁸⁰ Hf	4 50(10)		2204(14)			¹⁸⁰ Hf	100 34 37/	DC	[1996Al20]	
HI	4.78(10)				μ	HI	120 MeV/c	MuonicX-	[1984Ta10]	Ex
$^{180}\mathrm{Hf}$	4.73(5)				α	¹⁸⁰ Hf	11-17	ray CE	[1977Ro08,	NR
	, ,								1977Ro26]	
$^{180}\mathrm{Hf}$			2210(70)					DC	[1963Li04]	
$^{180}\mathrm{Hf}$	4.93(35)				¹⁶ O	¹⁸⁰ Hf	14-50	CE	[1963Gr04]	
$^{180}\mathrm{Hf}$			2160(60)					DC	[1962Fo05]	
$^{180}{ m Hf}$	4.35(20)				p, d	¹⁸⁰ Hf	4.5	CE	[1961Ha21]	
$^{180}{ m Hf}$	4.3(7)				p	Hf	3.18, 1.8	CE	[1961Go09]	
$^{180}{ m Hf}$			2210(90)					DC	[1961Bo25]	
$^{180}{ m Hf}$			2136(72)			100		DC?	[1960De18]	NR
$^{180}{ m Hf}$			2380(150)		p	$^{180}\mathrm{Hf}$	2.8	PB	[1959Bi10]	
180Hf	6.9(115)							CE	[1956Hu49]	Ex, NR
¹⁸⁰ Hf			2020(140)		21_	141-		DC	[1955Su64]	
168W			307(15)		³¹ P	¹⁴¹ Pr	158	RDM	[1984Dr02]	
$^{170}{ m W}$ $^{170}{ m W}$			720(150)		⁵² Cr	¹²² Sn	230	TDSA	[1994Mc06]	
$^{170}\mathrm{W}$ $^{172}\mathrm{W}$			718(14)		²⁰ Ne	¹⁵⁵ Gd	105	RDM	[1980Mi16]	
$^{172}\mathrm{W}$ $^{172}\mathrm{W}$			970(29)		¹⁶ O ⁵² Cr	¹⁶⁰ Dy	85	DC	[2010Ru12]	
172 W 172 W			1061(93)		52Cr 52Cr	¹²⁴ Sn ¹²⁴ Sn	225	RDM	[1991Mc04]	G
$^{174}\mathrm{W}$			890(60)		o ² Cr	121Sn	225	RDM DC	[1986Ra07]	Su
$^{174}\mathrm{W}$			1339(8)		¹⁹ F	¹⁵⁹ Tb	85	RDM	[2011We08] [1987Ga14]	
176W			1650(100) 1431(9)		11B	$^{169}\mathrm{Tm}$	55	DC	[1987Ga14] [2009Re20]	
$^{178}\mathrm{W}$			1642(21)		12C	$^{170}\mathrm{Er}$	$\begin{vmatrix} 35 \\ 62 \end{vmatrix}$	DC	[2010Ru12]	
$^{180}\mathrm{W}$			1976(43)			121	02	DC	[1965Hu02]	
$^{180}\mathrm{W}$			1718(53)			$^{180}{\rm Ta}(\beta^{-})$		DC	[1963De21]	
$^{180}\mathrm{W}$			1760(40)			14(5)		DC	[1963Cu03]	
$^{180}\mathrm{W}$			1920(70)					DC	[1962Fo05]	
$^{182}\mathrm{W}$			2185(90)		⁵⁸ Ni, ¹³⁶ Xe	$^{182}\mathrm{W}$	233,561	RDM	[1991Wu05]	NR
$^{182}\mathrm{W}$	3.76(16)				⁵⁸ Ni, ¹³⁶ Xe	$^{182}\mathrm{W}$	233,561	CE*	[1991Wu05]	NR
$^{182}\mathrm{W}$	5.02(54)				²⁰⁸ Pb	$^{182}\mathrm{W}$	4.9 A	CE*	[1989Ku04]	
$^{182}\mathrm{W}$	4.08(24)				¹³⁶ Xe, ⁵⁸ Ni	$^{182}\mathrm{W}$	561, 235	CE*	[1989Wu04]	Su
$^{182}\mathrm{W}$	4.140(40)				e	$^{182}\mathrm{W}$	75-345	EE	[1988PeZW]	
$^{182}\mathrm{W}$			1991(43)					DC	[1983El02]	
$^{182}\mathrm{W}$			2240(70)					DC	[1973GrXX]	
$^{182}\mathrm{W}$	4.21(7)				α	$^{182}\mathrm{W}$	13-21	CE	[1973Be40,	
100									1975Le22]	
$^{182}{ m W}$	()		1991(29)					DC	[1971Ho14]	_
$^{182}\mathrm{W}$	4.29(12)							MuonicX-	[1970Hi03]	Ex
$^{182}\mathrm{W}$			0105(40)					ray	[1050 41 44]	
182 W 182 W	4 20/9)		2135(43)			$^{182}\mathrm{W}$		DC CE	[1970Ab14] [1968St13]	
182 W	4.30(8)		2060(70)		α	102 00	8	DC	1 .	
$^{182}\mathrm{W}$			2060(70) 1950(100)					DC	[1966Ra04] [1966Fu03]	
$^{182}\mathrm{W}$			2090(60)					DC	[1966Bl08]	
$^{182}\mathrm{W}$			1976(43)					DC	[1965Me08]	
$^{182}\mathrm{W}$			2005(43)					DC	[1965Do02]	
$^{182}\mathrm{W}$			2120(130)					DC	[1964Ro19]	
$^{182}\mathrm{W}$			2020(140)					DC	[1964Be36]	
$^{182}\mathrm{W}$			1980(20)		D	$^{182}\mathrm{W}$	2.04	PB	[1964Sc21]	
$^{182}\mathrm{W}$	4.58(40)				р ¹⁶ О	$^{182}\mathrm{W}$	14-50	CE	[1963Gr04]	
$^{182}\mathrm{W}$	(-/		1820(60)					DC	[1963Fo02]	
$^{182}\mathrm{W}$			2240(160)					DC	[1963Ba24]	
$^{182}\mathrm{W}$			2030(90)					DC	[1963Ko02]	
$^{182}\mathrm{W}$			2060(60)		α	$^{182}\mathrm{W}$	3	PB	[1962Bi05]	
$^{182}\mathrm{W}$	4.00(20)				p, d	$^{182}\mathrm{W}$	4.5	CE	[1961Ha21]	
$^{182}{ m W}$ $^{182}{ m W}$			1971(20)			$^{182}\text{Ta}(\beta^-)$		DC	[1961Ke07]	NR
	1	1	2230(200)	1	p	$^{182}\mathrm{W}$	2.8	PB	[1959Bi10]	Su

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide		B(E2)	and β_2 -value τ (ps)	$\frac{\text{s in } Z=2-10}{\mid \beta_2 \mid}$	Beam	Target	Energy	Method	Reference	Comment
$ ^{182}\mathrm{W}$	$(e^{\hat{2}}b^2)$ 5.5(14)	(W.u.)					(MeV)	CE	[1956Hu49]	Ex, NR
$^{182}\mathrm{W}$	4.47(54)				р	$^{182}\mathrm{W}$	4	CE	[1958Mc02]	
$^{182}\mathrm{W}$	1111(01)		1830(140)		P	,,	1	DC	[1954Su10]	
$^{184}\mathrm{W}$			1869(79)		⁵⁸ Ni, ¹³⁶ Xe	$^{182}\mathrm{W}$	233,561	RDM	[1991Wu05]	NR
$^{184}\mathrm{W}$	3.57(15)		====()		⁵⁸ Ni, ¹³⁶ Xe	$^{182}\mathrm{W}$	233,561	CE*	[1991Wu05]	NR
$^{184}\mathrm{W}$	3.88(20)				136Xe, 58Ni	$^{184}\mathrm{W}$	561, 235	CE*	[1989Wu04]	Su
$^{184}\mathrm{W}$	4.49(47)				²⁰⁸ Pb	$^{184}\mathrm{W}$	4.9 A	CE*	[1989Ku04]	
$^{184}\mathrm{W}$	3.690(40)				e	$^{184}\mathrm{W}$	75-345	EE	[1988PeZW]	
$^{184}\mathrm{W}$	0.000(10)		1804(17)			• • • • • • • • • • • • • • • • • • • •	10 010	DC	[1984Al06]	
$^{184}\mathrm{W}$	3.76(8)		1001(11)		α	$184 \mathrm{W}$	12.5-19	CE	[1975Le22]	
$^{184}\mathrm{W}$	3.67(37)		1860(170)		γ	$^{184}\mathrm{W}$	111	Mossbauer	[1971Ob02]	Ex
$^{184}\mathrm{W}$	3.70(40)		1850(190)		γ	$^{184}\mathrm{W}$	111	Mossbauer	[1970Me09]	Ex, Su
$^{184}\mathrm{W}$	3.91(10)		1730(60)		,			MuonicX- ray	[1970Hi03]	Ex
$^{184}\mathrm{W}$	3.84(7)				α	$184 \mathrm{W}$	8	CE	[1968St13]	
$^{184}\mathrm{W}$	0.01(1)		1760(130)		16O	$^{184}\mathrm{W}$	35	RDM	[1967As03]	
$^{184}\mathrm{W}$			1850(30)		р	$^{184}\mathrm{W}$	2	PB	[1965Sc05]	
$^{184}\mathrm{W}$			1790(60)		P		_	DC	[1964Ko13]	
$^{184}\mathrm{W}$	4.18(30)		1100(00)		¹⁶ O	$^{184}\mathrm{W}$	14-50	CE	[1963Gr04]	
$^{184}\mathrm{W}$	4.10(00)		1790(50)		α	$^{184}\mathrm{W}$	3	PB	[1962Bi05]	
$^{184}\mathrm{W}$			1970(20)		l a	**	0	DC	[1961KeZZ]	
$^{184}\mathrm{W}$	3.62(20)		1370(20)		p, d	$^{184}\mathrm{W}$	4.5	CE	[1961Ha21]	
$^{184}\mathrm{W}$	3.02(20)		1850(120)		p, d	**	4.0	DC	[1960Bo07]	
$^{184}\mathrm{W}$			1920(150)		n	184W	2.8	PB	[1950B607] [1959Bi10]	Su
$^{184}\mathrm{W}$	4.37(44)		1920(190)		P	184W	4	CE	[1959BH0] [1958Mc02]	Su
$^{184}\mathrm{W}$	4.37(44)				P	VV	4	CE	[1956Hu49]	NR
$^{186}\mathrm{W}$	3.42(33)				²⁰⁸ Pb	186W	4.9 A	CE*	[1989Ku04]	INIT
$^{186}\mathrm{W}$	\ /					186W	13.25-19	CE	[1989Ku04] [1975Le22]	
$^{186}\mathrm{W}$	3.35(8)		1405(14)		α	VV	15.25-19	DC	15 4	
$^{186}\mathrm{W}$	2.27(20)		1495(14)			$^{186}{ m W}$	11.00		[1975Ka11]	
$^{186}\mathrm{W}$	3.37(80)		2010(170)		α	186W	11-20	CE	[1974Br31]	
186W	2.71(25)		2010(170)		γ	186W	122	Mossbauer	[1971Ob02]	Ex
	2.73(26)		1990(170)		γ	100 W	122	Mossbauer	[1970Me09]	Ex, Su
$^{186}\mathrm{W}$	3.46(12)		1560(70)					MuonicX-	[1970Hi03]	Ex
$^{186}\mathrm{W}$	9.50(6)					186W		ray	[10000[19]	
$^{186}\mathrm{W}$	3.50(6)		10-0(000)		$^{\alpha}_{16}$ O	186W	8	CE	[1968St13]	
			1870(300)				35	RDM	[1967As03]	
$^{186}{ m W}$ $^{186}{ m W}$			1610(30)		P	186W		PB	[1967Ku07]	
	0 == (0=)		1460(60)		α	186W	3	PB	[1962Bi05]	
186W	3.57(25)				p, d	¹⁸⁶ W ¹⁸⁶ W	4.5	CE	[1961Ha21]	
$^{186}\mathrm{W}$	3.56(37)				p	180 W	4	CE	[1961Mc01,	
100						100			1958Mc02]	
$^{186}{ m W}$			1610(100)		p	$^{186}{ m W}$	2.8	PB	[1959Bi10]	Su
186W 188W	3.80(95)		1255(173)					CE Fast-	[1956Hu49] [2013Ma66]	NR
$^{172}\mathrm{Os}$			167(10)		$^{32}\mathrm{S}$	$^{144}\mathrm{Nd}$	169	Timing	[100537:05]	
$^{172}\mathrm{Os}$			167(10)		³² S ²⁸ Si	¹⁵⁰ Sm	162	RDM	[1995Vi05]	
$^{174}\mathrm{Os}$			513(20)		127 _I	¹³⁰ Sm ⁵¹ V	140	DC	[2012Li50]	
¹⁷⁴ Os ¹⁷⁶ Os			505(60)		16O	164 Er	610	RDM	[1987Ga12]	
$^{178}\mathrm{Os}$			1210(180)		16O	166Er	80	DC	[2005Mo33]	
$^{178}\mathrm{Os}$			1050(100)				80	DC	[2005Mo33]	
$^{180}\mathrm{Os}$			940(90)		¹⁶ O	¹⁶⁶ Er	80	RDM	[2005Mo33]	
			970(100)		¹⁶ O	¹⁶⁸ Er	80	DC	[2005Mo33]	
$^{180}\mathrm{Os}$			$1160(^{+300}_{-200})$		³⁴ S	¹⁵⁰ Nd	157	RDM	[1990Ka11]	
$^{182}\mathrm{Os}$			1370(140)			182 Ir(EC)		DC	[1972HuZL]	NR
$^{182}\mathrm{Os}$			1370(140)					DC	[1970ErZY]	Su
$^{182}\mathrm{Os}$			1173(16)					DC	[1970BrZP]	
$^{184}\mathrm{Os}$	3.20(62)				$\alpha; {}^{16}O; {}^{32}S$	¹⁸⁴ Os	10, 12, 14; 36, 42, 48; 48, 52, 56	CE	[1972La16]	
$^{184}\mathrm{Os}$			1708(19)				,,,	DC	[1971Bb09]	
$^{184}\mathrm{Os}$			1529(43)					DC	[1971Bb09] [1970BrZP]	
$^{184}\mathrm{Os}$			1700(70)					DC	[1970BtZF]	
$^{184}\mathrm{Os}$			1590(70)					DC	[1970ErZY]	
$^{186}\mathrm{Os}$	2 80/+81		1030(10)		⁴⁰ Ca, ⁵⁸ Ni,	¹⁸⁶ Os	99404		1.	
Os	$2.80(^{+8}_{-7})$				¹³⁶ Xe, ²⁰⁸ Pb	Os	3.3-4.8 A	CE*	[1996Wu07]	
$^{186}\mathrm{Os}$	3.15(3)				μ	¹⁸⁶ Os		MuonicX- ray	[1981Ho22]	Ex, MD, NR

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	$(e^{\grave{2}}b^2)'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Com	ment
¹⁸⁶ Os ¹⁸⁶ Os	3.10(25) 2.88(39)				α α , ¹⁶ O, ³² S	¹⁸⁶ Os ¹⁸⁶ Os	13 10, 12, 14;	CE CE	[1976Ba06] [1972La16]		
							36, 42, 48; 48, 52, 56				
$^{186}\mathrm{Os}$	3.21(28)				α	$^{186}\mathrm{Os}$	3-5	CE	[1971Mi08]		
¹⁸⁶ Os ¹⁸⁶ Os			1332(26)					DC	[1971Bb09]		
186Os			1210(70) 1169(43)					DC DC	[1970Be18] [1968Ma14]		
$^{186}\mathrm{Os}$	2.95(40)		1100(10)		¹⁶ O	$^{186}\mathrm{Os}$	35.4	CE	[1967Gi02]	Ex	
¹⁸⁶ Os	3.10(40)				¹⁶ O	¹⁸⁶ Os	48.3, 62.1, 70.3	CE	[1967Ca08]		
$^{186}\mathrm{Os}$ $^{186}\mathrm{Os}$			1219(29) 1183(43)					DC DC	[1964Ro19] [1963Fo02]		
$^{186}\mathrm{Os}$			1260(60)					DC	[1963F002] [1962Ba14]		
$^{186}\mathrm{Os}$			1212(43)					DC	[1961Bo08]		
¹⁸⁶ Os	4.3(11)				α , p	Os	3.5, 4.8	CE	[1961Re02]		
$^{186}\mathrm{Os}$ $^{186}\mathrm{Os}$			870(290) 2600(580)					DC DC	[1957Be73] [1953Mc39]		
$^{186}\mathrm{Os}$			1150(140)					DC	[1951Mc14]		
$^{188}\mathrm{Os}$			930(140)		⁵⁸ Ni	$^{188}\mathrm{Os}$	275	RDM	[2001Wu03]		
¹⁸⁸ Os	2 742(22)		1030(50)		188Os	C	270	DC	[1997Bb08]		
¹⁸⁸ Os	2.512(32)				⁴⁰ Ca, ⁵⁸ Ni, ¹³⁶ Xe, ²⁰⁸ Pb	¹⁸⁸ Os	3.3-4.8 A	CE*	[1996Wu07]		
$^{188}\mathrm{Os}$	2.635(30)				е	¹⁸⁸ Os	200, 500	EE	[1988Bo08]		
$^{188}\mathrm{Os}$	2.82(3)				μ	$^{188}\mathrm{Os}$		MuonicX-	[1981Ho22]	Ex,	MD,
$^{188}\mathrm{Os}$	2.52(13)					¹⁸⁸ Os	13	$_{\mathrm{CE}}^{\mathrm{ray}}$	[1976Ba06]	NR	
$^{188}\mathrm{Os}$	2.52(13) $2.69(27)$				α	¹⁸⁸ Os	10, 12, 14;	CE	[1970Ba00] [1972La16]		
O.S.	2.00(21)						36, 42, 48; 48, 52, 56	02	[10,22010]		
$^{188}\mathrm{Os}$	2.78(15)				p	$^{188}\mathrm{Os}$	4.56-5.08	CE	[1971Mi08]		
$^{188}\mathrm{Os}$ $^{188}\mathrm{Os}$			1030(30)					DC	[1971Bo13]		
$^{188}\mathrm{Os}$	2.90(8)		1036(25)		α , ¹⁶ O	¹⁸⁸ Os	10-13; 42,	DC CE	[1971Bb09] [1970Pr09]		
$^{188}\mathrm{Os}$			1024(43)				47	DC	[1970Be18]		
$^{188}\mathrm{Os}$			981(43)					DC	[1968Ma14]		
¹⁸⁸ Os	2.70(40)				¹⁶ O	¹⁸⁸ Os	48.3, 62.1, 70.3	CE	[1967Ca08]		
$^{188}\mathrm{Os}$ $^{188}\mathrm{Os}$			1020(50)		¹⁶ O	$^{188}\mathrm{Os}$	35	RDM	[1966As03]		
¹⁸⁸ Os	2.43(24)		1024(29)		n.	¹⁸⁸ Os	2	DC CE	[1963Fo02] [1963Go05]	Ex	
$^{188}\mathrm{Os}$	2.40(24)		1050(90)		p	0.5	-	DC	[1962Ba14]	LA	
$^{188}\mathrm{Os}$	3.7(5)				α , p	Os	3.5, 4.8	CE	[1961Re02]		
$^{188}\mathrm{Os}$ $^{188}\mathrm{Os}$	3.17(33)							CE	[1961Mc18]	Rad	
100 Os	2.80(31)				α , p	Os		CE	[1958Mc02, 1961Mc01]		
$^{188}\mathrm{Os}$	3.5(10)				α	$^{188}\mathrm{Os}$	3	CE	[1957Ba11]		
¹⁸⁸ Os			940(220)					DC	[1955Su64]		
$^{188}\mathrm{Os}$ $^{190}\mathrm{Os}$			2450(280) 541(29)					DC Fast-	[1953Mc39] [2012MaZP]		
			341(29)					Timing	[2012MaZF]		
$^{190}\mathrm{Os}$			540(36)		⁵⁸ Ni	$^{190}\mathrm{Os}$	275	RDM	[2001Wu03]		
$^{190}\mathrm{Os}$	2.355(48)				⁴⁰ Ca, ⁵⁸ Ni, ¹³⁶ Xe, ²⁰⁸ Pb	¹⁹⁰ Os	3.3-4.8 A	CE*	[1996Wu07]		
$^{190}\mathrm{Os}$	2.315(27)				е	$^{190}\mathrm{Os}$	200, 500	EE	[1988Bo08]		
$^{190}\mathrm{Os}$	2.46(2)				μ	¹⁹⁰ Os		MuonicX-	[1981Ho22]	Ex,	MD,
$^{190}\mathrm{Os}$	2.14(11)				α	¹⁹⁰ Os	13	$_{\mathrm{CE}}^{\mathrm{ray}}$	[1976Ba06]	NR	
¹⁹⁰ Os	2.48(25)				α , ¹⁶ O, ³² S	190 Os	10, 12, 14; 36, 42, 48; 48, 52, 56	CE	[1970Ba00] [1972La16]		
$^{190}\mathrm{Os}$	2.37(13)				p	$^{190}\mathrm{Os}$	4.56-5.08	CE	[1971Mi08]		
$^{190}\mathrm{Os}$	2.39(6)				α , ¹⁶ O	$^{190}\mathrm{Os}$	12, 42	CE	[1970Pr09]		
¹⁹⁰ Os	2.55(25)		690(20)		¹⁶ O	¹⁹⁰ Os ¹⁹⁰ Os	42-80	CE	[1969Ca19]	NR	
$^{190}\mathrm{Os}$	I		680(30)		¹⁶ O	130 Os		RDM	[1967As03]		

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	eta_2	Beam	Target	Energy (MeV)	Method	Reference	Com	ment
¹⁹⁰ Os ¹⁹⁰ Os	3.38(40)				α, p	Os	3.5, 4.8	CE CE	[1961Re02] [1961Mc18]	Rad	
$^{190}\mathrm{Os}$	2.70(27)		350(60)					DC	[1961MC18] [1958Su54]	nad	
$^{190}\mathrm{Os}$	2.55(26)		390(60)		o p	Os		CE	[1958Su54] [1958Mc02,		
Os	2.55(20)				α , p	Os		CE	1961Mc01]		
$^{190}\mathrm{Os}$			720(290)					DC	[1958Be72]		
$^{190}\mathrm{Os}$	2.5(7)		120(230)		α	$^{190}\mathrm{Os}$	3	CE	[1957Ba11]		
$^{192}\mathrm{Os}$	1.97(16)				¹⁹² Os	С	270	CE*	[1997Bb08]		
$^{192}\mathrm{Os}$	2.119(25)				⁴⁰ Ca, ⁵⁸ Ni,	$^{192}\mathrm{Os}$	3.3-4.8 A	CE*	[1996Wu07]		
					¹³⁶ Xe.						
					²⁰⁸ Pb						
$^{192}\mathrm{Os}$	2.030(13)				α , ¹² C	$^{192}\mathrm{Os}$	14.190-	CE	[1988Li22]		
							16.497,				
100						100	40-55				
^{192}Os	1.999(23)				e	$^{192}{\rm Os}$	200, 500	EE	[1988Bo08]		
$^{192}\mathrm{Os}$	2.009(32)				e	$^{192}\mathrm{Os}$	150, 250,	EE	[1984Re10]		
102.5						102 0	355, 364		f	_	
$^{192}\mathrm{Os}$	2.10(2)				μ	$^{192}\mathrm{Os}$		MuonicX-	[1981Ho22]	Ex,	MD,
$^{192}\mathrm{Os}$	1.00(0)					$^{192}\mathrm{Os}$	10	ray	[10EaD oal	NR	
¹⁹² Os	1.90(9)		499/90)		α	$^{132}\mathrm{Os}$	13	CE	[1976Ba06]		
¹⁹² Os	2.09(21)		433(29)		α , ¹⁶ O, ³² S	$^{192}\mathrm{Os}$	10, 12, 14;	DC CE	[1973Ch26]		
Os	2.09(21)				α , 30, 3-5	Os	36, 42, 48;	CE	[1972La16]		
							48, 52, 56				
$^{192}\mathrm{Os}$	1.99(11)				p	$^{192}\mathrm{Os}$	4.56-5.08	CE	[1971Mi08]		
$^{192}\mathrm{Os}$	2.04(6)				α . ¹⁶ O	$^{192}\mathrm{Os}$	12; 42,52.5	CE	[1970Pr09]		
$^{192}\mathrm{Os}$	2.21(22)				16O	$^{192}\mathrm{Os}$	42-80	CE	[1969Ca19]	NR	
$^{192}\mathrm{Os}$	1.92(25)				16O	$^{192}\mathrm{Os}$	35.4	CE	[1967Gi02]	Ex	
$^{192}\mathrm{Os}$	2.92(40)				α , p	Os	3.5, 4.8	CE	[1961Re02]		
$^{192}\mathrm{Os}$	2.32(23)							CE	[1961Mc18]	Rad	
$^{192}\mathrm{Os}$	2.05(21)				α , p	Os		CE	[1958Mc02,		
									1961Mc01]		
^{192}Os	2.1(6)				α	$^{192}{\rm Os}$	3	$^{\mathrm{CE}}$	[1957Ba11]		
¹⁷⁶ Pt			109(10)		³⁵ Cl	¹⁴⁴ Sm	173	RDM	[1986Dr05]		
¹⁷⁸ Pt			412(30)		²⁸ Si	¹⁵⁴ Gd	146	DC	[2014Li45]		
¹⁸⁰ Pt			540(50)		⁴⁰ Ar ¹⁶ O	144Nd	192	RDM	[1990De04]		
¹⁸² Pt ¹⁸² Pt			590(102)		64Ni	¹⁷⁰ Yb ¹²² Sn	87	RDM	[2012Gl01]		
184Pt			709(43)		34 _S	$^{154}\mathrm{Sm}$	295	RDM RDM	[2012Wa16]		
184Pt			582(22) 519(17)		S	SIII	160	DC	[1986Ga21] [1972Fi12]		
$^{186}\mathrm{Pt}$			318(24)		36S	$^{154}\mathrm{Sm}$	167	RDM	[2012Wa16]		
$^{186}\mathrm{Pt}$			369(35)		36S	$^{154}\mathrm{Sm}$	101	RDM	[1990WeZZ]	Su	
$^{186}\mathrm{Pt}$			375(14)			2111		DC	[1972Fi12]		
$^{188}\mathrm{Pt}$			104(19)					DC	[1972Fi12]		
$^{190}\mathrm{Pt}$	1.82(9)				⁵⁸ Ni	$^{190}{\rm Pt}$	160	CE	[1995An15]	NR	
$^{190}\mathrm{Pt}$, ,		65(22)					DC	[1972Fi12]		
$^{190}\mathrm{Pt}$	1.75(22)				¹⁶ O	$^{190}\mathrm{Pt}$	36	CE	[1966Gr20]	Rad	
$^{192}\mathrm{Pt}$	1.833(20)				α , ¹² C, ¹⁶ O	$^{192}\mathrm{Pt}$	14.4-15.2,	$^{\mathrm{CE}}$	[1987Gy01]		
							41-48,				
$^{192}\mathrm{Pt}$	1 01(0)					Di	55-60	GE.	[100434 10]	_	
¹⁹² Pt	1.81(9)				α , p	$^{ m Pt}_{^{ m 192}{ m Pt}}$	5-6	CE	[1984Mu19]	Ex	
$^{192}\mathrm{Pt}$	1.89(3)		70.0(36)		$\frac{\alpha}{^{40}}$ Ar	¹⁹² Pt	14.9 149	CE RDM	[1977Ro16] [1977Jo05]		
$^{192}\mathrm{Pt}$			51(5)		Ar	Pt	149	DC	[19773005] [1976Bu20]		
$^{192}\mathrm{Pt}$			61.7(21)					DC	[1970Bu20] [1973Sm01]		
$^{192}\mathrm{Pt}$	2.10(12)		01.1(21)		p, ¹⁶ O	$^{192}\mathrm{Pt}$	4.5, 43.75	CE	[1971Mi08]		
$^{192}\mathrm{Pt}$	2.10(12)		49(7)		P, 0	1 0	110, 101, 0	DC	[1970Be08]		
$^{192}\mathrm{Pt}$	2.000(40)		-5(.)		α , ¹⁶ O	Pt	10, 15; 41	CE	[1970Br26]	Ex	
$^{192}\mathrm{Pt}$	\		51(4)		,			DC	[1966Sc06]		
$^{192}\mathrm{Pt}$	1.95(23)				¹⁶ O	$^{192}\mathrm{Pt}$	36	CE	[1966Gr20]	Rad	
$^{192}\mathrm{Pt}$			39(5)					DC	[1962De14]	NR	
$^{194}\mathrm{Pt}$	$1.46(^{+12}_{-4})$				⁴⁰ Ca, ⁵⁸ Ni,	$^{194}\mathrm{Pt}$	3.3-4.8 A	CE^*	[1996Wu07]		
					¹³⁶ Xe,						
104					²⁰⁸ Pb	104					
¹⁹⁴ Pt	1.636(48)				e 12 g 16 g	¹⁹⁴ Pt	200, 500	EE	[1988Bo08]		
$^{194}\mathrm{Pt}$	1.661(11)				α , ¹² C, ¹⁶ O	194 Pt	14-18.6, 41-	CE	[1986Gy04]		
					20	_	45, 55-63 100	RDM	[1986Bi13]		
$^{194}\mathrm{Pt}$			69.6(44)		^{32}S	Pt					

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	(W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁹⁴ Pt	1.620(15)				α , ¹⁶ O	¹⁹⁴ Pt	7-17.5; 46, 54	CE	[1978Ba38]	
$^{194}\mathrm{Pt}$	1.68(3)				α	¹⁹⁴ Pt	14.9	CE	[1977Ro16]	
$^{194}\mathrm{Pt}$			64.9(35)		40 Ar	¹⁹⁴ Pt	149	RDM	[1977Jo05]	
$^{194}\mathrm{Pt}$	1.67(13)		0 210 (00)		α	¹⁹⁴ Pt	12-24	CE	[1976Ba23]	
$^{194}\mathrm{Pt}$	1.01(10)		51(7)		$\begin{vmatrix} \alpha \\ \gamma \end{vmatrix}$	¹⁹⁴ Pt	0.7-1.8	GG	[1970Bh28]	
$^{194}\mathrm{Pt}$			50(5)		l '	1 0	0.1 1.0	DC	[1972Be53]	
$^{194}\mathrm{Pt}$			73.0(30)					RDM	[1971NoZT]	
$^{194}\mathrm{Pt}$	1.87(9)		75.0(50)		p, ¹⁶ O	¹⁹⁴ Pt	4.5, 43.76	CE	[1971Mi08]	
$^{194}\mathrm{Pt}$	1.64(4)				p, ¹⁶ O p, ¹⁶ O	¹⁹⁴ Pt	6, 42	CE	[1969Gl08]	
194Pt	1.94(20)					Pt	4-5	CE	[1961Mc01]	
196Pt	1.94(20)		50(6)		P	196Pt	cold	TCS		
¹⁹⁶ Pt	1 200(2)		50(6)		$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	196Pt	14.2-15.8,	CE	[2015Jo01]	
	1.368(3)				α , Li, C		22.0-22.5, 42-46	CE	[1992Li14]	
$^{196}\mathrm{Pt}$	1.49(21)				e	¹⁹⁶ Pt	90-334	EE	[1992Po09]	NR
$^{196}\mathrm{Pt}$	1.422(36)				e	¹⁹⁶ Pt	200, 500	EE	[1988Bo08]	
¹⁹⁶ Pt	1.382(6)				α , ¹² C, ¹⁶ O	¹⁹⁶ Pt	14-18.6, 41- 45, 55-63	CE	[1986Gy04]	
¹⁹⁶ Pt			54.5(37)		^{32}S	Pt	100	RDM	[1986Bi13]	
¹⁹⁶ Pt	1.382(6)				¹⁶ O, ¹² C	¹⁹⁶ Pt	55-61, 41- 56	CE	[1985Fe03]	
¹⁹⁶ Pt	1.42(7)				α, p	Pt	5-6	CE	[1984Mu19]	Ex
$^{196}\mathrm{Pt}$			46.5(21)		⁵⁸ Ni	¹⁹⁶ Pt	220	RDM	[1981Bo32]	
$^{196}\mathrm{Pt}$			50.8(22)		²⁰ Ne, ⁵⁸ Ni	¹⁹⁶ Pt	90, 220	RDM	[1979Bo31]	
$^{196}\mathrm{Pt}$	1.36(11)				α	¹⁹⁶ Pt	14-24	$^{\mathrm{CE}}$	[1976Ba35]	
$^{196}\mathrm{Pt}$			43.6(30)					DC	[1972Be53]	
$^{196}\mathrm{Pt}$	1.55(8)				p, ¹⁶ O	¹⁹⁶ Pt	4.5, 43.75	CE	[1971Mi08]	
196 Pt			51(5)					RDM	[1971NoZT]	
$^{196}{\rm Pt}$	1.350(40)				α, ¹⁶ O	Pt	10, 15; 41	CE	[1970Br26]	Ex
$^{196}\mathrm{Pt}$	1.49(5)				¹⁶ O	¹⁹⁶ Pt	42	CE	[1969Gl08]	
196 Pt	1.39(15)				¹⁶ O	¹⁹⁶ Pt	33	CE	[1967Ka16]	Ex
$^{196}{\rm Pt}$	1.34(17)				¹⁶ O	¹⁹⁶ Pt	36	CE	[1966Gr20]	Rad
¹⁹⁶ Pt	1.27(13)				p	Pt	4-5	CE	[1961Mc01]	
¹⁹⁸ Pt	1.090(7)				α , ¹² C, ¹⁶ O	¹⁹⁸ Pt	14-18.6, 41- 45, 55-63	CE	[1986Gy04]	
¹⁹⁸ Pt	1.08(5)				α , p	Pt	5-6	CE	[1984Mu19]	Ex
¹⁹⁸ Pt			35.1(30)		⁵⁸ Ni	¹⁹⁸ Pt	220	RDM	[1981Bo32]	
¹⁹⁸ Pt			33.6(16)			100		RDM	[1980Ke04]	
¹⁹⁸ Pt	1.16(9)				α	¹⁹⁸ Pt	14-24	CE	[1976Ba35]	
¹⁹⁸ Pt	1.17(5)				p, ¹⁶ O	¹⁹⁸ Pt	4.5, 43.75	CE	[1971Mi08]	
¹⁹⁸ Pt	0.980(30)				α , ¹⁶ O	Pt	10, 15, 41	CE	[1970Br26]	Ex
¹⁹⁸ Pt	1.01(5)				16O	¹⁹⁸ Pt	42	CE	[1969Gl08]	
¹⁹⁸ Pt	1.04(16)				¹⁶ O	¹⁹⁸ Pt	36	CE	[1966Gr20]	Ex
¹⁹⁸ Pt	1.49(16)				$^{ m p}_{ m 88Sr}$	Pt	5	CE	[1955St57]	Rad
¹⁸⁰ Hg			17.5(25)		ooSr	⁹⁴ Mo	300	RDM	[2009Gr09]	
$^{182}{ m Hg}$	$1.66(^{+11}_{-7})$				¹⁸² Hg	¹⁰⁷ Ag	2.85 A	CE	[2014Br05]	
¹⁸² Hg			42.1(23)		⁸⁸ Sr	⁹⁶ Mo	300	RDM	[2010Sc03]	
¹⁸² Hg	0		41(3)		⁸⁸ Sr	⁹⁶ Mo	300	RDM	[2009Gr09]	Su
$^{184}\mathrm{Hg}$	$1.61(^{+8}_{-7})$				¹⁸⁴ Hg	¹¹² Cd	2.85 A	CE	[2014 Br 05]	
¹⁸⁴ Hg			35.7(15)		40Ar	¹⁴⁸ Sm	200	RDM	[2014Ga04]	
$^{184}\mathrm{Hg}$			30(7)		$^{32}\mathrm{S}$	¹⁵⁶ Gd	156	RDM	[1973Ru08]	
$^{186}\mathrm{Hg}$	$1.56(^{+26}_{-17})$				¹⁸⁶ Hg	¹¹⁴ Cd	2.85 A	CE	[2014Br05]	
¹⁸⁶ Hg			24(3)		$^{40}\mathrm{Ar}$	$^{160}\mathrm{Sm}$	195	RDM	[2014Ga04]	
$^{186}\mathrm{Hg}$			20(25)			150		DC	[1994Jo13]	Ex, NR
¹⁸⁶ Hg			26.0(43)		²⁰ Ne	¹⁷⁰ Yb	108	RDM	[1974Pr02]	
$^{188}\mathrm{Hg}$	$1.72(^{+27}_{-26})$				¹⁸⁸ Hg	$^{120}\mathrm{Sn}$	2.85 A	CE	[2014 Br 05]	
$^{196}\mathrm{Hg}$	1.12(2)				α , ¹⁶ O	196Hg	13-16, 56- 60	CE	[1979Bo16]	
$^{196}\mathrm{Hg}$			19.6(29)			$^{196}{ m Au}(eta^{-})$		DC	[1963De21]	
$^{198}\mathrm{Hg}$	0.991(6)				α , ¹⁶ O	¹⁹⁸ Hg	13-16, 56-	CE	[1979Bo16]	
$^{198}\mathrm{Hg}$	0.961(6)				α , ¹² C, ¹⁶ O	¹⁹⁸ Hg	60 14.1-18, 43-	CE	[1977Es02,	NR
100-							54, 60-80		1984Fe08]	
¹⁹⁸ Hg			31.7(14)					DC	[1974Bu13]	
¹⁹⁸ Hg	0.000(0=)		22.0(12)					DC	[1970BaYH]	
$^{198}\mathrm{Hg}$	0.880(30)	1	1	1				CE	[1969GlZY]	

Table 1 Experimental B(E2) ↑-, $\tau\text{-}$ and $\beta_2\text{-values}$ in Z=2-104 nuclei (continued)

Nuclide	(e^2b^2)	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
¹⁹⁸ Hg			38.9(39)					DC	[1968Ra32]	
$^{198}\mathrm{Hg}$			28.9(43)					DC	[1967Be62]	
$^{198}\mathrm{Hg}$			36(7)					DC	[1966Go20]	
$^{198}\mathrm{Hg}$			49.0(30)		γ	$^{198}\mathrm{Hg}$	0.412	GG	[1963Fr05]	
$^{198}\mathrm{Hg}$			35(5)					DC	[1961Si01]	
¹⁹⁸ Hg			30(10)					DC	[1958Su57]	
$^{198}\mathrm{Hg}$	1.13(34)				p	$^{198}\mathrm{Hg}$	4.5	CE	[1956Ba45]	
$^{198}\mathrm{Hg}$			31.5(30)		γ	$^{198}\mathrm{Hg}$	0.411	GG	[1954Me55]	
$^{198}{ m Hg}$			32(7)		$ \gamma $	$^{198}\mathrm{Hg}$	0.412	GG	[1953Da23]	
²⁰⁰ Hg	0.853(7)				α , ¹² C, ¹⁶ O	²⁰⁰ Hg	13.5-16.5, 40-60, 59-65	CE	[1980Sp05]	
$^{200}\mathrm{Hg}$	0.853(15)				α , ¹⁶ O	$^{200}\mathrm{Hg}$	13-16, 56- 60	CE	[1979Bo16]	
$^{200}\mathrm{Hg}$	0.80(10)				¹⁶ O	$^{200}\mathrm{Hg}$	33	CE	[1971Ka03]	
$^{200}\mathrm{Hg}$	0.95(11)				¹⁶ O	$^{200}\mathrm{Hg}$	33-38	CE	[1970Ka09]	
$^{200}\mathrm{Hg}$	0.85(26)				p	$^{200}\mathrm{Hg}$	4.5	CE	[1956Ba45]	
$^{202}\mathrm{Hg}$	0.605(5)				α , ¹² C, ¹⁶ O	²⁰² Hg	13.5-16.5, 40-60, 59-65	CE	[1980Sp05]	
$^{202}\mathrm{Hg}$	0.616(9)				α , ¹⁶ O	$^{202}\mathrm{Hg}$	13-16, 56- 60	CE	[1979Bo16]	
$^{202}\mathrm{Hg}$	0.65(8)				¹⁶ O	$^{202}\mathrm{Hg}$	33-38	CE	[1970Ka09]	
$^{202}\mathrm{Hg}$	0.59(18)				p	$^{202}\mathrm{Hg}$	4.5	CE	[1956Ba45]	
$^{202}\mathrm{Hg}$			34(7)		$ \gamma $	$^{202}\mathrm{Hg}$	440	GG	[1955Me35]	
$^{204}\mathrm{Hg}$	0.429(4)				e	204 Hg	83-477	$_{ m EE}$	[1989BuZP]	NR
$^{204}\mathrm{Hg}$	0.423(5)				α , ¹² C, ¹⁶ O	²⁰⁴ Hg	13.5-16.5, 45-56; 63, 65	CE	[1981Es03]	
$^{204}\mathrm{Hg}$	0.427(6)				α , ¹⁶ O	$^{204}\mathrm{Hg}$	13-16, 56- 60	CE	[1979Bo16]	
$^{204}\mathrm{Hg}$	0.475(23)				α	$^{204}\mathrm{Hg}$	15-18	CE	[1971FoZW]	
$^{204}\mathrm{Hg}$	0.37(4)				¹⁶ O	$^{204}\mathrm{Hg}$	33-38	CE	[1970Ka09]	
$^{204}\mathrm{H}_{\odot}$	0.20(10)							CE	[1956Ba45]	
$^{206}\mathrm{Hg}$			<30000		t	$^{204}\mathrm{Hg}$	16	DC	[1982Be38]	NR
$^{186}\mathrm{Pb}$			18(5)		$^{83}\mathrm{Kr}$	¹⁰⁶ Pd	340, 357, 375	RDM	[2008Gr04]	
¹⁸⁶ Pb			18(5)		$^{83}\mathrm{Kr}$	¹⁰⁶ Pd	340, 357, 375	RDM	[2006Gr16]	Su
$^{188}\mathrm{Pb}$			8.5(35)		⁸³ Kr	¹⁰⁸ Pd	340, 357, 375	RDM	[2008Gr04]	
¹⁸⁸ Pb			8.5(35)		⁸³ Kr	¹⁰⁸ Pd	340, 357, 375	RDM	[2006Gr16]	Su
$^{188}\mathrm{Pb}$			13(7)		$^{152}\mathrm{Sm}$	$^{40}\mathrm{Ca}$	805	RDM	[2003 De24]	
$^{202}{\rm Pb}$			<144.3		p	Tl	50	DC	[1959Jo21]	ENSDF, NR
$^{204}{\rm Pb}$	0.174(18)				e	²⁰⁴ Pb	52-502	EE	[1984Pa02]	
²⁰⁴ Pb	0.166(2)				α , ¹² C, ¹⁶ O	²⁰⁴ Pb	13.8-18.5, 44-60, 59-85	CE	[1978Jo04]	
204 Pb	0.166(9)				^{32}S	²⁰⁴ Pb	100, 112.5, 125	CE	[1974Ol02]	
204 Pb	0.151(15)				α , ¹⁶ O	²⁰⁴ Pb	15-18, 69- 80	CE	[1972Ha59]	
204 Pb	0.146(15)				α , ¹⁶ O	²⁰⁴ Pb	15, 18; 70, 80	CE	[1971Gr31]	
²⁰⁶ Pb ²⁰⁶ Pb	0.096(10) 0.1030(10)				$\begin{bmatrix} e \\ \alpha, {}^{12}C, {}^{16}O \end{bmatrix}$	²⁰⁶ Pb	52-502 13.8-18.5, 44-60, 59-85	EE CE	[1984Pa02] [1978Jo04]	
$^{206}\mathrm{Pb}$	0.095(5)				α , ¹⁶ O	²⁰⁶ Pb	15-18, 69- 80	CE	[1972Ha59]	
$^{206}\mathrm{Pb}$	0.103(8)				α , ¹⁶ O	²⁰⁶ Pb	15, 18; 70, 80	CE	[1971Gr31]	
$^{206}\mathrm{Pb}$			13.2(8)		$^{40}\mathrm{Ar}$	$^{206}\mathrm{Pb}$	170	RDM	[1970Qu02]	
$^{206}\mathrm{Pb}$	0.108(10)		' '		$^{12}\mathrm{C}$	²⁰⁶ Pb	45.5-60.2	CE	[1966Hr01]	
$^{206}\mathrm{Pb}$	0.13(5)				α	²⁰⁶ Pb	20	CE	[1962Na06]	
$^{206}\mathrm{Pb}$	0.115				p	206 Pb	4.67	CE^*	[1960BaZZ]	NR

Table 1 Experimental B(E2) \uparrow -, τ - and β_2 -values in Z=2-104 nuclei (continued)

Nuclide	$(e^{\hat{2}}b^2)'$	B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
²⁰⁶ Pb	0.125(35)				p	Pb	4-5	CE	[1955St57]	
$^{208}{\rm Pb}$	0.25(6)				γ	²⁰⁸ Pb	7.0-7.4	GG	[2008Sh23]	
²⁰⁸ Pb			0.00147(10)		γ	²⁰⁸ Pb	4-7	GG	[2003En07]	
$^{208}{\rm Pb}$			0.00095(12)		γ	²⁰⁸ Pb	9	GG	[2001RyZZ]	
²⁰⁸ Pb			0.0015(1)		$_{^{12}\mathrm{C},^{16}\mathrm{O}}^{\gamma}$	²⁰⁸ Pb	4-7	GG	[2000En08]	Su, NR
²⁰⁸ Pb	0.275(7)					²⁰⁸ Pb	53-76	CE	[1984Ve07]	NR
²⁰⁸ Pb	0.318(32)				е	²⁰⁸ Pb	52-502	EE	[1984Pa02]	
²⁰⁸ Pb	0.318(16)		0.0000=(04)		e	²⁰⁸ Pb	50-335	EE	[1982He03]	
208 Pb			0.00097(21)		γ	²⁰⁸ Pb	7.0, 7.6, 8.0, 8.5	GG	[1980Ch22]	
$^{208}\mathrm{Pb}$			0.0013(5)			²⁰⁸ Pb	′	GG	[1977Co10]	
208Pb			0.0013(3)		γ	208Pb	6.6, 9.7 4-5	GG	[1977C610] [1974Sw05]	
$^{208}\mathrm{Pb}$	0.30(2)		0.00134(14)		$rac{\gamma}{\mathrm{e}}$	²⁰⁸ Pb	28-73	EE	[19745W05] [1968Zi02]	
$^{208}\mathrm{Pb}$	$0.83(^{+0.18}_{-0.25})$				$^{12}\mathrm{C}$	²⁰⁸ Pb	45.5-60.2	CE	[1966Hr01]	Ex
²¹⁰ Pb	$0.05(_{-0.25})$ 0.051(15)					²¹⁰ Pb	20	IN-EL	[190011101] [1971El03]	EX
¹⁹⁴ Po	0.051(15)		37(7)		$^{ m t}_{ m 83}{ m Kr}$	114Cd	340-375	RDM	[2008Gr04]	
¹⁹⁴ Po			37(7)		$^{83}\mathrm{Kr}$	114Cd	340-375	RDM	[2006Gr16]	Su
¹⁹⁶ Po	$1.85(^{+14}_{-16})$		01(1)		¹⁹⁶ Po	¹⁰⁴ Pd	2.85 A	CE	[2005G116]	Gos
¹⁹⁶ Po	1.65(-16)		11.6(15)		$^{86}\mathrm{Kr}$	113Cd	382	RDM	[2015Re22] [2009Gr08]	Gos
198Po	$1.30(^{+29}_{-24})$		11.0(13)		198Po	^{94}Mo	2.85 A	CE	[2009G108] [2015KeZZ]	Gos
200Po	$1.06(_{-24})$ $1.06(6)$				200Po	104Pd	2.85 A 2.85 A		[2015KeZZ]	Gos
²⁰² Po					²⁰² Po	104Pd,	2.85 A 2.85 A	CE	, ,	
202PO	$1.12(^{+34}_{-26})$				202P0	⁹⁴ Mo	2.85 A	CE	[2015KeZZ]	Gos
$^{210}\mathrm{Po}$	0.0200(40)				d, p, t	²¹⁰ Po	17.0, 17.8, 20.0	CE^*	[1973El06]	
^{214}Po			<6					DC	[2011ReZZ]	
$^{202}\mathrm{Rn}$	$1.00(^{+32}_{-26})$				$^{202}\mathrm{Rn}$	109 Ag, 120 Sn	2.9 A	CE	[2015Ga19]	Gos
$^{204}\mathrm{Rn}$	$1.51(^{+59}_{-45})$				$^{204}\mathrm{Rn}$	109Ag, 120Sn		CE	[2015Ga19]	Gos
$^{214}\mathrm{Rn}$	(-45)		<2000		⁹ Be	$^{208}\mathrm{Pb}$	45-57	\overline{DC}	[1987Dr08]	NR
$^{218}\mathrm{Rn}$			<115					\overline{DC}	[1960Be25]	
$^{220}\mathrm{Rn}$	1.88(11)				$^{220}\mathrm{Rn}$	⁶⁰ Ni, ¹²⁰ Sn	2.82 A	CE	[2013Ga23]	
$^{220}\mathrm{Rn}$	` ´		209(7)					DC	[1965Ne03]	
$^{220}\mathrm{Rn}$			211(7)					DC	[1960Be25]	
$^{222}\mathrm{Rn}$			400(150)					DC	[1961Fo08]	
$^{222}\mathrm{Rn}$			462(29)					DC	[1960Be25]	
$^{218}\mathrm{Ra}$			43(4)		¹³ C	²⁰⁸ Pb	5.3A	RDM	[1988Ga33]	NR
218 Ra			40(7)		¹³ C	²⁰⁸ Pb	5.3A	RDM	[1984EnZY]	Su
$^{218}_{222}$ Ra					$^{13}\mathrm{C}$	²⁰⁸ Pb	59-67	RDM	[1983Ga11]	Su, NR
²²² Ra	0.00(10)		750(60)		2245	60xx 120g		DC	[1960Be25]	
²²⁴ Ra	3.96(12)		10=0(00)		224 Ra	⁶⁰ Ni, ¹²⁰ Sn	2.83 A	CE	[2013Ga23]	
224 Ra 224 Ra			1079(29)			$^{228}\mathrm{Th}(\alpha)$ $^{228}\mathrm{Th}(\alpha)$		DC	[1970To08]	
224 Ra			1073(14)			$I^{\text{220}}\text{In}(\alpha)$		DC	[1965Ne03]	
224 Ra			1150(100) 1096(43)					DC DC	[1961Fo08] [1960Be25]	
224 Ra			1090(45)					DC	[1960Be25] [1959Si74]	
224 Ra			1080(220)					DC	[1959Si74]	
226 Ra	5.15(14)		1000(220)		α , ¹⁶ O,	226 Ra	15-17, 63,	CE*	[1993Wo05]	
226 Ra	0.10(14)		900(100)		$^{\alpha, 16}_{32}$ S, 208 Pb	Ita	135, 978	DC	[1961Fo08]	
226 Ra			710(130)			$^{230}\mathrm{Th}(\alpha)$		DC	[1960Un02]	
226 Ra			909(29)					DC	[1960Be25]	
226 Ra			910(100)			$^{230}\mathrm{Th}(\alpha)$		\overline{DC}	[1958Va04]	
228 Ra			793(29)			228 Fr (β^{-})		DC	[1998Gu09]	
228 Ra			790(60)					DC	[1960Be25]	
$^{222}\mathrm{Th}$			346(29)		¹⁶ O	$^{208}\mathrm{Pb}$	94	RDM	[1985Bo32]	
$^{224}\mathrm{Th}$			851(58)		α	226 Ra	55	DC	[1986Sc18]	NR
$^{226}{ m Th}$			570(29)					DC	[1960Be25]	
$^{228}{ m Th}$			590(14)			$^{232}\mathrm{U}(\alpha)$		DC	[1970To08]	
²²⁸ Th			580(14)			$^{232}U(\alpha)$		DC	[1965Ne03]	
²²⁸ Th			577(43)			220.00		DC	[1960Be25]	
²³⁰ Th	8.06(11)				α	²³⁰ Th	16,17	CE	[1973Be44]	
²³⁰ Th	8.01(11)		F11(10)		α	²³⁰ Th	17,18	CE	[1971Fo17]	Su
$^{230}{ m Th}$ $^{230}{ m Th}$	11 1/15		511(13)			$^{234}U(\alpha)$		DC	[1965Ne03]	
$^{230}{ m Th}$ $^{230}{ m Th}$	11.1(17)		534(20)		α	²³⁰ Th	2.2	CE DC	[1961Re02] [1960Be25]	
$^{232}\mathrm{Th}$	9.21(18)		534(29)		α	$^{232}\mathrm{Th}$	16.5,17.0	CE	[1960Be25] [1974Ba43]	
$^{232}\mathrm{Th}$	9.5(12)?				d	²³² Th	12	CE*	[1974Ba43] [1974ThZG]	Ex,NR

Table 1 Experimental B(E2) †-, $\tau\text{-}$ and $\beta_2\text{-}\text{values}$ in Z=2-104 nuclei (continued)

Nuclide		B(E2) (W.u.)	τ (ps)	β_2	Beam	Target	Energy (MeV)	Method	Reference	Comment
$^{-232}\mathrm{Th}$		<u> </u>	462(35)		α	²³² Th	6	Mossbauer	[1973Ca29]	
$^{232}\mathrm{Th}$	9.21(9)				α	$^{232}{ m Th}$	16,17	CE	[1973Be44]	
$^{232}\mathrm{Th}$	9.1(6)				d	$^{232}\mathrm{Th}$	16	CE*	[1972El08]	
$^{232}\mathrm{Th}$	9.40(20)				α	$^{232}\mathrm{Th}$	17,18	CE	[1971Fo17]	Su
$^{232}\mathrm{Th}$	11.5(17)				α	$^{232}\mathrm{Th}$	2.2	CE	[1961Re02]	
$^{232}\mathrm{Th}$	9.8(6)				p,d	$^{232}\mathrm{Th}$	3.5-4.5	CE	[1961Sk01]	
$^{232}\mathrm{Th}$	6.3(12)				1	$^{232}\mathrm{Th}$	4-6	CE	[1960Mc13]	
$^{232}\mathrm{Th}$	0.5(12)		498(22)		P	111	4-0	DC	[1960Be25]	
$^{234}\mathrm{Th}$			' '					DC	1.	
230U			534(43)					DC	[1960Be25] [1960Be25]	
$^{232}\mathrm{U}$			375(43)						1.	
234U	10.00(10)		366(29)			234 U	10.10	DC	[1960Be25]	
	10.90(10)				α		16-19	CE	[1973Be44]	_
^{234}U	10.33(26)				α	²³⁴ U	17,18	CE	[1971Fo17]	Su
$^{234}{ m U}$			364(10)			238 Pu(α)		DC	[1970To08]	
$^{234}\mathrm{U}$	9.7(8)				d	²³⁴ U		CE	[1965Fr11]	
$^{234}\mathrm{U}$	11.4(17)				α	$^{234}{ m U}$	2.2	CE	[1961Re02]	
$^{234}{ m U}$			384(29)					DC	[1960Be25]	
$^{236}\mathrm{U}$	11.60(15)				α	$^{236}\mathrm{U}$	16,17	CE	[1973Be44]	
$^{236}{ m U}$	11.62(23)				α	$^{236}{ m U}$	17,18	CE	[1971Fo17]	Su
$^{236}{ m U}$, ,		339(9)			240 Pu(α)	· ·	DC	[1970To08]	
$^{236}\mathrm{U}$	11.2(21)				d	236U		CE	[1965Fr11]	
$^{236}\mathrm{U}$	13.1(20)				α	$^{236}{ m U}$	2.2	CE	[1961Re02]	
236U	10.1(20)		335(29)				2.2	DC	[1960Be25]	
$^{238}\mathrm{U}$	12.7(17)		333(23)		d, α	238U	12,13,	CE*	[1974ThZG]	
O	12.1(11)				u, α		16,19,20	CE	[13/41112G]	
23811	10.90(15)					238[]		CE	[1079D 44]	
238U	12.30(15)				α	238U	16-18	CE	[1973Be44]	
_	11.7(8)				d		16	CE*	[1972El08]	_
²³⁸ U	11.70(15)				α	²³⁸ U	17,18	CE	[1971Fo17]	Su
$^{238}{ m U}$	13.2(20)				α	²³⁸ U	2.2	CE	[1961Re02]	
$^{238}{ m U}$	12.7(7)				p,d	$^{238}{ m U}$	3.5-4.5	CE	[1961Sk01]	
$^{238}{ m U}$			325(29)					DC	[1960Be25]	
$^{238}\mathrm{Pu}$	12.63(17)				α	238 Pu	17	CE	[1973Be44]	
$^{238}\mathrm{Pu}$	12.58(35)				α	²³⁸ Pu	17,18	CE	[1971Fo17]	Su
$^{238}\mathrm{Pu}$			255(7)			$^{242}\mathrm{Cm}(\alpha)$		DC	[1970To08]	
$^{238}\mathrm{Pu}$			264(22)					DC	[1960Be25]	
$^{240}\mathrm{Pu}$	13.33(18)		\ \ \ \		α	240 Pu	17	CE	[1973Be44]	
$^{240}\mathrm{Pu}$	12.57(35)				α	²⁴⁰ Pu	17,18	CE	[1971Fo17]	Su
$^{240}\mathrm{Pu}$, ,		237(7)			$^{244}\mathrm{Cm}(\alpha)$,	DC	[1970To08]	
$^{240}\mathrm{Pu}$	12.90(30)		(-)		d	²⁴⁰ Pu		CE	[1965Fr11]	
$^{240}\mathrm{Pu}$			231(29)			$^{244}\mathrm{Cm}(\alpha)$		TDSA	[1964No01]	
$^{240}\mathrm{Pu}$			250(22)					DC	[1960Be25]	
$^{242}\mathrm{Pu}$	13.47(18)		=====================================		α	²⁴² Pu	17	CE	[1973Be44]	
$^{242}\mathrm{Pu}$	16.5(14)				$\frac{\alpha}{d}$	²⁴² Pu	16	CE*	[1973Be44]	
²⁴² Pu	13.26(35)					²⁴² Pu	17,18	CE	[1971Fo17]	Su
²⁴² Pu					α	²⁴² Pu	11,10		1.	Su
²⁴⁴ Pu	13.9(12)				d	²⁴⁴ Pu	17	CE	[1965Fr11] [1973Be44]	
²⁴⁴ Pu ²⁴⁴ Pu	13.61(18)				α	²⁴⁴ Pu ²⁴⁴ Pu	17	CE	1 .	
240 ~	13.83(37)		100(13)		α		17,18	CE	[1971Fo17]	Su
$^{240}{ m Cm}$			190(13)		α	²³⁹ Pu	27,33	RDM	[1978Ul01]	
²⁴⁴ Cm	14.58(19)				α	²⁴⁴ Cm	17	CE	[1973Be44]	_
^{244}Cm	14.86(35)				α	²⁴⁴ Cm	17,18	CE	[1971Fo17]	Su
$^{244}\mathrm{Cm}$			140(7)			244 Am(β^-)		DC	[1962Ch19]	Ex
$^{246}\mathrm{Cm}$	14.94(19)				α	²⁴⁶ Cm	17	CE	[1973Be44]	
$^{246}\mathrm{Cm}$	15.03(45)				α	$^{246}\mathrm{Cm}$	17,18	CE	[1971Fo17]	Su
$^{248}\mathrm{Cm}$	13.7(8)				¹³⁶ Xe, ⁵⁸ Ni	$^{248}\mathrm{Cm}$	641, 260	CE	[1986Cz02]	
$^{248}\mathrm{Cm}$	14.99(19)				α	$^{248}\mathrm{Cm}$	17	CE	[1973Be44]	
$^{248}\mathrm{Cm}$	15.03(55)				α	$^{248}\mathrm{Cm}$	17,18	CE	[1971Fo17]	Su
$^{248}\mathrm{Cm}$			182(14)		"	$^{252}\mathrm{Cf}(\alpha)$,=5	DC	[1970To08]	
$^{250}\mathrm{Cf}$	16.0(16)		102(11)		d	²⁵⁰ Cf	15	CE*	[1980Ah01]	
$^{252}\mathrm{Cf}$	16.7(11)				α	²⁵² Cf	17,18	CE	[1971Fo17]	
	10.1(11)				u		1 -1,10	LOD	[10111011]	<u> </u>

Table 2 Comparative analysis of the present and S. Raman et al. [13] results. Both the present work and inverse B(E2) \uparrow have been calculated for the nuclides where multiple experimental results are available and no new measurements have been reported since the previous evaluation.

Nuclide	Inverse Squared B(E2) \uparrow (e^2b^2)	Inverse B(E2) \uparrow (e^2b^2)	Raman's B(E2) \uparrow [13] (e^2b^2)	Comments on Raman's value
^{12}C	0.00397(20)	0.00395(20)	0.00397(33)	
¹⁶ O	0.00371(39)	0.00354(22)	0.00406(38)	Different exclusions
.8O	0.00430(38)	0.00429(19)	0.00451(20)	
^{0}O	0.00298(26)	0.00265(22)	0.00281(20)	
$^{0}{ m Ne}$	$0.0333(\hat{16})^{'}$	$0.0369(27)^{'}$	$0.0340(30)^{'}$	
⁴ Ne	$0.0143\binom{+57}{-24}$	$0.01351(^{+50}_{-30})$	0.017(6)	τ was symmetrized
2 Mg	$0.034\binom{+16}{-11}$	0.038(44)	0.037(13)	v
⁸ Si	$0.03267(^{+55}_{-45})$	0.0325(16)	0.0326(12)	
⁰ Si	0.02081(64)	0.0218(10)	0.0215(10)	
$^2\mathrm{Si}$	$0.0122(^{+36}_{-21})$	0.0131(22)	0.0113(33)	Latest result was adopted
$^{4}\mathrm{S}$	0.02083(120)	0.0215(10)	0.0212(12)	Editor Tobali was daopied
$^4\mathrm{Ar}$	0.0232(29)	0.0253(40)	0.0240(40)	
² Ti	0.086(16)	0.0877(81)	0.087(25)	
$^8\mathrm{Cr}$	0.137(15)	0.133(16)	0.136(21)	
$^{4}\mathrm{Cr}$	0.0853(42)	0.0848(30)	0.0870(40)	Extended data set, EE included
4 Fe	0.0608 (31)	0.0596(20)	$0.062(\hat{5})$	
$^6\mathrm{Fe}$	0.0981(20)	0.0978(20)	0.0980(40)	
⁸ Fe	0.122(6)	0.1160(57)	0.1200(40)	
$^0\mathrm{Fe}$	0.0938(88)	0.094(10)	0.096(18)	
2 Ge	0.2087(30)	0.2084(30)	0.213(6)	
$^6\mathrm{Se}$	$0.432(\overset{+}{15})$	0.4374(90)	0.420(10)	Missing data
$^0\mathrm{Sr}$	0.909(40)	0.890(48)	0.959(36)	Different exclusions
$^2\mathrm{Sr}$	$0.505\binom{+29}{-20}$	0.497(26)	0.513(20)	
$^8\mathrm{Sr}$	1.240(61)	1.213(64)	1.282(39)	
$^{00}\mathrm{Sr}$	1.22(17)	1.22(16)	1.42(8)	Latest was adopted
$^2\mathrm{Zr}$	$0.91\binom{+12}{-5}$	0.98(11)	0.91(9)	Earliest experiment was adopted
$^4\mathrm{Zr}$	0.0629(45)	$0.06\hat{6}0(35)$	0.066(14)	Missing data
$^{00}\mathrm{Zr}$	$1.110\binom{+51}{-36}$	1.043(43)	1.11(6)	_
2 Mo	0.0975(43)	0.1009(56)	0.097(6)	
6 Mo	0.2775(59)	0.284(14)	0.271(5)	
$^{00}\mathrm{Mo}$	$0.530(\hat{2}2)^{'}$	0.546(24)	0.516(10)	Missing data
02 Mo	$0.976\binom{+49}{-40}$	0.995(48)	0.963(31)	
$^{04}\mathrm{Mo}$	1.28(11)	1.165(59)	1.34(8)	Missing data
$^{00}\mathrm{Ru}$	$0.49\overline{27(41)}$	0.4895(30)	0.490(5)	
$^{02}\mathrm{Ru}$	0.632(12)	0.6430(290)	0.630(10)	
$^{08}\mathrm{Ru}$	$0.894\binom{+80}{-58}$	0.954(80)	1.01(15)	Missing data
$^{10}\mathrm{Ru}$	1.071(61)	0.989(74)	1.05(12)	
$^{12}\mathrm{Ru}$	1.107(96)	1.04(13)	1.17(23)	
$^{02}\mathrm{Pd}$	0.460(23)	0.460(30)	0.460(30)	
$^{04}\mathrm{Pd}$	0.529(15)	0.528(30)	0.535(35)	
$^{06}\mathrm{Pd}$	0.660(17)	0.651(37)	0.660(35)	
⁰⁸ Pd	0.764(20)	0.763(41)	0.760(40)	
$^{06}\mathrm{Cd}$	0.407(12)	0.412(19)	0.410(20)	
¹² Cd	0.5012(220)	0.498(22)	0.510(20)	
¹⁴ Cd	0.5362(250)	0.537(25)	0.545(20)	
¹⁶ Cd	0.580(26)	0.588(26)	0.560(20)	Missing data
²⁴ Te	0.560(28)	0.588(28)	0.568(6)	
²⁰ Xe ²² Xe	1.739(110)	1.69(11)	1.73(11)	
$^{22}\mathrm{Xe}$ $^{24}\mathrm{Ba}$	1.349(68)	1.360(71)	1.40(6)	
²⁶ Ва	2.096(78)	1.958(70) 1.761(85)	2.09(10)	
³² Ba	1.740(80)	` '	1.75(9)	
⁷² Ba ⁸⁴ Ba	0.847(57) 0.665(19)	0.828(60) $0.658(33)$	0.86(6) $0.658(7)$	
⁷³ Ва ³⁸ Ва	0.000(19)	0.058(33) $0.235(11)$	0.008(7) 0.230(9)	
⁴⁶ Ва	0.2502(110) $1.350(68)$	1.336(68)	1.355(48)	
²⁶ Ce	3.65(46)	$3.68(^{+46}_{-37})$	2.68(48)	Missing data
²⁸ Ce	3.05(40) $2.27(13)$			missing data
³⁰ Ce	2.27(13) 1.755(79)	$2.27(18) \\ 1.804(79)$	$2.28(22) \\ 1.74(10)$	
³² Ce	1.755(79) 1.69(11)	1.676(74)	1.74(10) 1.87(17)	Missing data
³⁴ Ce	1.062(85)	1.054(91)	1.87(17) 1.04(9)	missing data
⁴⁰ Ce	0.2997(150)	0.298(15)	0.298(6)	Missing data
O.C.	O.4001(100)	0.400(10)	0.200(0)	wiissing data

 $\textbf{Table 2} \ \text{Comparative analysis of the present and S. Raman et} \ \textit{al.} \ [13] \ \text{results.} \ (\text{continued})$

Nuclide	Inverse Squared B(E2) \uparrow (e^2b^2)	Inverse B(E2) \uparrow (e^2b^2)	Raman's B(E2) \uparrow [13] (e^2b^2)	Comments on Raman's values
¹⁴⁴ Ce	$0.96\binom{+30}{-18}$	0.97(20)	0.83(9)	Different exclusions
$^{146}\mathrm{Ce}$	0.952 (90)	1.060(73)	1.14(12)	Missing data
¹⁵⁰ Ce	3.18(48)	3.16(60)	3.3(8)	Missing data
$^{132}\mathrm{Nd}$	3.58(59)	3.54(59)	3.5(6)	
$^{134}\mathrm{Nd}$	$1.879(^{+58}_{-46})$	1.915(35)	1.83(37)	Missing data
$^{142}\mathrm{Nd}$	0.2650(130)	0.279(13)	0.265(6)	
¹⁴⁴ Nd	0.504(15)	0.483(25)	0.491(5)	
¹⁴⁶ Nd	0.748(22)	0.736(38)	0.760(25)	
¹⁴⁸ Nd	1.338(30)	1.298(68)	1.35(5)	
¹⁵⁰ Nd	2.707(30)	2.721(42)	2.760(40)	Different exclusions
¹⁵² Nd	4.10(22)	4.11(22)	4.20(28)	Missing data
¹³⁸ Sm	1.30(19)	1.37(22)	1.41(23)	Unweighted average
¹⁴⁴ Sm ¹⁴⁸ Sm	0.259(19)	0.268(13)	0.262(6)	Missing data
150Sm 150Sm	0.713(35)	0.718(35)	0.720(30)	
$^{154}\mathrm{Sm}$	1.347(26)	1.339(68)	1.350(30)	Mississa data
$^{152}\mathrm{Gd}$	4.345(44)	4.370(69)	4.36(5)	Missing data
$^{154}\mathrm{Gd}$	1.655(65) $3.872(16)$	$1.626(82) \\ 3.859(16)$	1.67(14) $3.89(7)$	
$^{156}\mathrm{Gd}$	4.697(110)	4.70(11)	4.64(5)	Missing data
158Gd	5.093(110)	5.10(11)	5.02(5)	Wissing data
$^{154}\mathrm{Dy}$	2.421(120)	2.40(12)	2.39(13)	
$^{158}\mathrm{Dy}$	4.66(11)	4.66(23)	4.66(5)	
$^{160}\mathrm{Dy}$	5.049(40)	5.057(38)	5.13(11)	
$^{162}\mathrm{Dy}$	5.227(84)	5.172(84)	5.35(11)	Missing data
$^{164}\mathrm{Dy}$	5.616(68)	5.607(88)	5.60(5)	
$^{156}\mathrm{Er}$	1.645(80)	1.647(81)	1.64(7)	Missing data
$^{160}\mathrm{Er}$	$4.34(15)^{'}$	4.36(22)	4.38(20)	S
$^{164}{ m Er}$	5.50(12)	5.433(92)	5.45(6)	
$^{166}{ m Er}$	5.748(89)	5.732(89)	5.83(5)	Missing data
$^{168}\mathrm{Er}$	5.723(45)	5.804(59)	5.79(10)	Different exclusions
160 Yb	2.44(16)	2.46(16)	2.66(16)	Latest result was adopted
¹⁶⁴ Yb	4.33(14)	4.32(21)	4.38(26)	
¹⁶⁶ Yb	5.20(20)	5.20(26)	5.24(31)	
¹⁷⁰ Yb	5.721(70)	5.753(70)	5.79(13)	
¹⁷² Yb	6.088(150)	6.10(15)	6.04(7)	
¹⁷⁴ Yb	5.853(160)	5.85(16)	5.94(6)	Missing data
¹⁷⁶ Yb	5.189(89)	5.247(93)	5.30(19)	77 11 12 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
¹⁶⁴ Hf ¹⁷⁶ Hf	1.82(17)	1.79(25)	2.14(18)	Earlier result was adopted
¹⁷⁸ Hf	5.416(170)	5.42(17)	5.27(10)	Missing data
¹⁸⁰ Hf	4.736(63) 4.6470(30)	4.684(94)	4.82(6)	Missing data Missing data
$^{170}\mathrm{W}$	3.50(17)	4.6486(30)	4.67(12)	Missing data
180W	4.419(77)	3.52(17) $4.224(86)$	3.51(10) $4.25(24)$	
$^{182}\mathrm{W}$	4.123(42)	4.108(42)	4.20(8)	Missing data
$^{184}\mathrm{W}$	3.706(35)	3.692(35)	3.78(13)	Missing data
$^{186}\mathrm{W}$	3.500(38)	3.468(33)	3.50(12)	Wildeling date
$^{182}\mathrm{Os}$	3.896(85)	3.83(13)	3.86(35)	Missing data
$^{184}\mathrm{Os}$	3.214(79)	3.196(34)	3.23(16)	
$^{186}\mathrm{Os}$	3.064(72)	3.068(72)	2.90(10)	Different exclusions
$^{192}\mathrm{Os}$	2.031(100)	2.07(10)	2.100(30)	Missing data
$^{184}\mathrm{Pt}$	3.79(20)	3.76(21)	3.78(27)	3
$^{190}\mathrm{Pt}$	1.854(90)	1.943(90)	1.75(22)	Missing data
$^{192}\mathrm{Pt}$	1.908(68)	1.980(65)	1.870(40)	Missing data
$^{194}{\rm Pt}$	1.631(68)	1.634(68)	1.642(22)	
¹⁹⁸ Pt	1.072(50)	1.088(50)	1.080(12)	Different exclusions
$^{196}\mathrm{Hg}$	1.143(82)	1.19(11)	1.15(5)	Latest was adopted
¹⁹⁸ Hg	0.9612(70)	0.9674(60)	0.990(12)	Missing data
²⁰⁰ Hg	0.855(28)	0.858(43)	0.853(11)	
²⁰² Hg	0.615(21)	0.624(30)	0.612(10)	
²⁰⁴ Hg	0.424(21)	0.416(21)	0.427(7)	Missing data
²⁰⁴ Pb	0.1587(69)	0.1569(90)	0.1620(40)	
²⁰⁶ Pb	0.0989(28)	0.1009(50)	0.1000(20)	Rounded number
²²⁶ Ra	5.16(13)	5.23(16)	5.15(14)	
²²⁸ Th	7.05(12)	7.05(17)	7.06(24)	
²³⁰ Th	8.14(21)	8.24(21)	8.04(10)	Double-counted the same experiment
²³² Th	9.02(38)	9.05(38)	9.28(10)	Double-counted the same experiment
$^{234}\mathrm{U}$	10.22(50)	10.23(50)	10.66(20)	Double-counted the same experiment

 $\textbf{Table 2} \ \text{Comparative analysis of the present and S. Raman et} \ \textit{al.} \ [13] \ \text{results.} \ (\text{continued})$

Nuclide	Inverse Squared B(E2) \uparrow (e^2b^2)	Inverse B(E2) \uparrow (e^2b^2)	Raman's B(E2) \uparrow [13] (e^2b^2)	Comments on Raman's values
^{236}U	10.96(28)	11.17(28)	11.61(15)	Double-counted the same experiment
$^{238}{ m U}$	12.19(62)	12.21(62)	12.09(20)	Double-counted the same experiment
238 Pu	12.26(34)	12.25(34)	12.61(17)	Double-counted the same experiment
240 Pu	13.13(39)	13.10(39)	13.02(30)	Double-counted the same experiment
242 Pu	14.01(75)	14.30(67)	13.40(16)	Double-counted the same experiment
$^{248}\mathrm{Cm}$	14.43(75)	14.43(75)	14.99(19)	Double-counted the same experiment

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei. Model-independent, combined (*) and model-dependent (**) values are compared with S. Raman *et al.* [13] evaluation.

Nuclide	${ m E_{2}}^{+}_{1} \ ({ m keV})$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
$^4{ m He}$	27420(90)					
⁶ He	1797(25)	0.00054(7)**?	1.67(22)**?	$40.3(^{+60}_{-46})^{**}$?	1.024(66)**?	
⁸ He	3100(500)					
¹⁰ He	3240(200)					
⁶ Be	1670(50)					
⁸ Be	3030(10)					
$^{10}\mathrm{Be}$	3368.03 (3)	$0.00467(^{+23}_{-18})$	$7.30(^{+36}_{-28})$	$0.2017(^{+79}_{-95})$	$1.071\binom{+26}{-20}$	0.0053(6)
$^{12}\mathrm{Be}$	2102(12)	$0.0040(^{+22}_{-11})$	$4.9(^{+27}_{-13})$	$2.49\binom{+94}{-88}$	$0.88(^{+24}_{-12})$	
$^{14}\mathrm{Be}$	1540(130)					
$^{10}\mathrm{C}$	3353.7 (6)	0.00450(42)	7.03(66)	$0.214\binom{+22}{-19}$	$0.701\binom{+32}{-34}$	0.0064(10)
$^{12}\mathrm{C}$	4438.91 (31)	0.00397(20) 0.00397(20)*	4.86(25) 4.86(25)*	$0.0596\binom{+31}{-29} \\ 0.0596\binom{+31}{-29}^*$	0.583(15)	0.00397(33)
$^{14}\mathrm{C}$	7012 (4)	0.00187(25)*	1.87(25)*	$0.0129(^{+20}_{-15})^*$	0.361(24)*	0.00187(25)
¹⁶ C	1766 (10)	0.00179(20)	1.50(17)	$13.2\binom{+16}{-13}$	0.323(18)	
¹⁸ C	1620 (20)	$0.00168(^{+23}_{-15})$	$1.20(^{+16}_{-11})$	$21.8(^{+22}_{-26})$	$0.289(^{+20}_{-13})$	
²⁰ C	1618 (6)	$0.0038(^{+17}_{-8})$	$2.3(^{+10}_{-5})$	$9.8(^{+28}_{-30})$	$0.405(^{+89}_{-45})$	
¹² O	1800(400) ?					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}} \ ({ m keV})$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
	,	,	, ,	×- /		, ,
¹⁴ O	6590(10)					
¹⁶ O	6917.1 (6)	0.00371(39) 0.00390(22)*	3.098(326) 3.257(184)*	0.00694(82) 0.00660(35)*	0.349(19) 0.358(10)*	0.00406(38)
¹⁸ O	1982.07 (9)	0.00430(38) 0.00431(39)*	3.07(27) 3.08(28)*	$3.10(^{+30}_{-25}) \\ 3.09(^{+31}_{-26})^*$	0.347(16) 0.348(15)*	0.00451(20)
²⁰ O	1673.60 (15)	0.00298(26)	1.85(16)	$10.4\binom{+10}{-8}$	$0.269(^{+10}_{-8})$	0.00281(20)
²² O	3199 (8)	0.0021(8)	1.15(44)	$0.58(^{+36}_{-16})$	0.212(40)	0.0021(8)
²⁴ O	4720(110)	0.00118(63)**	0.57(31)**	$0.14\binom{+16}{-5}$ **	0.150(40)**	
²⁶ O	~1800					
¹⁶ Ne	1690(70)					
¹⁸ Ne	1887.3 (2)	0.0243(16)	17.4(11)	$0.700\binom{+46}{-43}$	0.661(21)	0.0269(26)
$^{20}{ m Ne}$	1633.674 (15)	0.0333(16) 0.0327(15)*	20.7(10) 20.29(96)*	$1.053(^{+54}_{-49}) \\ 1.072(^{+53}_{-48})^*$	0.721(18) 0.714(17)*	0.0340(30)
²² Ne	1274.577 (7)	0.02298(42) 0.02305(38)*	12.55(23) 12.59(21)*	5.281(98) 5.266(89)*	0.5616(51) 0.5625(47)*	0.0230(10)
$^{24}\mathrm{Ne}$	1981.6 (4)	$0.0143(^{+57}_{-24})$	$6.9(^{+28}_{-12})$	$0.94(^{+19}_{-27})$	$0.418\binom{+84}{-35}$	0.017(6)
$^{26}\mathrm{Ne}$	2018.2 (1)	0.0155(32)	6.8(14)	$0.79(^{+20}_{-13})$	0.413(43)	0.0228(41)
²⁸ Ne	1304 (3)	0.0136(23) 0.0153(16)**	5.37(90) 6.06(63)**	$8.0(^{+16}_{-11}) \\ 7.07(^{+83}_{-67})^{**}$	0.367(31) 0.39(2)**	0.027(14)
$^{30}{ m Ne}$	791 (26)	0.0226(35)**	8.2(13)**	58(⁺¹² ₋₈)**	0.453(37)**	
$^{32}\mathrm{Ne}$	722(9)					

Nuclide	$E_{2_{1}^{+}}$	B(E2) ↑	B(E2)	au	eta_2	B(E2) ↑ [13]
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
$^{20}{ m Mg}$	1598 (10)	0.0179(33)**	11.1(20)**	$1.96\binom{+44}{-30}$ **	0.44(4)**	
$^{22}{ m Mg}$	1247.02 (3)	$0.034(^{+16}_{-11})$	$18.4(^{+89}_{-61})$	$4.0(^{+20}_{-13})$	$0.57(^{+14}_{-9})$	0.037(13)
$^{24}{ m Mg}$	1368.672 (5)	0.04372(90) 0.04339(80)*	21.27(44) 21.10(39)*	1.944(41) 1.959(37)*	0.6092(62) 0.6069(56)*	0.0432(11)
$^{26}{ m Mg}$	1808.73 (3)	0.03136(72) 0.03113(67)*	13.71(31) 13.61(29)*	0.672(16) 0.677(15)*	0.4891(56) 0.4873(52)*	0.0305(13)
$^{28}{ m Mg}$	1473.88 (18)	0.0366(46)	14.5(18)	$1.60(^{+23}_{-18})$	0.503(31)	0.035(5)
$^{30}{ m Mg}$	1482.8 (3)	0.0273(26) 0.0435(58)**	9.86(94) 15.7(21)**	$2.09\binom{+22}{-19} \\ 1.31\binom{+20}{-16}**$	0.415(20) 0.524(36)**	0.0295(26)
$^{32}{ m Mg}$	885.3 (1)	0.0434(52) 0.0406(62)**	14.4(17) 13.5(22)**	$17.3(^{+24}_{-20})$ $18.5(^{+33}_{-26})**$	0.501(30) 0.0484(38)**	0.039(7)
$^{34}{ m Mg}$	652(6)	0.0573(79) 0.073(15)**	17.5(24) 22.3(46)**	$56.9\binom{+91}{-69} \\ 45\binom{+12}{-8}**$	$0.553(37) \\ 0.624(^{+61}_{-68})^{**}$	
$^{36}{ m Mg}$	662(6)	$0.051(^{+13}_{-11})^{**}$	$14.3(^{+37}_{-32})^{**}$	63(⁺¹⁹ ₋₁₃)**	0.50(6)**	
$^{38}{ m Mg}$	656(6)					
$^{24}\mathrm{Si}$	1879 (11)	0.0096(30)	4.7(15)	$1.40\binom{+64}{-33}$	0.245(38)	
²⁶ Si	1795.9 (2)	0.0344(25)	15.1(11)	0.635(47)	0.439(16)	0.0356(34)
²⁸ Si	1779.030 (11)	$0.03267(^{+55}_{-45}) 0.03281(^{+53}_{-44})^*$	$12.94\binom{+22}{-18} \\ 12.99\binom{+21}{-17}^*$	$0.701(^{+10}_{-12}) \\ 0.698(^{+10}_{-11})^*$	$0.4073\binom{+34}{-28} \\ 0.4082\binom{+33}{-27}^*$	0.0326(12)
$^{30}\mathrm{Si}$	2235.322 (18)	0.02081(64) 0.02084(61)*	7.52(23) 7.53(22)*	$0.351(11) \\ 0.351(^{+11}_{-10})^*$	0.3105(48) 0.3107(45)*	0.0215(10)
$^{32}\mathrm{Si}$	1941.4 (3)	$0.0122(^{+36}_{-21})$	$4.1(^{+12}_{-7})$	$1.21\binom{+25}{-28}$	$0.228\binom{+34}{-20}$	0.0113(33)
$^{34}\mathrm{Si}$	3327.7 (5)	0.0085(33)	2.6(10)	$0.118(^{+75}_{-33})$	0.183(35)	0.0085(33)

Nuclide	$\mathrm{E_{2_1^+}}_{(\mathrm{keV})}$	$\mathbf{B}(\mathbf{E2})\uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
	(***/	(* ')	(*****)	(F ¹)		(* *)
$^{36}\mathrm{Si}$	1399 (25)	0.0193(59)	5.5(17)	$4.0(^{+17}_{-9})$	0.265(40)	0.019(6)
³⁸ Si	1084 (20)	0.0193(71)	5.1(19)	$14.1(^{+82}_{-38})$	0.255(47)	0.019(7)
$^{40}\mathrm{Si}$	986 (5)?	0.043(12)	10.6(30)	$10.2(^{+39}_{-22})$	0.37(5)	
⁴² Si	742(8)					
$^{28}\mathrm{S}$	1512(8)	0.0181(31)	7.2(12)	$2.90(^{+60}_{-42})$	0.265(23)	
³⁰ S	2210.6 (5)	0.0324(22)	11.70(79)	$0.239(^{+17}_{-15})$	0.339(11)	0.0324(41)
$^{32}\mathrm{S}$	2230.57 (15)	$0.02958(^{+85}_{-44}) 0.02914(95)^*$	$9.80(^{+28}_{-15}) \\ 9.66(31)^*$	$0.2500(^{+38}_{-70}) \\ 0.2538(^{+86}_{-80})^*$	$0.3102\binom{+44}{-23} \\ 0.3079(50)^*$	0.0300(13)
$^{34}\mathrm{S}$	2127.564 (13)	0.02083(120) 0.02047(100)*	6.37(37) 6.26(31)*	$\begin{array}{c} 0.449(^{+27}_{-25}) \\ 0.457(^{+23}_{-21})^* \end{array}$	$0.250(7) \\ 0.248(^{+5}_{-6})^*$	0.0212(12)
$^{36}\mathrm{S}$	3290.9 (3)	$0.00886(^{+87}_{-52})$	$2.51\binom{+25}{-15}$	$0.119(^{+8}_{-11})$	$0.1569(^{+77}_{-46})$	0.0104(28)
$^{38}\mathrm{S}$	1292.0 (2)	0.0235(30)	6.19(79)	$4.82(^{+71}_{-55})$	0.247(16)	0.0235(30)
$^{40}\mathrm{S}$	903.69 (7)	0.0334(36)	8.22(89)	$20.3(^{+24}_{-20})$	0.284(15)	0.0334(36)
$^{42}\mathrm{S}$	890 (15)	0.0397(63)	9.2(15)	$18.4(^{+35}_{-25})$	0.300(24)	0.040(6)
⁴⁴ S	1329.0 (5)	0.0314(88)	6.8(19)	$3.1(^{+12}_{-7})$	0.258(36)	0.031(9)
⁴⁶ S	952(8)					
$^{32}\mathrm{Ar}$	1867 (8)	0.0266(68)	8.8(23)	$0.68(^{+23}_{-14})$	0.261(33)	
$^{34}\mathrm{Ar}$	2090.9 (3)	0.0232(29)	7.10(88)	$0.440(^{+62}_{-48})$	0.235(14)	0.0240(40)

Nuclide	$\mathbf{E}_{2_{1}^{+}}$	B(E2) ↑	B(E2)	au	eta_2	B(E2) ↑ [13
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
$^{36}\mathrm{Ar}$	1970.39 (5)	$0.0301(^{+20}_{-11}) \\ 0.0290(^{+14}_{-8})^*$	$8.53\binom{+58}{-32} \\ 8.22\binom{+40}{-22}^*$	$0.456(^{+18}_{-29}) \\ 0.473(^{+13}_{-22})^*$	$0.2573(^{+87}_{-48}) \\ 0.2526(^{+62}_{-34})^*$	0.0300(30)
$^{38}\mathrm{Ar}$	2167.64 (5)	0.01245(42)	3.28(11)	$0.685\binom{+24}{-23}$	0.1595(27)	0.0130(10)
$^{40}\mathrm{Ar}$	1460.851 (6)	0.0332(17) 0.0355(15)*	8.18(43) 8.73(37)*	$1.85(^{+10}_{-9}) \\ 1.730(^{+76}_{-69})^*$	0.2519(66) 0.2602(54)*	0.0330(40)
$^{42}\mathrm{Ar}$	1208.24 (13)	$0.042(^{+11}_{-9})$	$9.6(^{+26}_{-20})$	$3.8(^{+10}_{-8})$	$0.273(^{+36}_{-28})$	0.043(10)
$^{44}\mathrm{Ar}$	1157.97 (11)	$0.0358(^{+36}_{-22})$	$7.77(^{+78}_{-47})$	$5.47(^{+36}_{-50})$	$0.246\binom{+12}{-8}$	0.0345(41)
$^{46}\mathrm{Ar}$	1577 (1)	0.0243(22)	4.96(45)	$1.82\binom{+18}{-15}$	0.196(9)	0.0196(39)
⁴⁸ Ar	1038(6)	0.0346(55)	6.7(11)	$3.08(^{+58}_{-42})$	0.228(18)	
$^{50}\mathrm{Ar}$	1178(18)					
$^{36}\mathrm{Ca}$	3045.0(24)					
$^{38}\mathrm{Ca}$	2213.13 (10)	0.0097(27)	2.56(71)	$0.79(^{+31}_{-17})$	$0.127(^{+16}_{-19})$	0.0096(21)
$^{40}\mathrm{Ca}$	3904.38 (3)	0.00924(68) 0.00739(50)*	2.28(17) 1.82(12)*	$0.0486\binom{+39}{-33} \\ 0.0608\binom{+44}{-38}^*$	0.1196(44) 0.1069(36)*	0.0099(17)
$^{42}\mathrm{Ca}$	1524.70 (3)	0.0369(20) 0.0368(17)*	8.51(45) 8.48(40)*	$1.343(^{+76}_{-68}) \\ 1.347(^{+66}_{-60})^*$	0.2312(62) 0.2309(54)*	0.0420(30)
$^{44}\mathrm{Ca}$	1157.019 (4)	0.0467(21) 0.0485(18)*	10.13(46) 10.52(40)*	$4.21(^{+20}_{-18}) 4.06(^{+16}_{-15})^*$	0.2522(57) 0.2570(49)*	0.0470(20)
⁴⁶ Ca	1346.0 (3)	0.0168(13)	3.43(26)	$5.50(^{+46}_{-40})$	0.1468(58)	0.0182(13)
⁴⁸ Ca	3831.72 (6)	$0.0092\binom{+12}{-5} \\ 0.00844\binom{+54}{-23}^*$	$1.77(^{+23}_{-10})$ $1.63(^{+10}_{-4})^*$	$0.0539(^{+31}_{-63}) \\ 0.0585(^{+16}_{-35})^*$	$0.1054(^{+70}_{-29}) \\ 0.1012(^{+32}_{-14})^*$	0.0095(32)
⁵⁰ Ca	1026.72 (10)	$0.00373(^{+20}_{-18})$	$0.682(^{+37}_{-33})$	96(5)	$0.0654(^{+18}_{-16})$	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	E ₂ ⁺	$\mathbf{B}(\mathbf{E2})\uparrow$	B(E2)	au	eta_2	B(E2) ↑ [13
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
$^{52}\mathrm{Ca}$	2563.1(10)					
$^{54}\mathrm{Ca}$	2043(19)					
$^{42}\mathrm{Ti}$	1556.0 (8)	0.086(16)	19.8(37)	0.520(97)	0.321(30)	0.087(25)
$^{44}\mathrm{Ti}$	1083.06 (9)	$0.0680(^{+59}_{-28})$	$14.7(^{+13}_{-6})$	$4.03(^{+18}_{-32})$	$0.277(^{+12}_{-6})$	0.065(16)
⁴⁶ Ti	889.286 (3)	0.0951(25) 0.0900(33)*	19.42(52) 18.40(68)*	$7.72(^{+21}_{-20}) \\ 8.15(^{+31}_{-29})^*$	0.3175(42) 0.3091(57)*	0.095(5)
⁴⁸ Ti	983.5390 (24)	0.0662(29) 0.0627(27)*	12.77(56) 12.11(53)*	$6.70^{\binom{+31}{-28}} \\ 7.07^{\binom{+32}{-30}}^*$	0.2575(56) 0.2507(55)*	0.0720(40)
$^{50}\mathrm{Ti}$	1553.778 (7)	0.0275(16) 0.0284(14)*	5.04(30) 5.18(26)*	$1.64\binom{+10}{-9} \\ 1.589\binom{+82}{-75}$ *	0.1617(48) 0.1641(40)*	0.0290(40)
⁵² Ti	1049.73 (10)	$0.0603(^{+29}_{-24})$	$10.46\binom{+50}{-41}$	$5.31(^{+22}_{-24})$	$0.2331(^{+56}_{-46})$	
$^{54}\mathrm{Ti}$	1494.8 (8)	0.0357(63)	5.9(10)	$1.53(^{+33}_{-23})$	0.175(15)	
$^{56}\mathrm{Ti}$	1128.2 (4)	0.060(20)	9.4(31)	$3.7(^{+19}_{-9})$	0.221(37)	
⁵⁸ Ti	1047(4)	$0.042\binom{+26}{-23}$ **	$6.3(^{+39}_{-35})^{**}$	$7.8(^{+94}_{-30})^{**}$	$0.18\binom{+5}{-6}^{**}$	
⁶⁰ Ti	866(5)					
$^{46}\mathrm{Cr}$	892.16(10)	0.093(20)	19.0(41)	16.7(36)	0.288(31)	
⁴⁸ Cr	752.19(11)	0.137(15)	26.4(29)	12.4(14)	0.340(19)	0.136(21)
$^{50}{ m Cr}$	783.30(9)	0.1052(32) 0.1030(32)*	19.23(58) 18.83(58)*	$13.15\binom{+41}{-29} \\ 13.43\binom{+68}{-40}^*$	0.2897(44)	0.108(6)
$^{52}\mathrm{Cr}$	1434.094(14)	0.0622(24)	10.79(42)	$1.081(^{+44}_{-40})$	0.2170(42)	0.0660(30)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2}}^{+}_{1}$ (keV)	$\mathbf{B(E2)} \!\!\uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
		0.0623(19)*	10.81(33)*	$1.080(^{+34}_{-32})^*$		
$^{54}\mathrm{Cr}$	834.855(3)	0.0853(42) 0.0874(38)*	14.07(70) 14.42(63)*	$11.79\binom{+61}{-55} \\ 11.51\binom{+52}{-48}^*$	0.2478(62)	0.0870(40)
$^{56}\mathrm{Cr}$	1006.61(20)	0.055(19)	8.7(30)	7.1(25)	0.195(34)	
$^{58}\mathrm{Cr}$	880.7(2)	0.097(13)	14.6(19)	$7.9(^{+12}_{-9})$	0.252(16)	
⁶⁰ Cr	646(1)	0.121(15)	17.4(22)	$30.0(^{+42}_{-33})$	0.275(17)	
⁶² Cr	447(4)	0.173(17)	24.7(23)	$132\binom{+11}{-13}$	0.322(16)	
⁶⁴ Cr	430(2)	0.156(40)	20.5(52)	$200(^{+68}_{-40})$	0.299(38)	
⁴⁸ Fe	969.5(5)					
$^{50}\mathrm{Fe}$	765.0(10)	0.140(30)*	25.6(55)*	11.1(24)*	0.308(33)*	
⁵² Fe	849.45(10)	0.082(10)*	14.2(18)*	11.3(14)*	0.230(14)*	
⁵⁴ Fe	1408.19(19)	0.0608 (31) 0.0542(18)*	10.0(5) 8.94(30)*	1.21(6) 1.36(5)*	0.193(5)	0.062(5)
$^{56}\mathrm{Fe}$	846.776(5)	0.0981(20) 0.0954(27)*	15.4(3) 15.0(4)*	9.56(19) 9.83(28)*	0.239(2)	0.0980(40)
$^{58}\mathrm{Fe}$	810.7662(20)	0.122(6) 0.0932(76)*	18.3(9) 14.0(11)*	9.6(5) 12.5(10)*	0.270(7)	0.1200(40)
$^{60}\mathrm{Fe}$	823.63(15)	0.0938(88)	13.4(13)	11.5(11)	0.224(10)	0.096(18)
$^{62}\mathrm{Fe}$	876.8(3)	$0.102\binom{+10}{-8}$	$14.0(^{+14}_{-11})$	$7.74(^{+67}_{-71})$	$0.228(^{+12}_{-9})$	
⁶⁴ Fe	746.40(10)	$0.173(^{+21}_{-10})$	$22.7(^{+27}_{-13})$	$10.2(^{+6}_{-11})$	$0.291(^{+18}_{-9})$	
⁶⁶ Fe	574.4(10)	0.152(10)	19.2(13)	$42.9(^{+31}_{-27})$	0.2670(90)	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{(\mathrm{keV})}$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \ (e^2b^2)$	B(E2)	τ	eta_2	B(E2) \uparrow [13] (e^2b^2)
	(kev)	(e-o-)	(W.u.)	(ps)		(e-b-)
$^{68}\mathrm{Fe}$	522(1)	0.178(22)	21.6(26)	$62.1(^{+86}_{-67})$	0.283(17)	
⁵² Ni	1397(6)					
$^{54}\mathrm{Ni}$	1392.3(4)	0.061(12)	10.0(20)	1.28(25)	0.179(18)	
⁵⁶ Ni	2700.6(7)	0.0453(86) 0.0502(70)*	7.1(13) 7.9(11)*	0.062(13) 0.057(8)*	0.151(14)	0.060(12)
⁵⁸ Ni	1454.21(9)	0.0650(12) 0.0636(10)*	9.75(18) 9.54(16)*	$0.965\binom{+18}{-17} \\ 0.987\binom{+14}{-15}^*$	0.1768(16) 0.1749(15)*	0.0695(20)
$^{60}\mathrm{Ni}$	1332.518(5)	0.0916(16) 0.0886(17)*	13.13(23) 12.70(25)*	1.060(19) 1.096(21)*	0.2052(19) 0.2018(19)*	0.0933(15)
$^{62}\mathrm{Ni}$	1172.91(9)	0.0889(30) 0.0881(11)*	12.20(41) 12.09(15)*	2.068(67) 2.086(26)*	0.1977(18) 0.1969(13)*	0.0890(25)
$^{64}\mathrm{Ni}$	1345.75(5)	0.0674(32) 0.0687(22)*	8.86(42) 9.04(28)*	1.370(70) 1.345(45)*	0.1686(40) 0.1702(27)*	0.076(8)
⁶⁶ Ni	1424.8(10)	0.06(1)	7.6(13)	$1.16(^{+23}_{-17})$	0.1558(25)	0.062(9)
$^{68}\mathrm{Ni}$	2034.07(17)	0.0261 (60)	3.17(73)	$0.449(^{+13}_{-8})$	0.101(11)	0.026(6)
$^{70}\mathrm{Ni}$	1259.6(2)	0.086(14)	10.0(16)	1.50(24)	0.179(15)	
$^{72}\mathrm{Ni}$	1096.0(20)					
$^{74}\mathrm{Ni}$	1024(1)	0.064(22) 0.127(38)**	7.0(24) 13.8(41)**	$5.6\binom{+31}{-14} \\ 2.86(85)**$	$0.149(^{+23}_{-29}) \\ 0.21(3)^{**}$	
$^{76}\mathrm{Ni}$	992(2)					
$^{58}\mathrm{Zn}$	1356(3)					
$^{60}\mathrm{Zn}$	1003.9(2)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${{ m E}_2}^+_1 \ ({ m keV})$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
$^{62}\mathrm{Zn}$	954.0(4)	0.1224(59) 0.1224(59)*	16.79(81) 16.79(81)*	4.22(20) 4.22(20)*	0.2166(52)	0.124(9)
$^{64}{ m Zn}$	991.56(5)	0.1494(40) 0.1518(40)*	19.65(53) 19.97(52)*	$2.849(^{+78}_{-74}) 2.804(^{+75}_{-72})^*$	0.2342(32)	0.160(15)
$^{66}\mathrm{Zn}$	1039.2279(21)	0.1370(33) 0.1389(31)*	17.29(42) 17.53(39)*	2.458(59) 2.424(54)*	0.2198(26)	0.135(10)
$^{68}\mathrm{Zn}$	1077.37(4)	0.1199(21) 0.1195(20)*	14.55(25) 14.50(25)*	2.345(41) 2.352(40)*	0.2015(17)	0.124(15)
$^{70}{ m Zn}$	884.46(8)	0.1510(80) 0.1559(80)*	17.62(94) 18.20(93)*	$4.98\binom{+28}{-25} \\ 4.82\binom{+26}{-23}^*$	0.2218(59) 0.2254(58)*	0.160(14)
$^{72}\mathrm{Zn}$	652.70(5)	0.188(17)	21.1(19)	$18.3(^{+18}_{-14})$	0.243(11)	
$^{74}{ m Zn}$	605.9(8)	0.195(15)	21.2(16)	$25.6(^{+21}_{-18})$	0.2430(94)	
⁷⁶ Zn	598.68(10)	0.145(18)	15.2(19)	36.6(45)	0.206(12)	
$^{78}\mathrm{Zn}$	730.2(4)	0.077(19)	7.8(19)	25.5(63)	0.147(18)	
$^{80}{ m Zn}$	1492(1)	0.073(9)	7.1(9)	0.76(9)	0.141(9)	
⁶² Ge	964					
⁶⁴ Ge	1128.2 (4)	$0.208(^{+37}_{-27})$	$27.4\binom{+49}{-36}$	3.3(5)	$0.259(^{+23}_{-17})$	
$^{66}\mathrm{Ge}$	956.94(8)	0.134(11)	16.9(14)	$3.79(^{+34}_{-29})$	0.2038(80)	0.099(19)
⁶⁸ Ge	1015.801(16)	$0.1242\binom{+80}{-30}$	$15.07(^{+97}_{-37})$	$3.05(^{+8}_{-18})$	$0.1923(^{+62}_{-24})$	0.143(21)
$^{70}\mathrm{Ge}$	1039.485(22)	0.1790(30) 0.1786(30)*	20.89(35) 20.84(35)*	1.878(30) 1.882(30)*	0.2264(19) 0.2262(19)*	0.1760(40)
$^{72}\mathrm{Ge}$	834.011(19)	0.2087(30) 0.2092(30)*	23.46(34) 23.52(34)*	4.84(7) 4.83(7)*	0.2400(17) 0.2402(17)*	0.213(6)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}\atop (keV)}$	$\mathbf{B}(\mathbf{E2})\uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
$^{74}\mathrm{Ge}$	595.850(6)	0.306(15) 0.301(15)*	33.1(16) 32.6(16)*	17.8(9) 18.0(9)*	0.285(7) 0.285(7)*	0.300(6)
$^{76}\mathrm{Ge}$	562.93(3)	0.2735(30) 0.2734(30)*	28.61(31) 28.61(31)*	26.35(30) 26.35(30)*	0.2650(15) 0.2650(15)*	0.268(8)
⁷⁸ Ge	619.36(12)	0.222(14)	22.4(14)	$20.1(^{+14}_{-12})$	0.2346(74)	
$^{80}\mathrm{Ge}$	659.15(4)	0.139(27) 0.107(15)*	13.6(26) 10.5(15)*	$23.6(^{+57}_{-38}) 30.5(^{+51}_{-38})^*$	0.183(18) 0.160(11)*	
$^{82}\mathrm{Ge}$	1347.51(7)	0.121(15)	11.4(14)	$0.76(^{+11}_{-8})$	0.167(10)	
$^{84}\mathrm{Ge}$	624.3(7)					
$^{86}\mathrm{Ge}$	527					
$^{66}\mathrm{Se}$	929(2)					
$^{68}\mathrm{Se}$	854.2(3)	0.211(29)	25.6(35)	$4.25(^{+68}_{-41})$	$0.236(^{+15}_{-17})$	
$^{70}\mathrm{Se}$	944.52(5)	0.169(11)	19.7(13)	$3.21(^{+22}_{-20})$	0.207(7)	0.38(8)
$^{72}\mathrm{Se}$	862.07(8)	0.1895(79)	21.30(88)	$4.52(^{+20}_{-18})$	0.2152(45)	0.207(25)
$^{74}\mathrm{Se}$	634.74(6)	0.357(20)	38.7(21)	$11.07(^{+64}_{-58})$	0.2902(80)	0.387(8)
$^{76}\mathrm{Se}$	559.102(5)	$0.432(^{+15}_{-6})$	$45.1(^{+16}_{-6})$	$17.28(^{+23}_{-58})$	$0.3133(^{+55}_{-20})$	0.420(10)
$^{78}\mathrm{Se}$	613.727(3)	0.343(12)	34.6(12)	13.66(47)	0.2744(49)	0.335(9)
$^{80}\mathrm{Se}$	666.27(7)	0.2521(82)	24.62(80)	12.33(41)	0.2314(38)	0.253(6)
$^{82}\mathrm{Se}$	654.75(16)	0.183(10)	17.3(9)	18.5(10)	0.1939(53)	0.182(5)
⁸⁴ Se	1454.55(8)	0.105(15)	9.61(14)	0.597(85)	0.145(10)	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${\rm E_{2}}^{+}_{1} \ m (keV)$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	$\mathbf{B}(\mathbf{E2})\uparrow [13]$ (e^2b^2)
$^{86}\mathrm{Se}$	704.1(3)					
$^{72}{ m Kr}$	709.72(14)	0.466(65)	52.4(72)	$4.86(^{+78}_{-60})$	0.319(22)	
$^{74}{ m Kr}$	455.61(10)	0.627(31)	68.0(34)	$33.0(^{+17}_{-16})$	0.363(9)	0.84(10)
$^{76}{ m Kr}$	423.96(7)	0.758(26)	79.2(27)	$39.1(^{+14}_{-13})$	0.3920(66)	0.824(24)
$^{78}{ m Kr}$	455.033(23)	0.634(16)	64.0(16)	32.89(85)	0.3524(44)	0.633(39)
$^{80}{ m Kr}$	616.60(10)	0.381(12)	37.2(11)	12.00(37)	0.2686(41)	0.370(21)
$^{82}{ m Kr}$	776.520(3)	$0.2251\binom{+67}{-61}$	$21.28\binom{+63}{-58}$	6.42(19)	$0.2031(^{+30}_{-28})$	0.223(10)
$^{84}{ m Kr}$	881.615(3)	$0.1268(^{+48}_{-27})$	$11.60(^{+44}_{-25})$	$6.04(^{+13}_{-22})$	$0.1500(^{+29}_{-16})$	0.125(6)
$^{86}{ m Kr}$	1564.75(10)	0.1056(95)	9.36(84)	$0.412\binom{+41}{-34}$	0.1347(60)	0.122(10)
⁸⁸ Kr	775.31(4)	0.0895(93)	7.7(8)	$16.3(^{+19}_{-15})$	$0.1222(^{+72}_{-66})$	
$^{90}{ m Kr}$	707.13(5)	$0.154(^{+307}_{-61})$	$12.8(^{+257}_{-51})$	15(10)	$0.158(^{+116}_{-36})$	
$^{92}{ m Kr}$	769.1(5)	0.2073(70)	16.81(57)	$7.30(^{+26}_{-23})$	$0.1805(^{+30}_{-27})$	
$^{94}{ m Kr}$	666.1(3)	0.247(28)	19.5(22)	$12.6(^{+16}_{-13})$	0.194(11)	
$^{96}{ m Kr}$	554.1(5)	0.436(93)	33.4(71)	$17.9(^{+48}_{-31})$	0.254(27)	
$^{74}{ m Sr}$	471(1)					
$^{76}\mathrm{Sr}$	262.3(2)	$1.08(^{+15}_{-12})$	$113(^{+16}_{-13})$	295(37)	$0.443(^{+31}_{-25})$	

Nuclide	$\mathrm{E}_{2_{1}^{+}}$	B(E2) ↑	B(E2)	au	eta_2	B(E2) ↑ [13
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
⁷⁸ Sr	277.60(10)	0.97(10)	98(10)	$248(^{+29}_{-23})$	0.413(21)	1.08(15)
⁸⁰ Sr	385.88(8)	0.909(40)	88.8(39)	$52.1(^{+24}_{-22})$	0.3930(86)	0.959(36)
⁸² Sr	573.54(8)	$0.505(^{+29}_{-20})$	$47.8(^{+28}_{-19})$	$12.97(^{+53}_{-71})$	$0.2884\binom{+83}{-57}$	0.513(20)
⁸⁴ Sr	793.22(6)	0.292(23)	26.7(21)	$4.45\binom{+38}{-32}$	0.2156(84)	0.289(44)
⁸⁶ Sr	1076.68(4)	0.1341(77) 0.1278(58)*	11.89(68) 11.34(52)*	$2.10\binom{+13}{-11} \\ 2.21\binom{+11}{-10}^*$	0.1439(41) 0.1405(32)*	0.128(14)
⁸⁸ Sr	1836.087(8)	$0.0903\binom{+32}{-23} \\ 0.0897(24)^*$	$7.77(^{+27}_{-19}) \\ 7.72(21)^*$	$0.2165\binom{+56}{-74} \\ 0.2179\binom{+61}{-58}^*$	$0.1163(^{+20}_{-15}) \\ 0.1159(16)^*$	0.092(5)
$^{90}\mathrm{Sr}$	831.68(4)	$0.102(^{+44}_{-24})$	$8.5(^{+37}_{-20})$	10(3)	$0.122(^{+26}_{-14})$	0.113(34)
$^{92}\mathrm{Sr}$	814.98(3)	$0.095\binom{+68}{-28}$	$7.7(^{+55}_{-23})$	12(5)	$0.116\binom{+41}{-17}$	0.114(48)
$^{94}\mathrm{Sr}$	836.9(1)	$0.099(^{+66}_{-28})$	$7.8(^{+52}_{-22})$	10.0(40)	$0.117(^{+39}_{-16})$	0.118(47)
$^{96}\mathrm{Sr}$	814.93(7)	$0.231(^{+16}_{-5})$	$17.7(^{+13}_{-4})$	$4.92(^{+10}_{-33})$	$0.1753(^{+62}_{-17})$	0.24(14)
⁹⁸ Sr	144.225(6)	1.240(61)	92.4(46)	4200(200)	0.4010(99)	1.282(39)
$^{100}\mathrm{Sr}$	129.16(9)	1.22(17)	88(12)	$6700(^{+1100}_{-800})$	0.392(27)	1.42(8)
$^{102}\mathrm{Sr}$	126.0(2)					
$^{80}{ m Zr}$	288.9(2)					
$^{82}\mathrm{Zr}$	407.00(10)	$0.91(^{+12}_{-5})$	86(+11)	39.8(+24)	$0.368(^{+24}_{-10})$	0.91(9)
$^{84}{ m Zr}$	539.92(9)	$0.437(^{+25}_{-22})$	$40.0(^{+23}_{-20})$	20.3(11)	$0.2506\binom{+72}{-63}$	0.438(25)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}} \ m (keV)$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
	(Rev)	(6 0)	(w.u.)	(ps)		(6 0)
$^{86}\mathrm{Zr}$	751.75(3)	$0.157(^{+36}_{-24})$	$13.9(^{+32}_{-22})$	10.8(20)	$0.148(^{+16}_{-12})$	0.166(31)
⁸⁸ Zr	1057.03(4)	$0.086(^{+11}_{-9})$	$7.39(^{+92}_{-74})$	3.60(40)	$0.1077(^{+67}_{-54})$	0.26(8)
$^{90}{ m Zr}$	2186.274(15)	0.0627(34) 0.0631(30)*	5.23(28) 5.27(25)*	$0.1302(^{+75}_{-67}) \\ 0.1294(^{+64}_{-59})^*$	0.0907(24) 0.0910(22)*	0.0610(40)
$^{92}{ m Zr}$	934.47(5)	0.0800(39) 0.0786(27)**	6.49(31) 6.37(22)**	$7.15\binom{+36}{-33} \\ 7.29\binom{+26}{-24} **$	0.1009(24) 0.1000(17)**	0.083(6)
$^{94}{ m Zr}$	918.75(5)	0.0629(45) 0.0646(58)**	4.96(35) 5.09(46)**	$9.90(^{+76}_{-66}) 9.65(^{+95}_{-79})**$	0.0882(31) 0.0894(40)**	0.066(14)
$^{96}{ m Zr}$	1750.497(15)	0.0314(33)	2.41(26)	0.79(9)	0.0615(33)	0.055(22)
$^{98}\mathrm{Zr}$	1222.92(12)	>0.0093	>0.69	<16	>0.033	
$^{100}{ m Zr}$	212.530(9)	$1.110(^{+51}_{-36})$	$80.5(^{+37}_{-26})$	$791(^{+26}_{-35})$	$0.3556(^{+82}_{-57})$	1.11(6)
$^{102}{ m Zr}$	151.78(11)	1.35(12)	95.4(85)	$3000(^{+300}_{-200})$	0.387(17)	1.66(34)
$^{104}{ m Zr}$	139.3(3)	1.958(100)	134.8(69)	$2931(^{+158}_{-143})$	0.460(12)	
$^{106}{ m Zr}$	152.1	1.55(5)	104.0(33)	$2600(^{+200}_{-150})$	0.36(1)	
$^{108}\mathrm{Zr}$	173.7					
⁸⁴ Mo	443.9(2)					
$^{86}\mathrm{Mo}$	566.6(4)					
⁸⁸ Mo	740.54(4)					
⁹⁰ Mo	947.97(2)					

Nuclide	E ₂₁ +	B(E2) ↑	B(E2)	τ ()	eta_2	B(E2) ↑ [13]
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
$^{92}\mathrm{Mo}$	1509.51(3)	0.0975(43)	7.90(35)	$0.534(^{+24}_{-22})$	0.1061(23)	0.097(6)
$^{94}\mathrm{Mo}$	871.098(16)	0.2072(74)	16.32(58)	$3.92(^{+14}_{-13})$	0.1525(27)	0.2030(40)
⁹⁶ Mo	778.237(10)	0.2775(59)	21.26(45)	5.15(11)	0.1740(19)	0.271(5)
⁹⁸ Mo	787.384(13)	0.2695(57)	20.09(43)	5.00(11)	0.1692(18)	0.267(9)
$^{100}\mathrm{Mo}$	535.561(22)	0.530(22)	38.4(16)	$17.41(^{+77}_{-71})$	0.2340(49)	0.516(10)
$^{102}\mathrm{Mo}$	296.610(4)	$0.976(^{+49}_{-40})$	$69.0(^{+35}_{-28})$	$177.7(^{+76}_{-86})$	$0.3135(^{+79}_{-64})$	0.963(31)
¹⁰⁴ Mo	192.19(9)	1.28(11)	87.8(75)	$1095(^{+102}_{-86})$	0.354(15)	1.34(8)
¹⁰⁶ Mo	171.549(8)	1.290(65)	86.6(44)	$1817(^{+97}_{-87})$	0.351(9)	1.31(7)
$^{108}\mathrm{Mo}$	192.79(15)	1.74(46)	114(30)	$793(^{+281}_{-166})$	$0.403(^{+50}_{-57})$	1.6(5)
¹¹⁰ Mo	213.7(3)					
⁸⁸ Ru	616.2*					
$^{90}\mathrm{Ru}$	738.00(10)*					
$^{92}\mathrm{Ru}$	864.6(10)*					
⁹⁴ Ru	1430.71(20)					
$^{96}\mathrm{Ru}$	832.56(5)	0.2379(65)	18.22(50)	$4.28(^{+12}_{-11})$	0.1538(21)	0.251(10)
⁹⁸ Ru	652.44(4)	0.401(13)	29.89(97)	$8.59(^{+29}_{-27})$	0.1970(32)	0.392(12)

Nuclide	$\begin{array}{c} {\rm E_{2_1^+}} \\ ({\rm keV}) \end{array}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
¹⁰⁰ Ru	539.510(10)	0.4927(41)	35.74(30)	18.05(15)	0.21539(90)	0.490(5)
¹⁰² Ru	475.0962(10)	0.632(12)	44.68(88)	26.50(53)	0.2408(24)	0.630(10)
$^{104}\mathrm{Ru}$	358.02(7)	0.826(17)	56.9(12)	82.8(17)	0.2717(28)	0.820(12)
¹⁰⁶ Ru	270.07(4)	1.074(95)	72.1(64)	$255(^{+25}_{-21})$	0.306(14)	0.77(20)
¹⁰⁸ Ru	242.23(4)	$0.894(^{+80}_{-58})$	$58.6(^{+52}_{-38})$	$518\binom{+36}{-43}$	$0.276\binom{+12}{-9}$	1.01(15)
¹¹⁰ Ru	240.71(10)	1.071(61)	68.4(39)	447(25)	0.2980(85)	1.05(12)
$^{112}\mathrm{Ru}$	236.66(17)	1.107(96)	69.0(60)	469(41)	0.299(13)	1.17(23)
$^{114}\mathrm{Ru}$	265.19(17)					
$^{116}\mathrm{Ru}$	292.43(21)					
¹¹⁸ Ru	327.6(3)					
⁹² Pd	873.6(2)*					
⁹⁴ Pd	813.8(1)*					
⁹⁶ Pd	1415.31(10)					
⁹⁸ Pd	862.89(10)	>0.0523	>3.897	<16.3	>0.06804	
¹⁰⁰ Pd	665.50(10)	$0.347(^{+16}_{-15})$	$25.1(^{+12}_{-11})$	9.0(4)	$0.1728(^{+40}_{-38})$	
¹⁰² Pd	556.44(5)	0.460(23)	32.5(16)	16.57(83)	0.1965(49)	0.460(30)

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{\mathrm{(keV)}}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
$^{104}\mathrm{Pd}$	555.81(4)	0.529(15) 0.529(15)*	36.4(10) 36.4(10)*	14.48(40) 14.48(40)*	0.2080(29)	0.535(35)
¹⁰⁶ Pd	511.850(23)	0.660(17) 0.646(15)*	44.3(12) 43.3(10)*	$17.50(^{+48}_{-45}) 17.89(42)^*$	0.2294(30) 0.2269(26)*	0.660(35)
¹⁰⁸ Pd	433.938(4)	0.764(20) 0.778(17)*	50.0(13) 50.9(11)*	34.42(90) 33.79(71)*	0.2437(33) 0.2459(26)*	0.760(40)
¹¹⁰ Pd	373.80(6)	0.865(23) 0.861(20)*	55.3(15) 55.0(13)*	63.7(17) 64.0(14)*	0.2562(34) 0.2556(29)*	0.870(40)
¹¹² Pd	348.79(17)	$0.64(^{+13}_{-9})$	$40.1(^{+79}_{-57})$	121(20)	$0.218(^{+22}_{-15})$	0.66(11)
¹¹⁴ Pd	332.50(24)	$0.83(^{+17}_{-12})$	$51(^{+10}_{-7})$	118(20)	$0.245\binom{+25}{-18}$	0.38(12)
¹¹⁶ Pd	340.26(8)	$0.57(^{+22}_{-13})$	$34\binom{+13}{-8}$	153(43)	$0.201(^{+39}_{-23})$	0.62(18)
¹¹⁸ Pd	378.6(1)*					
¹²⁰ Pd	438(1)					
¹²² Pd	499(9)					
¹²⁴ Pd	590(11)					
¹²⁶ Pd	686(17)					
¹²⁸ Pd	1311.4					
⁹⁸ Cd	1394.7(3)*					
$^{100}\mathrm{Cd}$	1004.11(10)	< 0.28	<20.03	>1.43	< 0.1488	
$^{102}\mathrm{Cd}$	776.55(14)	0.257(23)	18.2(16)	$5.61\binom{+55}{-46}$	0.1407(64)	
$^{104}\mathrm{Cd}$	658.00(20)	0.337(19)	23.2(13)	$9.79(^{+58}_{-53})$	0.1590(45)	0.41(11)

Nuclide	$\mathbf{E}_{2_{1}^{+}}$	B(E2) ↑	B(E2)	au	eta_2	B(E2) ↑ [13]
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
¹⁰⁶ Cd	632.64(4)	0.407(12)	27.32(83)	9.86(30)	0.1726(26)	0.410(20)
$^{108}\mathrm{Cd}$	632.988(15)	0.419(14)	27.45(91)	$9.55(^{+33}_{-31})$	0.1730(29)	0.430(20)
¹¹⁰ Cd	657.7645(20)	0.426(21) 0.4283(93)*	27.2(13) 27.36(59)*	$7.77(^{+40}_{-37}) \\ 7.71(^{+18}_{-16})^*$	0.1723(43) 0.1728(19)*	0.450(20)
¹¹² Cd	617.520(10)	0.501(22) 0.502(22)*	31.3(14) 31.3(14)*	$9.04\binom{+41}{-38} \\ 9.02\binom{+41}{-38}^*$	0.1847(40) 0.1848(40)*	0.510(20)
¹¹⁴ Cd	558.456(2)	0.536(25) 0.536(25)*	32.7(15) 32.7(15)*	$13.94\binom{+68}{-62} \\ 13.94\binom{+68}{-62}^*$	0.1888(44) 0.1888(44)*	0.545(20)
¹¹⁶ Cd	513.490(15)	0.580(26) 0.575(26)*	34.5(16) 34.2(16)*	$19.59(^{+91}_{-89})$ $19.76(^{+93}_{-86})^*$	0.1940(44) 0.1932(44)*	0.560(20)
¹¹⁸ Cd	487.77(8)	0.578(44)	33.6(26)	25.4(19)	0.1915(73)	0.568(44)
¹²⁰ Cd	505.94(17)	0.473(55)	26.9(31)	25.9(30)	0.171(10)	0.48(6)
$^{122}\mathrm{Cd}$	569.45(8)	0.44(20)	24.5(111)	$15.4(^{+129}_{-48})$	$0.163(^{+34}_{-42})$	0.58(27)
¹²⁴ Cd	612.8(4)	0.35(19)	19.1(10)	$13.4\binom{+8}{-7}$	0.144(4)	
$^{126}\mathrm{Cd}$	652.0(9)*	0.263(60)	14.0(32)	$13.1(^{+39}_{-24})$	0.124(14)	
¹²⁸ Cd	645.8(2)*					
¹³⁰ Cd	1325(1)*					
$^{102}\mathrm{Sn}$	1472*					
$^{104}\mathrm{Sn}$	1260.1(3)	0.176(28)	12.1(19)	$0.73(^{+14}_{-10})$	$0.1104\binom{+84}{-92}$	
¹⁰⁶ Sn	1207.7(5)	0.209(33)	14.0(22)	0.76(12)	0.1187(94)	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E}_{2_1^+} \ m (keV)$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
	(Ne v)	(6.0)	(vv.u.)	(Ps)		(6.0)
¹⁰⁸ Sn	1206.07(10)	0.224(16)	14.7(11)	0.713(52)	0.1214(44)	
¹¹⁰ Sn	1211.88(15)	0.231(18)	14.7(11)	0.676(52)	0.1217(47)	
¹¹² Sn	1256.85(7)	0.232(11)	14.49(68)	$0.560(^{+28}_{-25})$	0.1207(29)	0.240(14)
¹¹⁴ Sn	1299.907(7)	0.215(13)	13.10(79)	$0.511\binom{+33}{-29}$	0.1147(34)	0.24(5)
¹¹⁶ Sn	1293.560(8)	0.2062(50) 0.2066(50)*	12.27(30) 12.30(30)*	$0.546\binom{+14}{-13} \\ 0.545\binom{+14}{-13}^*$	0.1110(14) 0.1112(14)*	0.209(6)
¹¹⁸ Sn	1229.666(16)	0.2070(40) 0.2041(40)*	12.04(23) 11.87(23)*	$0.701(^{+14}_{-13}) \\ 0.711(14)^*$	0.1100(10) 0.1092(11)*	0.209(8)
$^{120}\mathrm{Sn}$	1171.265(15)	0.1975(24) 0.1967(30)*	11.24(13) 11.19(17)*	0.937(12) 0.940(15)*	0.1063(7) 0.1061(8)*	0.2020(40)
¹²² Sn	1140.51(3)	0.1887(45)	10.50(25)	1.120(27)	0.1027(13)	0.1920(40)
$^{124}\mathrm{Sn}$	1131.739(17)	0.1622(40) 0.1626(40)*	8.83(22) 8.85(22)*	1.354(33) 1.351(33)*	0.0942(12) 0.0943(12)*	0.1660(40)
$^{126}\mathrm{Sn}$	1141.15(4)	0.1269(73)	6.76(39)	$1.66(^{+10}_{-9})$	0.0825(24)	
¹²⁸ Sn	1168.82(4)	0.0771(38)	4.03(20)	$2.42(^{+13}_{-11})$	0.0636(16)	
¹³⁰ Sn	1221.26(5)	0.023(5)	1.18(26)	6.5(14)	0.0344(37)	
$^{132}\mathrm{Sn}$	4041.20(15)	0.118(26)	5.9(13)	0.00321(71)	0.0771(85)	
$^{134}\mathrm{Sn}$	725.6	0.029(5)	1.42(28)	$69.8(^{+145}_{-103})$	0.0378(34)	
¹³⁶ Sn	688					
¹³⁸ Sn	715					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\begin{array}{c} \mathbf{E}_{2_1^+} \\ (\mathrm{keV}) \end{array}$	$\mathbf{B}(\mathbf{E2})\uparrow$ (e^2b^2)	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
¹⁰⁶ Te	664.8(3)*					
¹⁰⁸ Te	625.20(20)	$0.387(^{+52}_{-41})$	$25.3(^{+34}_{-27})$	11.0(13)	$0.153(^{+10}_{-8})$	
¹¹⁰ Te	657.70(9)					
¹¹² Te	689.01(2)	0.46(4)	28.7(25)	5.7(5)	0.163(7)	
¹¹⁴ Te	708.74(15)	$0.556(^{+49}_{-41})$	$33.9(^{+30}_{-25})$	4.09(33)	$0.1774\binom{+78}{-65}$	
¹¹⁶ Te	678.92(3)					
¹¹⁸ Te	605.706(20)	$0.57(^{+11}_{-8})$	$32.9(^{+62}_{-45})$	8.8(14)	$0.175(^{+17}_{-12})$	
$^{120}\mathrm{Te}$	560.438(20)	0.685(33)	38.97(88)	$10.71(^{+54}_{-49})$	0.1903(46)	0.77(16)
$^{122}\mathrm{Te}$	564.094(16)	0.650(30)	36.2(17)	$10.93(^{+52}_{-49})$	0.1834(44)	0.660(6)
¹²⁴ Te	602.7271(21)	0.560(28)	30.5(15)	$9.12(^{+48}_{-44})$	0.1684(42)	0.568(6)
¹²⁶ Te	666.352(10)	0.4738(93)	25.26(50)	6.53(13)	0.1532(15)	0.475(10)
¹²⁸ Te	743.219(7)	0.3800(71)	19.83(37)	4.724(88)	0.1358(13)	0.383(6)
$^{130}\mathrm{Te}$	839.494(17)	0.296(10)	15.12(51)	$3.30(^{+12}_{-11})$	0.1185(20)	0.295(7)
¹³² Te	974.22(9)	0.207(17)	10.39(86)	$2.24(^{+20}_{-17})$	0.0983(41)	
¹³⁴ Te	1279.11(10)	0.1034(40)	5.08(20)	$1.152(^{+46}_{-53})$	0.0687(13)	
¹³⁶ Te	606.64(5)	0.122(18)	5.87(87)	$40.5(^{+70}_{-52})$	0.0739(55)	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}} \ ({ m keV})$	$\mathbf{B(E2)} \uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
			,	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		,
¹³⁸ Te	443.1(10)*					
¹¹⁰ Xe	469.7(2)*					
$^{112}\mathrm{Xe}$	466.0(2)*					
$^{114}\mathrm{Xe}$	450.08(19)	0.971(58)	59.1(35)	$22.5(^{+14}_{-13})$	0.2257(67)	0.93(6)
¹¹⁶ Xe	393.6(2)	1.211(61)	72.1(36)	35.1(18)	0.2492(63)	1.21(6)
$^{118}\mathrm{Xe}$	337.32(13)	$1.383(^{+48}_{-42})$	$80.4(^{+28}_{-24})$	65.6(22)	$0.2633(^{+45}_{-40})$	1.40(7)
¹²⁰ Xe	332.61(4)	1.739(110)	98.9(63)	$65.2(^{+44}_{-39})$	0.2920(94)	1.73(11)
$^{122}\mathrm{Xe}$	331.28(7)	1.349(68)	75.1(38)	$73.6(^{+39}_{-35})$	0.2544(64)	1.40(6)
¹²⁴ Xe	354.04(4)	1.072(44)	58.4(24)	$66.8(^{+29}_{-26})$	0.2243(46)	0.96(6)
¹²⁶ Xe	388.631(9)	0.826(60)	44.1(32)	$54.7(^{+43}_{-37})$	0.1949(70)	0.770(25)
¹²⁸ Xe	442.911(9)	0.790(38)	41.2(20)	$29.9(^{+15}_{-14})$	0.1885(46)	0.750(40)
¹³⁰ Xe	536.068(6)	0.634(29)	32.4(15)	$14.43(^{+60}_{-63})$	0.1671(39)	0.65(5)
¹³² Xe	667.715(2)	0.468(24)	23.5(12)	$6.54(^{+34}_{-33})$	0.1422(36)	0.460(30)
$^{134}\mathrm{Xe}$	847.041(23)	0.317(18)	15.57(88)	$2.95(^{+17}_{-16})$	0.1158(33)	0.34(6)
¹³⁶ Xe	1313.027(10)	0.217(33)	10.5(16)	$0.481(^{+86}_{-64})$	0.0949(75)	0.36(6)
¹³⁸ Xe	588.827(18)	0.38(10)	17.9(47)	15.1(40)	0.124(16)	

Nuclide	${\rm E_{2}}_{1}^{+}$ (keV)	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	$\mathbf{B}(\mathbf{E2})\uparrow [13]$ (e^2b^2)
$^{140}\mathrm{Xe}$	376.658(15)	0.522(40)	24.2(18)	$101.0(^{+84}_{-72})$	0.144(6)	0.324(14)
$^{142}\mathrm{Xe}$	287.20(20)	0.69(10)	31.4(45)	289(42)	0.164(12)	
$^{144}\mathrm{Xe}$	252.6*	0.73(17)	32.6(76)	$507(^{+154}_{-96})$	0.168(20)	
¹¹⁸ Ba	194*					
¹²⁰ Ba	186(1)*					
$^{122}\mathrm{Ba}$	195.90(20)	2.34(22)	130(12)	$510(^{+54}_{-44})$	0.323(15)	2.81(28)
$^{124}\mathrm{Ba}$	229.91(10)	2.096(78)	114.1(43)	$275(^{+11}_{-10})$	0.3024(56)	2.09(10)
¹²⁶ Ba	256.02(6)	1.740(80)	92.8(43)	$198.2(^{+96}_{-87})$	0.2726(63)	1.75(9)
¹²⁸ Ba	284.00(8)	1.441(53)	75.2(27)	145.5(53)	0.2455(45)	1.48(7)
$^{130}\mathrm{Ba}$	357.38(8)	1.138(46)	58.2(24)	$60.0(^{+25}_{-23})$	0.2159(44)	1.163(16)
$^{132}\mathrm{Ba}$	464.508(12)	0.847(57)	42.4(29)	22.0(15)	0.1844(62)	0.86(6)
$^{134}\mathrm{Ba}$	604.7223(19)	0.665(19)	32.63(95)	7.55(22)	0.1617(23)	0.658(7)
$^{136}\mathrm{Ba}$	818.497(11)	0.413(11)	$19.87(^{+54}_{-53})$	2.684(73)	0.1262(17)	0.410(8)
¹³⁸ Ba	1435.816(10)	0.230(11) 0.233(11)*	10.87(52) 11.00(48)*	$0.290(^{+15}_{-13}) \\ 0.287(^{+14}_{-13})^*$	0.0933(23) 0.0939(23)*	0.230(9)
¹⁴⁰ Ba	602.36(3)	0.484(38)	22.4(18)	$10.57(^{+90}_{-77})$	0.1340(52)	0.45(19)
$^{142}\mathrm{Ba}$	359.597(14)	0.676(35)	30.7(16)	$97.9(^{+54}_{-48})$	0.1569(41)	0.699(37)

Nuclide	${ m E_{2_1^+}} \ ({ m keV})$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
	,			<u> </u>		
$^{144}\mathrm{Ba}$	199.326(6)	1.012(55)	45.2(25)	$1092(^{+63}_{-56})$	0.1902(52)	1.05(6)
¹⁴⁶ Ba	181.05(5)	1.350(68)	59.1(29)	$1252(^{+66}_{-60})$	0.2177(55)	1.355(48)
¹⁴⁸ Ba	141.8(1)					
¹²² Ce	136.4(5)					
¹²⁴ Ce	141.90(20)	$3.50(^{+100}_{-63})$	$190(^{+54}_{-34})$	1270(280)	$0.377(^{+50}_{-36})$	3.7(9)
$^{126}\mathrm{Ce}$	169.59(3)	3.65(46)	195(25)	$603(^{+87}_{-67})$	0.381(24)	2.68(48)
¹²⁸ Ce	207.09(18)	2.27(13)	118.5(68)	405(23)	0.2975(85)	2.28(22)
¹³⁰ Ce	253.85(16)	1.755(79)	89.7(40)	$203.8(^{+96}_{-88})$	0.2589(59)	1.74(10)
¹³² Ce	325.34(8)	1.69(11)	84.7(55)	$63.9(^{+44}_{-39})$	0.2515(84)	1.87(17)
¹³⁴ Ce	409.20(10)	1.062(85)	52.1(42)	32.9(26)	0.1974(79)	1.04(9)
¹³⁶ Ce	552.20(11)	0.81(9)	39.0(43)	9.7(11)	0.1707(95)	0.81(9)
¹³⁸ Ce	788.744(8)	0.467(10)	22.0(5)	2.85(6)	0.1283(14)	0.450(30)
¹⁴⁰ Ce	1596.237(25)	0.300(15) 0.3016(80)*	13.88(70) 13.97(37)*	$0.1313(^{+69}_{-63}) \\ 0.1305(^{+35}_{-34})^*$	0.1018(25) 0.1022(14)*	0.298(6)
¹⁴² Ce	641.282(9)	0.4572(50) 0.4572(50)*	20.8(2) 20.8(2)*	8.2(1) 8.2(1)*	0.1245(7) 0.1245(7)*	0.480(6)
¹⁴⁴ Ce	397.441(9)	$0.96(^{+30}_{-18})$	$43(^{+13}_{-8})$	42(10)	$0.179(^{+28}_{-17})$	0.83(9)
¹⁴⁶ Ce	258.46(3)	0.97 (11)	42.5(48)	339(+43)	0.178(10)	1.14(12)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\mathrm{E_{2_{1}^{+}}}_{(\mathrm{keV})}$	$\mathbf{B}(\mathbf{E2})\uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
			, ,	<u> </u>		
$^{148}\mathrm{Ce}$	158.467(5)	2.02(11)	86.9(47)	$1437(^{+83}_{-74})$	0.2548(69)	1.96(18)
¹⁵⁰ Ce	97.1	3.18(48)	134(20)	4530(680)	0.317(24)	3.3(8)
¹⁵² Ce	81.7	$5.9(^{+15}_{-10})$	$246\binom{+61}{-41}$	3608(722)	$0.429(^{+51}_{-37})$	
$^{128}\mathrm{Nd}$	133.66(7)					
$^{130}\mathrm{Nd}$	159.05(14)	3.9(16)	199(81)	720(300)	0.373(77)	4.1(18)
$^{132}\mathrm{Nd}$	213.16(12)	3.58(59)	179(30)	$224\binom{+44}{-32}$	0.354(29)	3.5(6)
$^{134}\mathrm{Nd}$	294.17(16)	$1.879(^{+58}_{-46})$	$92.3(^{+28}_{-23})$	$93.4(^{+24}_{-28})$	$0.2538\binom{+39}{-31}$	1.83(37)
¹³⁶ Nd	373.72(16)	1.66(23)	80(11)	32.9(46)	0.236(16)	
¹³⁸ Nd	520.85(17)					
¹⁴⁰ Nd	773.73(6)	0.72(5)	33.3(23)	$2.04\binom{+15}{-13}$	0.1526(53)	
$^{142}\mathrm{Nd}$	1575.781(10)	0.265(13) 0.272(13)*	12.05(58) 12.36(59)*	$0.1583(^{+82}_{-72}) \\ 0.1543(^{+77}_{-70})^*$	0.0917(23) 0.0929(21)*	0.265(6)
$^{144}\mathrm{Nd}$	696.561(10)	0.504(15) 0.498(14)*	22.48(67) 22.22(62)*	4.92(15) 4.98(14)*	0.1253(19)	0.491(5)
$^{146}\mathrm{Nd}$	453.77(5)	0.748(22) 0.705(22)*	32.76(96) 30.88(96)*	27.90(82) 29.61(92)*	0.1512(22)	0.760(25)
¹⁴⁸ Nd	301.702(16)	1.338(30)	57.5(13)	116.1(26)	0.2004(22)	1.35(5)
$^{150}\mathrm{Nd}$	130.21(8)	2.707(30) 2.697(30)*	114.4(13) 113.9(13)*	2168(24) 2176(24)*	0.2825(16)	2.760(40)
$^{152}\mathrm{Nd}$	72.51(19)	4.10(22)	170.2(91)	6100(330)	0.3447(92)	4.20(28)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}\atop (keV)}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
$^{154}\mathrm{Nd}$	70.8(1)	$2.35\binom{+82}{-49}$	$96\binom{+33}{-20}$	11111(2886)	$0.258(^{+42}_{-58})$	
$^{156}\mathrm{Nd}$	66.9					
$^{130}\mathrm{Sm}$	122(3)					
$^{132}\mathrm{Sm}$	131(1)					
$^{134}\mathrm{Sm}$	163	4.14(34)	203(17)	605(50)	0.365(15)	4.2(6)
$^{136}\mathrm{Sm}$	254.92(16)	$2.71\binom{+28}{-23}$	$130(^{+13}_{-11})$	128(12)	$0.292(^{+15}_{-12})$	2.73(27)
¹³⁸ Sm	346.75(20)	1.30(19)	61.4(90)	60.3(88)	0.200(15)	1.41(23)
$^{140}\mathrm{Sm}$	530.68(10)	$1.053\binom{+75}{-65}$	$48.8(^{+35}_{-30})$	9.1(6)	0.179(6)	
$^{142}\mathrm{Sm}$	768.0(2)	0.70(9)	32(4)	$2.17(^{+32}_{-25})$	0.144(9)	
$^{144}\mathrm{Sm}$	1660.027(10)	0.259(19)	11.55(85)	$0.1249\binom{+99}{-86}$	0.0869(32)	0.262(6)
$^{146}\mathrm{Sm}$	747.115(13)	$0.24(_{-7})$	10.5(_31)	$7.3(^{+30}_{-73})$	0.083(_12)	
¹⁴⁸ Sm	550.255(8)	0.713(35) 0.724(35)*	30.7(15) 31.1(15)*	$11.23\binom{+58}{-53} \\ 11.06\binom{+56}{-51}^*$	0.1416(35) 0.1426(35)*	0.720(30)
$^{150}\mathrm{Sm}$	333.863(9)	1.347(26) 1.345(24)*	56.9(11) 56.8(10)*	70.1(14) 70.2(13)*	0.1929(19)	1.350(30)
$^{152}\mathrm{Sm}$	121.7817(3)	3.4611(21) 3.4611(21)*	143.67(8) 143.67(8)*	2042.7(16) 2042.7(16)*	0.3065(1) 0.3065(1)*	3.46(6)
$^{154}\mathrm{Sm}$	81.981(15)	4.345(44) 4.347(43)*	177.2(18) 177.3(18)*	4327(44) 4325(43)*	0.3404(17) 0.3405(16)*	4.36(5)
$^{156}\mathrm{Sm}$	75.89(5)	<7.2	<289	>3000	< 0.434	

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${\rm E_{2}}^{+}_{1} \ ({\rm keV})$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
$^{158}\mathrm{Sm}$	72.8					
¹⁶⁰ Sm	70.9					
¹³⁸ Gd	220.79(20)	2.18(13)	102.9(61)	$307.5(^{+195}_{-173})$	0.2513(77)	
¹⁴⁰ Gd	328.6(3)					
¹⁴² Gd	515.37(8)					
¹⁴⁴ Gd	743.00(17)					
¹⁴⁶ Gd	1971.97(22)	>0.014	>0.60	<1	>0.019	
¹⁴⁸ Gd	784.432(15)	$0.228\binom{+114}{-55}$	$9.8\binom{+45}{-24}$	6.0(19)	$0.078(^{+16}_{-10})$	
$^{150}\mathrm{Gd}$	638.045(14)					
$^{152}\mathrm{Gd}$	344.2789(12)	1.655(65)	68.7(27)	49.0(19)	0.2053(40)	1.67(14)
¹⁵⁴ Gd	123.0709(9)	3.872(16) 3.872(16)*	157.95(65) 157.95(65)*	1706.9(71) 1706.9(71)*	0.3113(7) 0.3113(7)*	3.89(7)
$^{156}\mathrm{Gd}$	88.970(1)	4.70(11) 4.70(11)*	188.3(44) 188.3(44)*	$3194(^{+77}_{-73}) \\ 3195(^{+77}_{-73})^*$	0.3399(40) 0.3399(40)*	4.64(5)
$^{158}\mathrm{Gd}$	79.5128(15)	5.09(11)	200.8(43)	$3638(^{+23}_{-20})$	0.3510(38)	5.02(5)
$^{160}\mathrm{Gd}$	75.26(1)	5.183(13)	200.91(50)	3915.9(98)	0.35109(44)	5.25(6)
$^{162}\mathrm{Gd}$	71.6	5.50(11)	$209.9(^{+43}_{-41})$	3980(80)	$0.3588(^{+36}_{-34})$	
¹⁶⁴ Gd	73.3(2)	$5.29(^{+28}_{-25})$	198(+11)	4000(200)	$0.3489(^{+92}_{-82})$	
$^{166}\mathrm{Gd}$	70(1)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{\mathrm{(keV)}}$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
		, ,	,	(1 /		
¹⁴⁰ Dy	202.20(20)					
¹⁴² Dy	315.9(4)					
¹⁴⁴ Dy	492.5(3)					
¹⁴⁶ Dy	682.9(3)					
¹⁴⁸ Dy	1677.3					
¹⁵⁰ Dy	803					
¹⁵² Dy	613.82(7)	0.43(23)	17.8(95)	10.8(58)	0.101(27)	0.43(23)
¹⁵⁴ Dy	334.34(3)	2.42(12)	98.8(49)	$38.6(^{+20}_{-18})$	0.2387(59)	2.39(13)
¹⁵⁶ Dy	137.77(8)	3.72(12)	149.2(48)	1194(39)	0.2933(47)	3.710(40)
¹⁵⁸ Dy	98.9180(10)	4.66(11)	183.7(43)	2421(57)	0.3255(38)	4.66(5)
¹⁶⁰ Dy	86.7878(3)	5.049(40)	195.7(16)	2916(233)	0.3360(13)	5.13(11)
¹⁶² Dy	80.661(3)	5.227(84)	199.3(32)	$3203(^{+52}_{-50})$	0.3391(27)	5.35(11)
¹⁶⁴ Dy	73.392(5)	5.616(68)	210.1(26)	3452(42)	0.3486(21)	5.60(5)
¹⁶⁶ Dy	76.587(1)					
¹⁶⁸ Dy	74.96(6)					
¹⁷⁰ Dy	72(?)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\begin{array}{c} {\rm E_{2}}_{1}^{+} \\ ({\rm keV}) \end{array}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
1445	000(4)					
¹⁴⁴ Er	329(1)					
$^{148}{ m Er}$	646.6(3)					
$^{150}{ m Er}$	1578.87(18)					
$^{152}{ m Er}$	808.27(10)					
$^{154}{ m Er}$	560.8(1)					
¹⁵⁶ Er	344.51(6)	1.645(80)	66.0(32)	$48.9(^{+25}_{-23})$	0.1893(46)	1.64(7)
$^{158}{ m Er}$	192.15(3)	3.41(13)	134.4(51)	355(14)	0.2703(52)	3.05(24)
$^{160}{ m Er}$	125.8(1)	4.34(15)	168.2(58)	1322(46)	0.3024(52)	4.38(20)
$^{162}{ m Er}$	102.04(3)	5.04(25)	192.2(95)	$1966(^{+103}_{-93})$	0.3232(81)	5.01(6)
164Er	91.38(2)	5.50(12)	206.3(45)	2264(49)	0.3348(37)	5.45(6)
166Er	80.5776(20)	5.748(89)	212.2(33)	$2687(^{+42}_{-41})$	0.3396(26)	5.83(5)
168Er	79.804(1)	5.723(45)	207.9(16)	2741(22)	0.3361(13)	5.79(10)
170Er	78.599(22)	5.838(68)	208.7(24)	2747(32)	0.3368(20)	5.82(10)
172Er	77.0(4)					
$^{174}{ m Er}$	81.6					
¹⁵² Yb	1531.4(5)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2_1^+}\atop (keV)}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
$^{154}\mathrm{Yb}$	821.3(2)					
¹⁵⁶ Yb	536.4(1)					
¹⁵⁸ Yb	358.2(1)	1.84(22)	72.5(87)	36.0(43)	0.193(12)	1.87(23)
¹⁶⁰ Yb	243.1(1)	2.44(16)	94.6(62)	172(11)	0.2202(72)	2.66(16)
¹⁶² Yb	166.72(4)	3.47(11)	132.4(42)	609(+20)	0.2606(41)	3.53(15)
¹⁶⁴ Yb	123.310(23)	4.33(14)	162.4(53)	1345(43)	0.2886(47)	4.38(26)
¹⁶⁶ Yb	102.37(3)	5.20(20)	191.9(74)	1776(68)	0.3137(60)	5.24(31)
¹⁶⁸ Yb	87.73(1)	5.75(12)	208.8(44)	$2152(^{+46}_{-44})$	0.324(3)	5.58(30)
¹⁷⁰ Yb	84.25468(8)	5.721(70)	204.6(25)	2308(28)	0.3239(20)	5.79(13)
¹⁷² Yb	78.7427(6)	6.09(15)	214.3(53)	$2394(^{+61}_{-58})$	0.3315(41)	6.04(7)
¹⁷⁴ Yb	76.471(1)	5.85(16)	202.9(56)	$2589(^{+73}_{-69})$	0.3226(44)	5.94(6)
¹⁷⁶ Yb	82.135(15)	5.189(89)	177.1(30)	2645(45)	0.3014(26)	5.30(19)
¹⁷⁸ Yb	84.0(3)					
¹⁵⁴ Hf	1513					
¹⁵⁶ Hf	858					
¹⁵⁸ Hf	476.36(11)					
¹⁶⁰ Hf	389.40(10)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{\mathrm{(keV)}}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
¹⁶² Hf	285	1.34(10)	51.1(38)	148(11)	0.1574(59)	1.35(12)
$^{164}\mathrm{Hf}$	210.7(3)	1.82(17)	68.3(64)	435(41)	0.1819(85)	2.14(18)
¹⁶⁶ Hf	158.64(5)	$3.46(^{+17}_{-15})$	$127.7(^{+63}_{-55})$	717(33)	$0.2488(^{+61}_{-54})$	3.50(20)
¹⁶⁸ Hf	124.10(5)	4.393(36)	159.58(30)	1239(10)	0.2781(11)	4.30(23)
¹⁷⁰ Hf	100.80(17)	5.11(18)	182.7(64)	1740(61)	0.2976(52)	5.3(12)
¹⁷² Hf	95.22(4)	5.77(10)	203.1(35)	$1710(^{+31}_{-39})$	0.314(3)	4.47(33)
¹⁷⁴ Hf	90.985(19)	5.38(20)	186.5(70)	$1986(^{+77}_{-71})$	0.301(6)	4.88(31)
¹⁷⁶ Hf	88.349(24)	5.42(17)	184.9(58)	$2069(^{+67}_{-63})$	0.299(5)	5.27(10)
¹⁷⁸ Hf	93.1803(10)	4.736(63)	159.3(21)	2168(29)	0.2779(18)	4.82(6)
¹⁸⁰ Hf	93.3243(20)	4.6470(30)	153.953(99)	2203.9(14)	0.273190(88)	4.67(12)
¹⁸² Hf	97.79(9)					
¹⁸⁴ Hf	107.1(1)					
$^{160}{ m W}$	609.9(2)					
$^{162}\mathrm{W}$	449.4(3)					
¹⁶⁴ W	332.7					
166W	252.0(3)					

168_{W} 199.3(2) 3.22(16) 117.0(58)	207(17)		
168W $199.3(2)$ $3.22(16)$ $117.0(58)$	207(17)		
	307(15)	0.2317(58)	3.24(18)
170 W $156.72(13)$ $3.50(17)$ $125.1(61)$	716(35)	0.2396(58)	3.51(10)
172 W $123.2(1)$ $5.363(15)$ $188.78(53)$	979.8(27)	0.29434(41)	5.02(48)
174 W 113.0(1) 4.38(35) 152(12)	$1479(^{+128}_{-109})$	0.264(11)	3.97(28)
176 W $108.3(7)$ $4.953(31)$ $169.1(11)$	1431.1(90)	0.27856(87)	
178W $105.90(9)$ $4.552(58)$ $153.1(20)$	1642(21)	0.2650(17)	
180 W $103.531(10)$ $4.15(14)$ $137.5(66)$	$1879(^{+66}_{-61})$	0.251(5)	4.25(24)
182 W $100.10598(7)$ $4.123(42)$ $134.6(14)$ $4.123(42)^*$ $134.6(14)^*$	2014(21) 2014(21)*	0.2485(13)	4.20(8)
184W $111.2174(4)$ $3.706(35)$ $119.2(11)$ $3.705(35)^*$ $119.2(11)^*$	1813(173) 1813(17)*	0.2339(11) 0.2339(11)*	3.78(13)
186 W $122.630(15)$ $3.500(38)$ $111(12)$	1519(16)	0.2257(12)	3.50(12)
188W $143.16(9)$ $2.71\binom{+42}{-33}$ $85\binom{+14}{-12}$	1255(173)	$0.198(^{+15}_{-13})$	
$^{190}{ m W}$ 207			
$^{192}{ m W}$ 219 (?)			
¹⁶² Os 706.7(3)			
¹⁶⁴ Os 548.0(2)			
166 Os 432.0(3)			

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{\mathrm{(keV)}}$	$\mathbf{B(E2)} \uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	$\mathbf{B}(\mathbf{E2})\uparrow [1$ (e^2b^2)
¹⁶⁸ Os	341.20(20)					
¹⁷⁰ Os	286.70(14)					
$^{172}\mathrm{Os}$	227.77(9)	$3.28(^{+21}_{-19})$	$115.5(^{+74}_{-67})$	167(10)	$0.2241(^{+72}_{-65})$	3.30(23)
¹⁷⁴ Os	158.60(10)	$4.55(^{+18}_{-15})$	$157.6(^{+64}_{-51})$	$512(^{+17}_{-20})$	$0.2618\binom{+53}{-43}$	4.7(6)
¹⁷⁶ Os	135.1(7)	3.20(48)	109(16)	1210(180)	0.218(16)	
¹⁷⁸ Os	132.20(17)	$4.12\binom{+31}{-25}$	139(+10/9)	999(+65)	$0.2456(^{+91}_{-75})$	
¹⁸⁰ Os	132.11(10)	4.07(38)	135(13)	1012(94)	0.242(11)	3.6(8)
¹⁸² Os	126.89(8)	3.896(85)	127.2(28)	1177(26)	0.2352(26)	3.86(35)
¹⁸⁴ Os	119.77(9)	3.214(79)	103.4(25)	1645(40)	0.2121(26)	3.23(16)
¹⁸⁶ Os	137.159(8)	3.064(72)	97.2(23)	$1208(^{+29}_{-28})$	0.2056(34)	2.90(10)
¹⁸⁸ Os	155.021(11)	2.500(36) 2.518(36)*	78.2(11) 78.7(11)*	1007(15) 1000(14)*	0.1844(13)	2.55(5)
$^{190}\mathrm{Os}$	186.718(2)	2.354(90) 2.348(90)*	72.6(28) 72.4(28)*	538(22) 539(22)*	0.1777(33) 0.1775(36)*	2.35(6)
¹⁹² Os	205.79442(9)	2.03(10) 2.03(10)*	61.7(30) 61.6(30)*	$418\binom{+22}{-20} \\ 419\binom{+22}{-20}^*$	0.1639(40) 0.1637(40)*	2.100(30)
¹⁹⁴ Os	218.509(6)					
¹⁹⁶ Os	324.4(10)					
¹⁹⁸ Os	465.4(5)					
¹⁶⁸ Pt	581.40(10)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	E ₂₁ + (IroV)	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2)	τ	eta_2	B(E2) \uparrow [13 (e^2b^2)
	(keV)	(e-b-)	(W.u.)	(ps)		(e-b-)
¹⁷⁰ Pt	508.9(10)					
¹⁷² Pt	457.60(10)					
¹⁷⁴ Pt	394.2(10)					
¹⁷⁶ Pt	264.0(3)	2.55(23)	87.1(79)	109.0(98)	0.1896(86)	2.58(28)
¹⁷⁸ Pt	170.30(10)	$4.24\binom{+33}{-29}$	$143(^{+11}_{-10})$	412(30)	$0.2427(^{+94}_{-84})$	
¹⁸⁰ Pt	153.21(7)	4.66(43)	154(14)	540(50)	0.253(11)	4.81(49)
¹⁸² Pt	154.97(9)	$3.46\binom{+23}{-17}$	$113.0(^{+76}_{-54})$	$699\binom{+35}{-44}$	$0.2160(^{+73}_{-52})$	
¹⁸⁴ Pt	162.98(6)	3.79(20)	121.9(64)	539(28)	0.2244(59)	3.78(27)
¹⁸⁶ Pt	191.53(4)	3.04(12)	96.4(38)	$368(^{+15}_{-14})$	0.200(4)	2.99(13)
¹⁸⁸ Pt	265.63(5)	2.60(47)	81(15)	104(19)	0.183(17)	2.69(49)
¹⁹⁰ Pt	295.80(4)	1.854(90)	57.2(28)	$88.2(^{+45}_{-41})$	0.1537(38)	1.75(22)
¹⁹² Pt	316.50714(15)	1.940(65)	59.0(20)	$61.1\binom{+21}{-20}$	0.1561(27)	1.870(40)
¹⁹⁴ Pt	328.464(5)	1.631(68) 1.632(68)*	48.9(20) 48.9(20)*	$60.9(^{+27}_{-24}) 60.8(^{+26}_{-24})^*$	0.1421(30) 0.1422(30)*	1.642(22)
¹⁹⁶ Pt	355.6841(20)	1.401(68) 1.405(68)*	41.4(20) 41.6(20)*	$48.3(^{+25}_{-22}) 48.1(^{+25}_{-22})^*$	0.1308(32) 0.1310(32)*	1.375(16)
¹⁹⁸ Pt	407.22(5)	1.072(50)	31.3(15)	$32.6(^{+16}_{-15})$	0.1137(27)	1.080(12)
²⁰⁰ Pt	470.10(20)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

	$\begin{array}{c} {\rm E}_{2_1^+} \\ ({\rm keV}) \end{array}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	$\mathbf{B(E2)}\uparrow[13]$ (e^2b^2)
²⁰² Pt	534.90(20)					
²⁰⁴ Pt	872(1)					
¹⁷² Hg	672.8(4)					
$^{174}\mathrm{Hg}$	647					
¹⁷⁶ Hg	613.3(10)					
¹⁷⁸ Hg	558.00(20)					
¹⁸⁰ Hg	434.30(10)	1.45(21)	48.0(70)	17.5(25)	0.1373(99)	
¹⁸² Hg	351.7(3)	1.677(88)	54.8(29)	$42.4(^{+24}_{-21})$	0.1466(38)	
¹⁸⁴ Hg	366.78(9)	1.623(71)	52.2(25)	$35.7(^{+19}_{-15})$	0.143(3)	2.05(49)
¹⁸⁶ Hg	405.33(14)	1.47(21)	46.6(66)	$24.3(^{+40}_{-31})$	0.135(10)	1.41(24)
¹⁸⁸ Hg	412.8(1)	$1.72(^{+27}_{-26})$	53.8(84)	$19.0(^{+26}_{-25})$	0.145(13)	
¹⁹⁰ Hg	416.32(14)					
$^{192}{ m Hg}$	422.79(10)					
$^{194}\mathrm{Hg}$	427.89(9)					
¹⁹⁶ Hg	425.98(10)	1.143(82)	33.8(24)	24.5(18)	0.1152(41)	1.15(5)
¹⁹⁸ Hg	411.80250(17)	0.9612(70)	28.05(20)	$34.34(^{+26}_{-24})$	0.1049(4)	0.990(12)

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	${ m E_{2}}_{1}^{+}$ (keV)	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
²⁰⁰ Hg	367.943(10)	0.855(28)	24.6(81)	66.8(22)	0.0983(16)	0.853(11)
²⁰² Hg	439.512(8)	0.615(21)	17.47(60)	39.0(1)	0.0828(14)	0.612(10)
$^{204}\mathrm{Hg}$	436.552(8)	0.424(21) 0.4288(44)*	11.89(59) 12.02(12)*	$58.5(^{+31}_{-28})$ $57.84(^{+60}_{-59})^*$	0.0683(17) 0.06871(36)*	0.427(7)
$^{206}\mathrm{Hg}$	1068.20(20)	>0.0000097	>0.00027	<30000	>0.00033	
²⁰⁸ Hg	669.0(5)					
²¹⁰ Hg	643					
¹⁸⁰ Pb	1168(1)					
¹⁸² Pb	888.3(3)					
¹⁸⁴ Pb	701.5					
¹⁸⁶ Pb	662.4(5)	0.190(53)	6.0(17)	16.6(46)	0.0475(66)	
¹⁸⁸ Pb	723.90(20)	0.255(85)	8.0(27)	8.0(27)	0.0546(91)	
¹⁹⁰ Pb	773.9(4)					
¹⁹² Pb	853.64(18)					
¹⁹⁴ Pb	965.08(15)					
¹⁹⁶ Pb	1049.20(9)					
¹⁹⁸ Pb	1063.5(2)					
²⁰⁰ Pb	1026.61(14)		114			

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\mathbf{E_{2_1^+}}_{(\mathbf{lro}V)}$	$\mathbf{B}(\mathbf{E2})\uparrow \ (e^2b^2)$	B(E2)	τ	eta_2	B(E2) \uparrow [13 (e^2b^2)
	(keV)	(e-b-)	(W.u.)	(ps)		(e-b-)
²⁰² Pb	960.67(5)	>0.0034	>0.0975	<144.3	>0.006036	
²⁰⁴ Pb	899.165(25)	0.1587(69) 0.1607(64)*	4.45(19) 4.51(18)*	4.34(19) 4.29(17)*	0.04078(89)	0.1620(40)
²⁰⁶ Pb	803.054(25)	0.0989(28) 0.0987(27)*	2.737(77) 2.732(75)*	12.23(35) 12.26(34)*	0.03198(45)	0.1000(20)
²⁰⁸ Pb	4085.52(4)	0.287(18) 0.301(16)*	7.84(49) 8.22(45)*	$0.00125(8) \\ 0.00119(^{+7}_{-6})^*$	0.0541(17) 0.0554(15)*	0.300(30)
²¹⁰ Pb	799.7(1)	0.051(15)**	1.38(40)**	24.2(71)**	0.0227(33)**	0.051(15)
$^{212}\mathrm{Pb}$	804.9(5)					
²¹⁴ Pb	836(2)					
¹⁹⁰ Po	233					
¹⁹² Po	262					
¹⁹⁴ Po	319.8(3)	$2.99(^{+70}_{-48})$	$90(^{+20}_{-14})$	37(7)	$0.179(^{+18}_{-15})$	
¹⁹⁶ Po	463.12(9)	1.59(21)	47.0(62)	11.6(15)	0.1294(85)	
¹⁹⁸ Po	604.94(10)	$1.30(^{+29}_{-24})^{**}$	$37.9(^{+85}_{-70})^{**}$	$3.80(^{+86}_{-70})^{**}$	0.116(12)**	
²⁰⁰ Po	665.90(10)	1.06(6)**	30.5(17)**	$2.89(^{+17}_{-15})^{**}$	0.104(3)**	
²⁰² Po	677.20(20)	$1.12\binom{+34}{-26}$ **	31.8(+97)**	$2.52\binom{+75}{-59}$ **	$0.106(^{+15}_{-13})^{**}$	
²⁰⁴ Po	684.341(10)					
²⁰⁶ Po	700.66(3)					

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{\mathrm{(keV)}}$	$\mathbf{B}(\mathbf{E2})\uparrow \ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
	()	(* *)	(11131)	(F*)		(3 3)
²⁰⁸ Po	686.526(20)					
²¹⁰ Po	1181.40(2)	0.0200(40)	0.54(11)	8.8(18)	0.0138(14)	0.0200(40)
²¹² Po	727.330(9)					
²¹⁴ Po	609.316(4)	>0.794	>20.9	<6	>0.0863	
²¹⁶ Po	549.76(4)					
²¹⁸ Po	509.70(10)					
¹⁹⁸ Rn	339.0(2)					
$^{200}\mathrm{Rn}$	432.60(20)					
$^{202}\mathrm{Rn}$	504.00(10)	$1.00(^{+32}_{-26})$	$28.4(^{+91}_{-84})$	$12.1(^{+43}_{-30})$	$0.098(^{+15}_{-14})$	
²⁰⁴ Rn	542.90(10)	$1.51(^{+59}_{-45})$	$42.3(^{+165}_{-126})$	$5.6(^{+24}_{-16})$	$0.120(^{+21}_{-20})$	
²⁰⁶ Rn	575.30(10)					
²⁰⁸ Rn	635.8(2)					
²¹⁰ Rn	643.8(1)					
$^{212}\mathrm{Rn}$	1273.8(2)					
²¹⁴ Rn	694.7	>0.0012	>0.033	<2000	>0.0033	
$^{216}\mathrm{Rn}$	461.4(2)					

Nuclide	$\frac{\mathrm{E_{2}^{+}_{1}}}{\mathrm{(keV)}}$	$\mathbf{B(E2)} \uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13 (e^2b^2)
$^{218}\mathrm{Rn}$	324.320(18)	>0.89	>23	<115	>0.088	
$^{220}\mathrm{Rn}$	240.986(6)	1.872(63)	47.46(60)	$210.2(^{+73}_{-68})$	0.1270(22)	1.86(7)
$^{222}\mathrm{Rn}$	186.211(13)	2.36(15)	59.1(37)	461(32)	0.1417(45)	2.37(16)
206 Ra	474.3(5)					
²⁰⁸ Ra	520.2(2)					
$^{210}\mathrm{Ra}$	603.5(5)					
$^{212}\mathrm{Ra}$	629.3(1)					
$^{214}\mathrm{Ra}$	1382.3(1)					
$^{216}\mathrm{Ra}$	688.2(2)					
$^{218}\mathrm{Ra}$	388.90(10)	$1.00(^{+10}_{-9})$	$25.5(^{+26}_{-22})$	43.0(40)	$0.0910(^{+47}_{-39})$	1.10(20)
$^{220}\mathrm{Ra}$	178.47(12)					
$^{222}\mathrm{Ra}$	111.12(2)	4.51(36)	113.0(90)	749(69)	0.1915(76)	4.54(39)
$^{224}\mathrm{Ra}$	84.373(3)	3.990(52)	98.8(13)	1078(14)	0.1790(12)	3.99(15)
$^{226}\mathrm{Ra}$	67.67(1)	5.16(13)	126.2(32)	905(35)	0.2024(25)	5.15(14)
²²⁸ Ra	63.823(20)	5.98(20)	144.7(48)	792(37)	0.2167(36)	5.99(28)
$^{230}\mathrm{Ra}$	57.4(1)					
232 Ra	54.5(10)					

Table 3 Adopted (recommended) B(E2) \uparrow -, τ - and β_2 -values for Z=2-104 nuclei (continued).

Nuclide	$\frac{\mathrm{E}_{2_{1}^{+}}}{(\mathrm{keV})}$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
$^{214}\mathrm{Th}$	623.0(10)					
²¹⁶ Th	1478.2(1)					
²¹⁸ Th	689.6(6)					
$^{220}\mathrm{Th}$	386.5(1)					
$^{222}\mathrm{Th}$	183.3	2.98(25)	74.6(63)	346(31)	0.1522(64)	3.01(32)
$^{224}\mathrm{Th}$	98.1(3)	$3.96(^{+29}_{-25})$	$98.0(^{+72}_{-62})$	851(58)	$0.1744\binom{+64}{-55}$	
$^{226}\mathrm{Th}$	72.20(4)	6.82(35)	170.9(87)	570(29)	0.2303(59)	6.85(42)
$^{228}\mathrm{Th}$	57.759(4)	7.05(12)	170.3(29)	584(18)	0.2299(19)	7.06(24)
$^{230}\mathrm{Th}$	53.227(11)	8.14(21)	194.5(50)	$512(^{+14}_{-13})$	0.2456(32)	8.04(10)
$^{232}\mathrm{Th}$	49.369(9)	9.02(38)	213.1(90)	$470(^{+21}_{-19})$	0.2571(54)	9.28(10)
$^{234}\mathrm{Th}$	49.55(6)	7.92(64)	185(15)	534(51)	0.2395(97)	8.0(7)
$^{236}\mathrm{Th}$	48.4(SY)					
226U	81.3(6)					
228U	59(14)					
²³⁰ U	51.727(23)	9.5(11)	227(26)	376(49)	0.260(15)	9.7(12)
²³² U	47.573(8)	9.91(79)	234(19)	366(34)	0.264(11)	10.0(10)

Nuclide	${ m E_{2_1^+}} \ ({ m keV})$	$\mathbf{B}(\mathbf{E2}) \!\!\uparrow \\ (e^2b^2)$	B(E2) (W.u.)	au (ps)	eta_2	B(E2) \uparrow [13] (e^2b^2)
²³⁴ U	43.4981(10)	10.22(50)	239(12)	359(⁺¹⁹ ₋₁₇)	0.2662(66)	10.66(20)
²³⁶ U	45.2440(20)	10.96(28)	253.1(65)	$332.9(^{+87}_{-83})$	0.2741(35)	11.61(15)
²³⁸ U	44.916(13)	12.19(62)	278(14)	$300(^{+16}_{-15})$	0.2741(36)	12.09(20)
²⁴⁰ U	45(1)					
²⁴² U	47.8(SY)					
²³⁶ Pu	44.63(10)					
²³⁸ Pu	44.076(18)	12.26(34)	279.9(78)	$253.9(^{+73}_{-69})$	0.2821(39)	12.61(17)
²⁴⁰ Pu	42.824(8)	13.13(39)	296.4(88)	$238.2(^{+73}_{-69})$	0.2904(42)	13.02(30)
²⁴² Pu	44.54(2)	14.01(75)	312.8(88)	$222(^{+13}_{-11})$	0.2983(80)	13.40(16)
²⁴⁴ Pu	44.2(4)	13.61(68)	301(15)	$228(^{+12}_{-11})$	0.2924(73)	13.68(16)
²⁴⁶ Pu	46.7(SY)					
$^{238}\mathrm{Cm}$	35(7)					
$^{240}\mathrm{Cm}$	38(5)	14.26(98)	322(22)	190(16)	0.296(10)	14.3(6)
$^{242}\mathrm{Cm}$	42.13(5)					
²⁴⁴ Cm	42.965(10)	14.58(73)	322(16)	$181.9(^{+95}_{-87})$	0.2963(74)	14.67(17)
²⁴⁶ Cm	42.851(5)	14.94(75)	326(16)	$177.5(^{+94}_{-65})$	0.2983(75)	14.94(19)
²⁴⁸ Cm	43.40(3)	14.43(75)	312(16)	$183.5(^{+100}_{-91})$	0.2857(74)	14.99(19)

Nuclide	$\begin{array}{c} {\rm E_{2_1^+}} \\ ({\rm keV}) \end{array}$	B(E2) ↑	B(E2)	au	eta_2	B(E2) ↑ [13]
	(keV)	(e^2b^2)	(W.u.)	(ps)		(e^2b^2)
$^{250}\mathrm{Cm}$	47.8(SY)					
²⁴⁴ Cf	41(20)					
²⁴⁶ Cf	44(20)					
²⁴⁸ Cf	41.53(6)					
$^{250}\mathrm{Cf}$	42.721(5)	16.0(16)	338(34)	141(16)	0.298(15)	16.0(16)
$^{252}\mathrm{Cf}$	45.72(5)	16.7(11)	353(26)	133(11)	0.304(10)	16.7(11)
²⁴⁶ Fm	47(SY)					
²⁴⁸ Fm	44(10)					
$^{252}\mathrm{Fm}$	46.6(12)					
$^{254}\mathrm{Fm}$	45.000(15)					
²⁵⁶ Fm	48.3					
²⁵² No	46.4(10)					
²⁵⁴ No	44.2(4)					
$^{256}\mathrm{Rf}$	44(1)					

Table 4 Shell model $E(2_1^+)$ -, $B(E2)\uparrow$ -values for even-even nuclei.

		$\mathbf{B}(\mathbf{E2})\uparrow (e^2b^2)$		Effective Interaction	Comments
$^6{ m He}$	1.894	0.000465	p	CKIHE	[36]
$^{10}\mathrm{Be}$	3.704	0.007	p	PWT	P(5-16) interaction [37]
$^{12}\mathrm{Be}$	3.319	0.005465	p	PWT	
$^{10}\mathrm{C}$	7589	0.0037945	p	PWT	
$^{12}\mathrm{C}$	1443	0.007215	p	PWT	
¹⁸ O	1.999	0.0016315	sd	USDB	[38]
^{20}O	1.746	0.0020585	sd	USDB	
²² O	3.158	0.001984	sd	USDB	
¹⁸ Ne	1.999	0.001491	sd	USDB	
$^{20}{ m Ne}$	1.7467	0.046	sd	USDB	
²² Ne	1.3629	0.0447	sd	USDB	
²⁴ Ne	2.1108	0.0363	sd	USDB	
$^{26}{ m Ne}$ $^{28}{ m Ne}$	2.0633	0.0358	sd	USDB	
³⁰ Ne	1.6228	0.0311	sd	USDB	
$^{20}{ m Mg}$	1.7461	0.035	sd	USDB	
$^{22}\mathrm{Mg}$	1.3629	0.06	sd	USDB	
$^{24}\mathrm{Mg}$	1.5023	0.07	sd	USDB	
$^{26}\mathrm{Mg}$	1.8969	0.0605	sd	USDB	
$^{28}\mathrm{Mg}$	1.518	0.0548	sd	USDB	
$^{30}\mathrm{Mg}$	1.5914	0.0443	sd	USDB	
$^{24}\mathrm{Si}$	2.1108	0.0422	sd	0.022	
$^{26}\mathrm{Si}$	1.8969	0.0414	sd		
$^{28}\mathrm{Si}$	1.9317	0.0707	sd		
$^{30}\mathrm{Si}$	2.2656	0.0409	sd		
$^{32}\mathrm{Si}$	2.0526	0.0373	sd		
$^{34}\mathrm{Si}$	5.2452	0.0293	sd		
$^{36}\mathrm{Si}$	1.723	0.0271	sdpf	SDPFU	not very good: shape coexistence [39]
$^{38}\mathrm{Si}$	1.395	0.03575	sdpf	SDPFU	
$^{40}\mathrm{Si}$	1.217	0.0541	sdpf	SDPFU	
$^{30}\mathrm{S}$	2.2656	0.0506	sd		
^{32}S	2.16	0.0413	sd		
^{34}S	2.1314	0.0312	sd		
^{36}S	3.3823	0.0176	sd		
^{38}S	1.459	0.027	sdpf	SDPFU	
$^{40}{ m S}$ $^{42}{ m S}$	0.942	0.0463	sdpf	SDPFU	
^{32}Ar	0.999	0.0564	sdpf	SDPFU	
$^{34}\mathrm{Ar}$	2.0526	0.0449	sd		
46 Ca	2.1314 1.2799	0.0383 0.0047	sd	GXPF1A	[40, 41]
48 Ca	3.7356	0.0047	pf pf	GXPF1A GXPF1A	[40, 41]
$^{50}\mathrm{Ca}$	1.1923	0.0047	pf	GXPF1A GXPF1A	
⁴⁴ Ti	1.2874	0.0535	pf	GXPF1A	
$^{46}\mathrm{Ti}$	1.0054	0.0635	pf	GXPF1A	
⁴⁸ Ti	1.01	0.0529	pf	GXPF1A	
$^{50}\mathrm{Ti}$	1.624	0.0511	pf	GXPF1A	
$^{52}\mathrm{Ti}$	1.1064	0.0511	pf	GXPF1A	
$^{54}\mathrm{Ti}$	1.395	0.0519	pf	GXPF1A	
$^{56}\mathrm{Ti}$	1.176	0.052	pf	GXPF1A	
$^{46}\mathrm{Cr}$	1.0054	0.0955	pf	GXPF1A	
$^{48}\mathrm{Cr}$	0.7887	0.1273	pf	GXPF1A	
$^{50}\mathrm{Cr}$	0.7872	0.1107	pf	GXPF1A	
$^{52}\mathrm{Cr}$	1.5101	0.0849	pf	GXPF1A	
⁵⁴ Cr	0.8949	0.1138	pf	GXPF1A	
$^{56}\mathrm{Cr}$	1.0715	0.1109	pf	GXPF1A	
⁵⁸ Cr	0.9062	0.1143	pf	GXPF1A	
$^{60}\mathrm{Cr}$ $^{62}\mathrm{Cr}$	0.958	0.0972	pf	GXPF1A	
	0.84	0.0793	pf pf	GXPF1A	
⁵⁰ Fe	0.787	0.1151	pf	GXPF1A	
⁵² Fe ⁵⁴ Fe	0.883	0.1124	pf pf	GXPF1A	
$^{56}\mathrm{Fe}$	1.4483 0.8903	0.0761 0.1228	pf pf	GXPF1A GXPF1A	
⁵⁸ Fe	0.8478	0.1228	pf pf	GXPF1A GXPF1A	
$^{60}\mathrm{Fe}$	0.8173	0.1345	pf pf	GXPF1A GXPF1A	
$^{62}\mathrm{Fe}$	0.8114	0.1101	pf	GXPF1A	
64 Fe	0.9008	0.0784	pf	GXPF1A GXPF1A	
$^{54}\mathrm{Ni}$	1.448	0.0375	pf	GXPF1A GXPF1A	
111		2.00.0	r-		

$\mathbf{Nuclide}$	$\mathbf{E}(2_1^+) \; (\mathbf{MeV})$	$\mathbf{B}(\mathbf{E2})\uparrow (e^2b^2)$	Model Space	Effective Interaction	Comments
⁵⁶ Ni	2.599	0.0823	pf	GXPF1A	
$^{58}\mathrm{Ni}$	1.478	0.0599	pf	GXPF1A	
$^{60}\mathrm{Ni}$	1.474	0.0946	pf	GXPF1A	
$^{62}\mathrm{Ni}$	1.149	0.1195	pf	GXPF1A	
$^{64}\mathrm{Ni}$	1.268	0.0706	pf	GXPF1A	
$^{66}\mathrm{Ni}$	1.265(1.624)	0.0365(0.0464)		GXPF1A(Jun-45)	
$^{68}\mathrm{Ni}$	1.963	0.0376		Jun-45	
$^{70}\mathrm{Ni}$	1.599	0.0427		Jun-45	
$^{72}\mathrm{Ni}$	1.505	0.0483		Jun-45	
$^{74}\mathrm{Ni}$	1.442	0.044		Jun-45	
$^{76}\mathrm{Ni}$	1.374	0.0296		Jun-45	
$^{62}\mathrm{Zn}$	1.013	0.1479	pf	GXPF1A	
$^{64}\mathrm{Zn}$	0.973	0.1492	pf	GXPF1A	
$^{66}\mathrm{Zn}$	0.95	0.129	pf	GXPF1A	
$^{68}\mathrm{Zn}$	0.879(1.104)	0.0799(1.493)		GXPF1A(Jun-45)	
$^{70}\mathrm{Zn}$	1.109	0.1581		Jun-45	
$^{72}\mathrm{Zn}$	1.007	0.1773		Jun-45	
$^{74}\mathrm{Zn}$	0.966	0.1763		Jun-45	
$^{76}\mathrm{Zn}$	0.976	0.1521		Jun-45	
$^{78}\mathrm{Zn}$	1.045	0.1097		Jun-45	
$^{104}\mathrm{Sn}$	1.496	0.0225	jj55	jj55pn	jj55 model space: 1d5/2,1d3/2,2s1/2,0g7/2,0h11/2 [43]
$^{106}\mathrm{Sn}$	1.414	0.0345	jj55	jj55pn	

References used in the Tables

- [1950Mc79] F.K. McGowan, Phys. Rev. 80, 923 (1950).
- [1951Mc14] F.K. McGowan, Phys. Rev. 81, 1066 (1951).
- [1952Gr18] R.L. Graham, J.L. Wolfson, R.E. Bell, CAN. J. PHYS. 30, 459 (1952).
- [1952Mc03] F.K. McGowan, Phys. Rev. 85, 142 (1952).
- [1953Da23] W.G. Davey, P.B. Moon, PROC. Phys. Soc. (London) 66A, 956 (1953).
- [1953Mc39] C.C. McMullen, M.W. Johns, Phys. Rev. 91, 418 (1953).
- [1954Br96] H.N. Brown, R.A. Becker, Phys. Rev. 96, 1372 (1954).
- [1954Me55] F.R. Metzger, W.B. Todd, Phys. Rev. 95, 853 (1954).
- [1954Su10] A.W. Sunyar, Phys. Rev. 93, 1122 (1954).
- [1955Co55] C.F. Coleman, Phil. Mag. 46, 1135 (1955).
- [1955Gr07] R.L. Graham, J.L. Wolfson, M.A. Clark, Phys. Rev. 98, 1173A (1955).
- [1955He64] N.P. Heydenburg, G.M. Temmer, Phys. Rev. 100, 150 (1955); Erratum Priv.Comm. (May 1956).
- [1955Me10] F.R. Metzger, J. Franklin Inst. 260, 239 (1955).
- [1955Me35] F.R. Metzger, Phys. Rev. 98, 200 (1955).
- [1955Si12] B.E. Simmons, D.M. Van Patter, K.F. Famularo, R.V. Stuart, Phys. Rev. 97, 89 (1955).
- [1955St57] P.H. Stelson, F.K. McGowan, Phys. Rev. 99, 112 (1955).
- [1955Su64] A.W. Sunyar, Phys. Rev. 98, 653 (1955).
- [1956Ba45] R. Barloutaud, T. Grjebine, M. Riou, COMPT. REND. 242, 1284 (1956).
- [1956Be54] E.E. Berlovich, IZVEST. AKAD. NAUK SSSR, Ser.Fiz. 20, 1438 (1956); COLUMBIA TECH. TRANSL. 20, 1315 (1957).
- [1956De22] S. Devons, G. Manning, J.H. Towle, Proc. Phys. Soc.(London) 69A, 173 (1956).
- [1956De57] H. DeWaard, T.R. Gerholm, Nucl. Phys. 1, 281 (1956).
- [1956He83] R.H. Helm, Phys. Rev. 104, 1466 (1956).
- [1956Hu49] T. Huus, J.H. Bjerregaard, B. Elbek, Kgl. Danske Videnskab. Selskab, Mat.-Fys. Medd. 30, No.17 (1956).
- [1956Me13] F.R. Metzger, Phys. Rev. 101, 286 (1956).
- [1956Me59] F.R. Metzger, Phys. Rev. 103, 983 (1956).
- $[1956\mathrm{Te}26]\,$ G.M. Temmer, N.P. Heydenburg, Phys. Rev. $\mathbf{104},\,967$ (1956).
- [1957Al43] D.G. Alkhazov, D.S. Andreev, K.I. Erokhina, I.K. Lemberg, Zhur. Eksptl. I Teoret. Fiz. 33, 1347 (1957); Soviet Phys. JETP 6, 1036 (1958).
- [1957Ba11] R. Barloutaud, P. Lehmann, A. Leveque, Compt. Rend. Acad. Sci. 245, 523 (1957).
- [1957Be73] E.E. Berlovich, Zhur. Eksptl. I Teoret. Fiz. 33, 1522 (1957); Soviet Phys. JETP 6, 1176 (1958).
- [1957He48] N.P. Heydenburg, G.F. Pieper, C.E. Anderson, Phys. Rev. 108, 106 (1957).
- [1957Sw17] C.P. Swann, F.R. Metzger, Phys. Rev. 108, 982 (1957).
- [1958Al22] D.G. Alkhazov, A.P. Grinberg, G.M. Gusinskii et~al., Zhur. Eksptl.i Teoret.Fiz. 35, 1056 (1958); Soviet Phys. JETP 8, 737 (1959)
- [1958Be72] E.Y. Berlovich, K. Grotovski, M. Bonitz et al., Nucl. Phys. 6, 672 (1958).
- [1958De33] N.N. Delyagin, V.S. Shpinel, IZVEST. AKAD. NAUK SSSR, Ser.Fiz. 22, 861 (1958); COLUMBIA TECH. TRANSL. 22, 855 (1959).
- [1958Fa01] L.W. Fagg, Phys. Rev. 109, 100 (1958).
- [1958Kn36] V. Knapp, Proc. Phys. Soc. (London) 71 A, 194 (1958).
- [1958Mc02] F.K. McGowan, P.H. Stelson, Phys. Rev. 109, 901 (1958).
- [1958Na01] O. Nathan, Nucl. Phys. 5, 401 (1958).
- [1958Pi05] G.F. Pieper, C.E. Anderson, N.P. Heydenburg, Bull. Am. Phys. Soc. 3, No.1, 38, N13 (1958).
- $[1958Ra12]\ \ V.\ Ramsak,\ M.C.\ Olesen,\ B.\ Elbek,\ Nucl.\ Phys.\ {\bf 6},\ 451\ (1958).$
- [1958Ra14] V.K. Rasmussen, F.R. Metzger, C.P. Swann, Phys. Rev. 110, 154 (1958).
- [1958Sh01] R.D. Sharp, W.W. Buechner, Phys. Rev. 109, 1698 (1958).
- [1958St32] P.H. Stelson, F.K. McGowan, Phys. Rev. 110, 489 (1958).
- [1958Su54] A.W. Sunyar, Proc. U.N. Intern. Conf. Peaceful Uses At. Energy, 2nd, Geneva 14, 347 (1958); Priv. Comm. (November 1961).
- [1958Su57] A.W. Sunyar, Proc. U.N. Intern. Conf. Peaceful Uses At. Energy, 2nd, Geneva 14, 347 (1958).
- [1958Va04] H. Vartapetian, R. Foucher, Compt. Rend. 246, 939 (1958).

- [1959Al91] D.G. Alkhazov, A.P. Grinberg, I.K. Lemberg, V.V. Rozhdestvenskii, Zhur. Eksptl. i Teoret. Fiz. 36, 322 (1959); Soviet Phys. JETP 9, 222 (1959).
- [1959Al95] D.G. Alkhazov, A.P. Grinberg, K.I. Erokhina, I.Kh. Lemberg, Izvest. Akad. Nauk SSSR, Ser.Fiz. 23, 223 (1959); Columbia Tech. Transl. 23, 215 (1960).
- [1959Ar56] R.G. Arns, R.E. Sund, M.L. Wiedenbeck, Phys. Rev. Letters 2, 50 (1959).
- [1959Be57] R.E. Bell, M.H. Jorgensen, Nucl. Phys. 12, 413 (1959).
- [1959Be73] E.E. Berlovich, V.G. Fleisher, V.I. Breslav, B.K. Preobrazhenskii, Zhur. Eksptl. i Teoret. Fiz. 36, 1589 (1959); Soviet Phys. JETP 9, 1128 (1959).
- [1959Bi10] M. Birk, G. Goldring, Y. Wolfson, Phys. Rev. 116, 730 (1959).
- [1959Bu12] N.A. Burgov, Y.V. Terekhov, G.E. Bizina, Zhur. Eksptl. I Teoret. Fiz. 36, 1612 (1959); Soviet Phys. JETP 9, 1146 (1959).
- [1959Jo21] B. Johansson, T. Alvager, W. Zuk, Arkiv Fysik 14, 439 (1959).
- [1959Of14] S. Ofer, A. Schwarzschild, Phys. Rev. Letters 3, 384 (1959).
- [1959Si74] J.G. Siekman, Thesis, State University of Groningen (1959).
- [1960Ad01] B.M. Adams, D. Eccleshall, M.J.L. Yates, Proc. Conf. Reactions between Complex Nuclei, 2nd, Gatlinbrug, A.Zucker, E.C.Halbert, F.T.Howard, Eds., John Wiley and Sons, Inc., New York, 95 (1960).
- [1960An07] D.S. Andreyev, A.P. Grinberg, K.I. Erokhina, I.Kh. Lemberg, Nucl. Phys. 19, 400 (1960).
- [1960An09] D.S. Andreyev, A.P. Grinberg, G.M.Gusinskii, K.I. Erokhina, I.Kh. Lemberg, IZVEST. AKAD. NAUK SSSR, Ser.Fiz. 24, 1474 (1960); COLUMBIA TECH. TRANSL. 24, 1466 (1961).
- [1960BaZZ] R. Barloutaud, CEA-1531 (1960).
- [1960Be25] R.E. Bell, S. Bjornholm, J.C. Severiens, KGL.Danske Videnskab.Selskab, Mat.-fys.Medd. 32, No.12 (1960).
- [1960Be28] E.E. Berlovich, V.V. Ilin, A.I. Kislyakov *et al.*, IZVEST. AKAD. NAUK SSSR, Ser. Fiz. **24**, 1492 (1960); COLUMBIA TECH. TRANSL. **24**, 1483 (1961).
- [1960Bo07] E. Bodenstedt, E. Matthias, H.J. Korner et al., Nucl. Phys. 15, 239 (1960).
- [1960De08] N.N. Delyagin, Zhur. Eksptl. I Teoret. Fiz. 38, 1111 (1960); Soviet Phys. JETP 11, 803 (1960).
- [1960De18] M. Deutsch, A. Hrynkiewicz, R. Stiening, H. Wilson, MIT-LNS PROGR. REPORT 116 (May 1960); TID-11592 (1960).
- [1960Dz03] B.S. Dzhelepov, M.A. Dolgoborodova, Izvest. Akad. Nauk. SSSR, Ser.Fiz. 24, 304 (1960); Columbia Tech. Transl. 24, 292 (1961).
- [1960El07] B. Elbek, M.C. Olesen, O. Skilbreid, Nucl. Phys. 19, 523 (1960).
- [1960Go08] H.E. Gove, C. Broude, Proc. Conf. Reactions between Complex Nuclei, 2nd, Gatlinburg, A.Zucker, E.C.Halbert, F.T.Howard, Eds., John Wiley and Sons, Inc., New York, 57 (1960).
- [1960Le07] I.Kh. Lemberg, Proc. Conf. Reactions between Complex Nuclei, 2nd, Gatlinburg, A.Zucker, E.C.Halbert, F.T.Howard, Eds., John Wiley and Sons, Inc., New York, 112 (1960).
- [1960Mc13] F.K. McGowan, P.H. Stelson, Phys. Rev. 120, 1803 (1960).
- [1960Me06] F.R. Metzger, C.P. Swann, V.K. Rasmussen, Nucl. Phys. 16, 568 (1960).
- [1960Na13] O. Nathan, V.I. Popov, Nuclear Phys. 21, 631 (1960).
- [1960Re05] K. Reibel, A.K. Mann, Phys. Rev. 118, 701 (1960).
- [1960Un02] J.P. Unik, UCRL-9093, 41 (1960).
- [1960Wi18] W.R. Wisseman, R.M. Williamson, Nucl. Phys. 21, 688 (1960).
- [1961Ak02] A.F. Akkerman, D.K. Kaipov, Y.K. Shubnyi, Zhur. Eksptl. i Teoret. Fiz. **40**, 1031 (1961); Soviet Phys. JETP **13**, 725 (1961).
- [1961An07] D.S. Andreev, V.D. Vasilev, G.M. Gusinskii et al., IZVEST. AKAD. NAUK SSSR, Ser.Fiz. 25, 832 (1961); COLUMBIA TECH. Transl. 25, 842 (1962).
- [1961Be43] E.M. Bernstein, E.Z. Skurnik, Phys. Rev. 121, 841 (1961).
- [1961Bo05] E. Bodenstedt, H.J. Korner, C. Gunther, J. Radeloff, Nucl. Phys. 22, 145 (1961).
- [1961Bo08] E. Bodenstedt, H.-J. Korner, G. Strube et al., Z. Physik $\mathbf{163}$, 1 (1961).
- [1961Bo25] E. Bodenstedt, H.J. Korner, E. Gerdau et al., Z. Physik 165, 57 (1961).
- [1961Bu17] J. Burde, M. Rakavy, S. Ofer, Phys. Rev. 124, 1911 (1961).
- [1961Cl06] M.A. Clark, H.E. Gove, A.E. Litherland, Can. J. Phys. 39, 1241 (1961).
- [1961Cr01] H. Crannell, R. Helm, H. Kendall, J. Oeser, M. Yearian, Phys. Rev. 123, 923 (1961).
- [1961De38] S. Devons, Proc. Conf. Electromagnetic Lifetimes and Properties of Nuclear States, Gatlinburg, Tennessee (October 1961); NAS-974, p.86 (1962).
- [1961Fo08] R. Foucher, Thesis, University of Paris (1961).
- [1961Ga05] C.J. Gallagher, Jr., H.L. Nielsen, O.B. Nielsen, Phys. Rev. 122, 1590 (1961).
- [1961Ge14] J.S. Geiger, R.L. Graham, G.T. Ewan, Proc. Conf. Electromagnetic Lifetimes and Properties Nuclear States, Gatlin-

- burg, Tennessee (October 1961); NAS-NRC Publ.974, 71 (1962).
- [1961Go09] G. Goldring, Z. Vager, Nucl. Phys. 26, 250 (1961).
- [1961Go24] S. Gorodetzky, R. Manquenouille, R. Richert, A.C. Knipper, Proc. Conf. Electromagnetic Lifetimes and Properties Nuclear States, Gatlinburg, Tennessee (October 1961); NAS-NRC Publ.974, 79 (1962).
- [1961Ha21] O. Hansen, M.C. Olesen, O. Skilbreid, B. Elbek, Nucl. Phys. 25, 634 (1961).
- [1961Ha36] W.D. Hamilton, PROC. PHYS. Soc.(LONDON) 78, 1064 (1961).
- [1961Ke06] W.H. Kelly, G.B. Beard, Nucl. Phys. 27, 188 (1961).
- [1961Ke07] G. Kegel, MITS-LNS PROGR. REPORT 112 (May, 1961).
- [1961KeZZ] G.H.R. Kegel, Thesis, Massachusetts Inst. Tech. (1961).
- [1961La09] F. Lacoste, G.R. Bishop, Nucl. Phys. 26, 511 (1961).
- [1961Mc01] F.K. McGowan, P.H. Stelson, Phys. Rev. 122, 1274 (1961).
- [1961Mc18] F.K. McGowan, P.H. Stelson, R.L. Robinson, Proc. Conf. Electromagnetic Lifetimes and Properties Nuclear States, Gatlinburg, Tennessee (October 1961); NAS-NRC Publ.974, 119 (1962).
- [1961Me11] F.R. Metzger, Nucl. Phys. 27, 612 (1961).
- [1961Na06] T.D. Nainan, Phys. Rev. 123, 1751 (1961).
- $[1961Ra05] \ \, V.K. \ \, Rasmussen, \, F.R. \ \, Metzger, \, C.P. \ \, Swann, \, \, Phys. \, \, Rev. \, \, {\bf 123}, \, 1386 \, \, (1961).$
- [1961Re02] D.H. Rester, M.S. Moore, F.E. Durham, C.M. Class, Nucl. Phys. 22, 104 (1961).
- [1961Sa21] J.-J. Samueli, A. Sarazin, J. Phys. Radium 22, 692 (1961).
- [1961Si01] P.C. Simms, N. Benczer-Koller, C.S. Wu, Phys. Rev. 121, 1169 (1961).
- [1961Sk01] E.Z. Skurnik, B. Elbek, M.C. Olesen, Nucl. Phys. 22, 316 (1961).
- [1961St02] P.H. Stelson, F.K. McGowan, Phys. Rev. 121, 209 (1961).
- $[1961St04] \;\; R. \; Stiening, \; M. \; Deutsch, \; Phys. \; Rev. \; {\bf 121}, \; 1484 \; (1961).$
- [1962Af02] O.F. Afonin, Y.P. Gangrskii, I.K. Lemberg et al., Zhur. Eksptl. I Teoret. Fiz. 43, 1995 (1962); Soviet Phys. JETP 16, 1406 (1963).
- [1962Ak01] A.F. Akkerman, E.Y. Vilkovskii, D.K. Kaipov, V.N. Chekanov, Zhur. Eksptl. I Teoret. Fiz. 43, 1268 (1962); Sov. Phys. JETP 16, 899 (1963).
- [1962Ba14] E. Bashandy, M.S. El-Nesr, Nucl. Phys. 34, 483 (1962).
- [1962Ba30] E. Bashandy, M.S. El-Nesr, ARKIV FYSIK 22, 341 (1962).
- [1962Ba38] R.W. Bauer, M. Deutsch, Phys. Rev. 128, 751 (1962).
- [1962Be18] J. Bellicard, P. Barreau, Nucl. Phys. 36, 476 (1962).
- [1962Be46] E.E. Berlovich, Y.K. Gusev, V.V. Ilin, M.K. Nikitin, Zhur. Eksptl. i Teoret. Fiz. 43, 1625 (1962); Soviet Phys. JETP 16, 1144 (1963).
- $[1962 Bi05] \ \ M. \ Birk, \ A.E. \ Blaugrund, \ G. \ Goldring \ \textit{et al.}, \ Phys. \ Rev. \ \textbf{126}, \ 726 \ (1962).$
- $[1962 Bo13]\,$ E. Bodenstedt, H.J. Korner, E. Gerdau et al., Z. Physik ${\bf 168},\,103$ (1962).
- [1962Bo17] E.C. Booth, K.A. Wright, Nucl. Phys. 35, 472 (1962).
- [1962Bo18] E. Bodenstedt, H.J. Korner, E. Gerdau et al., Z. Physik 170, 355 (1962).
- [1962Ch19] P.R. Christensen, Nucl. Phys. 37, 482 (1962).
- [1962De14] T.J. De Boer, H. Voorthuis, J. Blok, Physica 28, 417 (1962).
- [1962Ec01] D. Eccleshall, B.M. Hinds, M.J.L. Yates, Nucl. Phys. 32, 190 (1962).
- [1962Ec03] D. Eccleshall, B.M. Hinds, M.J.L. Yates, N. MacDonald, Nucl. Phys. 37, 377 (1962).
- [1962El03] M.S. El-Nesr, E. Bashandy, Z. Physik 168, 349 (1962).
- [1962Er05] K.I. Erokhina, I.K. Lemberg, Izv. Akad. Nauk SSSR, Ser. Fiz. 26, 205 (1962); Columbia Tech. Transl. 26, 205 (1963).
- $[1962 Fo 05] \;\; \mathrm{D.B. \; Fossan, \; B. \; Herskind, \; Phys. \; Lett. \; \textbf{2}, \; 155 \; (1962)}.$
- [1962Ga13] Y.P. Gangrskii, I.K. Lemberg, Izvest. Akad. Nauk SSSR, Ser.Fiz. 26, 1001 (1962); Columbia Tech. Transl. 26, 1009 (1963).
- [1962Ga19] Y.P. Gangrskii, I.K. Lemberg, IZVEST. AKAD. NAUK SSSR, Ser. Fiz. 26, 212 (1962); COLUMBIA TECH. TRANSL. 26, 212 (1963).
- [1962Ka14] E. Karlsson, E. Matthias, S. Ogaza, Arkiv Fysik 22, 257 (1962).
- [1962Ka28] D.K. Kaipov, Y.K. Shubnyi, R.B. Begzhanov, A.A. Islamov, Zhur. Eksptl. i Teoret. Fiz. 43, 808 (1962); Soviet Phys. JETP 16, 572 (1963).
- [1962Li10] N. Lingappa, E. Kondaiah, C. Badrinathan et al., Nucl. Phys. 38, 146 (1962).
- [1962Na06] O. Nathan, Nucl. Phys. 30, 332 (1962).
- [1962Ri07] F.W. Richter, D. Wiegandt, Z. NATURFORSCH. 17a, 638 (1962).
- [1962St02] P.H. Stelson, F.K. McGowan, Nucl. Phys. 32, 652 (1962).

- [1962Va22] V.D. Vasilev, K.I. Erokhina, I.K. Lemberg, Izvest. Akad. Nauk SSSR **26**, 999, (1962); Columbia Tech. Transl. **26**, 1007 (1963).
- [1962Wa19] F.E. Wagner, F.W. Stanek, P. Kienle, H. Eicher, Z. Physik 166, 1 (1962).
- [1963Ak01] A.F. Akkerman, V.L. Kochetkov, V.N. Chekanov, Izv. Akad. Nauk SSSR, Ser. Fiz. 27, 862 (1963); Bull. Acad. Sci. USSR, Phys. Ser. 27, 852 (1964).
- [1963Ak02] A.F. Akkerman, V.L. Kochetkov, V.N. Chekanov et al., Izv. Akad. Nauk SSSR, Ser.Fiz. 27, 865 (1963); Bull. Acad. Sci. USSR, Phys.Ser. 27, 855 (1964).
- [1963Al31] D.G. Alkhazov, D.S. Andreev, V.D. Vasilev et al., Izv. Akad. Nauk SSSR, Ser. Fiz. 27, 1285 (1963); Bull. Acad. Sci. USSR, Phys. Ser. 27, 1263 (1964).
- [1963Ba24] E. Bashandy, M.S. El-Nesr, S.C. Pancholi, Nucl. Phys. 41, 346 (1963).
- [1963Be14] G.B. Beard, W.H. Kelly, Nucl. Phys. 43, 523 (1963).
- [1963Be29] R.B. Begzhanov, A.A. Islamov, D.K. Kaipov, Y.K. Shubnyi, Zh. Eksperim. i Teor. Fiz. 44, 137 (1963); Soviet Phys. JETP 17, 94 (1963).
- [1963Bj04] J. Bjerregaard, B. Elbek, O. Hansen, P. Salling, Nucl. Phys. 44, 280 (1963).
- [1963Bl04] D. Blum, P. Barreau, J. Bellicard, Phys. Lett. 4, 109 (1963).
- [1963Bu03] J. Burde, M. Rakavy, G. Rakavy, Phys. Rev. 129, 2147 (1963).
- [1963Cu03] W.M. Currie, Nucl. Phys. 47, 551 (1963).
- [1963De21] T.J. De Boer, E.W. Ten Napel, J. Blok, Physica 29, 1013 (1963).
- [1963Fo02] D.B. Fossan, B. Herskind, Nucl. Phys. 40, 24 (1963).
- [1963Fr05] E. Friedland, H.R. Lemmer, Z. Physik 174, 507 (1963).
- [1963Go05] G. Goldring, D. Kedem, Z. Vager, Phys. Rev. 129, 337 (1963); G.Goldring, Priv. Comm. (April 1972).
- [1963Gr04] R. Graetzer, E.M. Bernstein, Phys. Rev. 129, 1772 (1963).
- [1963He01] B. Herskind, D.B. Fossan, Nucl. Phys. 40, 489 (1963).
- [1963Ka29] D.K. Kaipov, R.B. Begzhanov, A.V. Kuzminov, Y.K. Shubnyi, Zh. Eksperim. I Teor. Fiz. 44, 1811 (1963); Soviet Phys. JETP 17, 1217 (1963).
- [1963Ko02] H.J. Korner, J. Radeloff, E. Bodenstedt, Z. Physik 172, 279 (1963).
- [1963Li04] A. Li, A. Schwarzschild, Phys. Rev. 129, 2664 (1963).
- [1963Li07] A.E. Litherland, M.J.L. Yates, B.M. Hinds, D. Eccleshall, Nucl. Phys. 44, 220 (1963).
- [1963Pr04] J.R. Pruett, Phys. Rev. 129, 2583 (1963).
- [1963Sh17] Y.K. Shubnyi, Zh. Eksperim. I Teor. Fiz. 45, 460 (1963); Soviet Phys. JETP 18, 316 (1964).
- [1963Sk01] S.J. Skorka, T.W. Retz-Schmidt, Nucl. Phys. 46, 225 (1963).
- [1963Zi02] W. Zimmermann, Ann. Phys. (Leipzig) 12, 45 (1963).
- [1964Be25] R.B. Begzhanov, A.A. Islamov, Zh. Eksperim. i Teor. Fiz. 46, 1486 (1964); Soviet Phys. JETP 19, 1005 (1964).
- [1964Be32] J. Bellicard, P. Barreau, D. Blum, Nucl. Phys. 60, 319 (1964).
- [1964Be36] E.E. Berlovich, Y.K. Gusev, D.M. Khai, I. Shenaikh, Izv. Akad. Nauk SSSR, Ser. Fiz. 28, 80 (1964); Bull. Acad. Sci. USSR, Phys. Ser. 28, 77 (1965).
- [1964Bo22] E.C. Booth, B. Chasan, K.A. Wright, Nucl. Phys. 57, 403 (1964).
- [1964Cr11] H.L. Crannell, T.A. Griffy, Phys. Rev. 136, B1580 (1964).
- [1964Do06] M. Dorikens, L. Dorikens-Vanpraet, J. Demuynck, O. Segaert, Proc. Phys. Soc. (London) 83, 461 (1964).
- [1964El03] B. Elbek, H.E. Gove, B. Herskind, Kgl. Danske Videnskab. Selskab., Mat.-Fys.Medd. 34, No.8 (1964).
- [1964Es02] M.A. Eswaran, C. Broude, CAN. J. Phys. 42, 1311 (1964).
- [1964Gu01] C. Gunther, W. Engels, E. Bodenstedt, Phys. Lett. 10, 77 (1964).
- [1964Ho25] B.W. Hooton, Nucl. Phys. 59, 332 (1964).
- [1964Ja09] J. Jastrzebski, M. Moszynski, K. Pawlak, K. Stryczniewicz, Compt. Rend. Congr. Intern. Phys. Nucl., Paris, P.Gugenberger, Ed., Centre National de la Recherche Scientifique, Paris, II, 573 (1964).
- [1964Ko13] H.J. Korner, E. Gerdau, J. Heisenberg, J. Braunsfurth, Perturbed Angular Correlations, E.Karlsson, E.Matthias, K.Siegbahn, Ed., North-Holland Publishing Co., 200 (1964).
- [1964L008] R. Lombard, P. Kossanyi-Demay, G.R. Bishop, Nucl. Phys. 59, 398 (1964).
- [1964Ma01] D.L. Malaker, L. Schaller, W.C. Miller, Bull. Am. Phys. Soc. 9, No.1, 9, AB7 (1964).
- [1964No01] T. Novakov, J.M. Hollander, R.L. Graham, Bull. Am. Phys. Soc. 9, No.1, 9, AB6 (1964).
- $[1964 Pa17] \;\; \mathrm{J.C.} \;\; \mathrm{Palathingal}, \;\; \mathrm{Phys.} \;\; \mathrm{Rev.} \;\; \mathbf{136}, \; \mathrm{B1553} \;\; (1964).$
- [1964Ro19] R. Rougny, J.J. Samueli, A. Sarazin, J. Phys. (Paris) 25, 989 (1964).
- [1964Sc21] R.P. Scharenberg, J.D. Kurfess, G. Schilling et al., Nucl. Phys. 58, 658 (1964); R.P. Scharenberg, Priv. Comm. (April 1972).

- [1964St04] P.H. Stelson, F.K. McGowan, R.L. Robinson, J.L.C. Ford, Jr., Bull. Am. Phys. Soc. 9, No.4, 484, JA8 (1964).
- [1964Sy01] G.D. Symons, J. De Boer, Bull. Am. Phys. Soc. 9, No.5, 554, N9 (1964).
- [1965Ab02] H. Abou-Leila, N.N. Perrin, J. Valentin, Arkiv Fysik 29, 53 (1965).
- [1965Do02] M. Dorikens, O. Segaert, J. Demuynck et al., Nucl. Phys. 61, 33 (1965).
- [1965Es01] M.A. Eswaran, H.E. Gove, A.E. Litherland, C. Broude, Nucl. Phys. 66, 401 (1965).
- [1965Ev03] H.C. Evans, M.A. Eswaran, H.E. Gove, Can. J. Phys. 43, 82 (1965).
- [1965Fr11] A.M. Friedman, J.R. Erskine, T.H. Braid, Bull. Am. Phys. Soc. 10, No.4, 540, KA13 (1965).
- [1965Ga05] Y.P. Gangrskii, I.K. Lemberg, YADERN. FIZ. 1, 1025 (1965); SOVIET J. NUCL. PHYS. 1, 731 (1965).
- [1965Gu02] C. Gunther, G. Strube, U. Wehmann et al., Z. Physik 183, 472 (1965).
- [1965Gu10] G.M. Gusinskii, K.I. Erokhina, I.K. Lemberg, Yadern. Fiz. 2, 794 (1965); Soviet J. Nucl. Phys. 2, 567 (1966)
- [1965Hu02] A. Hubner, Z. Physik 183, 25 (1965).
- [1965Ka15] D.K. Kaipov, Y.K. Shubnyi, V.M. Amerbaev et al., Zh. Eksperim. i Teor. Fiz. 48, 1221 (1965); Soviet Phys. JETP 21, 815 (1965).
- [1965Mc05] F.K. McGowan, R.L. Robinson, P.H. Stelson, J.L.C. Ford, Jr., Nucl. Phys. 66, 97 (1965).
- [1965Me08] W. Meiling, F. Stary, Nucl. Phys. 74, 113 (1965).
- [1965Ne03] W.R. Neal, H.W. Kraner, Phys.Rev. 137, B1164 (1965).
- [1965Ro17] R. Rougny, J.J. Samueli, A. Sarazin, J. Phys. (Paris) 26, 63 (1965).
- [1965Sc05] R.P. Scharenberg, J.D. Kurfess, G. Schilling et al., Phys. Rev. 137, B26 (1965).
- [1965Si02] J.J. Simpson, J.A. Cookson, D. Eccleshall, M.J.L. Yates, Nucl. Phys. 62, 385 (1965).
- [1965Ta13] G.K. Tandon, Thesis, Yale University (1965).
- [1965Ti02] J.W. Tippie, R.P. Scharenberg, Phys.Lett. 16, 154 (1965); R.P. Scharenberg, Priv.Comm. (April 1972).
- [1966Ab02] H. Abou-Leila, J. Treherne, J. Phys. (Paris) 27, 5 (1966).
- [1966As03] D. Ashery, N. Assaf, G. Goldring et al., Nucl. Phys. 77, 650 (1966).
- [1966Be16] G.B. Beard, Phys. Rev. 145, 862 (1966).
- [1966Be53] R.B. Begzhanov, A.A. Islamov, Program and Theses, Proc. 16th All-Union Conf. Nucl. Spectroscopy and Struct. Of At. Nuclei, Moscow, 21 (1966).
- [1966Bl08] D. Bloess, A. Krusche, F. Munnich, Z. Physik **192**, 358 (1966).
- [1966Ec02] D. Eccleshall, M.J.L. Yates, J.J. Simpson, Nucl. Phys. 78, 481 (1966).
- [1966Fu03] E.G. Funk, H.J. Prask, J.W. Mihelich, Phys. Rev. 141, 1200 (1966).
- [1966Go20] S. Gorodetzky, N. Schulz, E. Bozek, A.C. Knipper, Nucl. Phys. 85, 529 (1966).
- [1966Gr20] L. Grodzins, R.R. Borchers, G.B. Hagemann, Nucl. Phys. 88, 474 (1966).
- [1966Hr01] A.Z. Hrynkiewicz, S. Kopta, S. Szymczyk, T. Walczak, Nucl. Phys. 79, 495 (1966).
- [1966Hr03] B. Hrastnik, V. Knapp, M. Vlatkovic, Nucl. Phys. 89, 412 (1966).
- $[1966 Ja16]\,$ J. Jastrzebski, M. Moszynski, A. Zglinski, Nukleonika ${\bf 11},\,471$ (1966).
- [1966Li07] K.P. Lieb, Nucl. Phys. 85, 461(1966).
- [1966Li08] H. Liesem, Z. Phys. 196, 174 (1966).
- $[1966 Mc 07] \;\; \text{R.E. McAdams, E.N. Hatch, Nucl. Phys. } \textbf{82}, \, 372 \,\, (1966).$
- [1966Mc18] F.K. McGowan, P.H. Stelson, R.L. Robinson *et al.*, Proc.Conf.Bases for Nucl.Spin-Parity Assignments, Gatlinburg, Tenn. (1966), N.B. Gove, R.L. Robinson, Eds., Academic Press, New York, 222 (1966)
- [1966Me11] F.R. Metzger, G.K. Tandon, Phys. Rev. 148, 1133 (1966).
- [1966Ra04] B.V.N. Rao, S. Jnanananda, Nucl. Phys. 75, 109 (1966).
- [1966Sc06] A. Schwarzschild, Phys. Rev. 141, 1206 (1966).
- [1966Se06] G.G. Seaman, J.S. Greenberg, D.A. Bromley, F.K. McGowan, Phys. Rev. 149, 925 (1966).
- [1966Sk01] S.J. Skorka, D. Evers, J. Hertel et al., Nucl. Phys. 81, 370 (1966).
- [1966Ti01] J.W. Tippie, R.P. Scharenberg, Phys. Rev. 141, 1062 (1966).
- [1966Wa10] E.K. Warburton, J.W. Olness, K.W. Jones et al., Phys. Rev. 148, 1072 (1966)
- [1967Ab06] H. Abou-Leila, Ann. Phys. (Paris) 2, 181 (1967).
- $[1967Af03] \quad \text{O.F. Afonin, A.P. Grinberg, I.K. Lemberg, I.N. Chugunov, Yadern. Fiz. \textbf{6}, 219 (1967); Soviet J. Nucl. Phys. \textbf{6}, 160 (1968).$
- $[1967 \mathrm{As} 03]\,$ D. Ashery, N. Bahcall, G. Goldring $et~al.,~\mathrm{Nucl.}$ Phys. A $\mathbf{101},~51~(1967).$
- $[1967 Ba27]\;$ A. Backlin, S.G. Malmskog, H. Solhed, Arkiv Fysik ${\bf 34},\,495$ (1967).
- $[1967 Ba52] \ \ P. \ Barreau, \ J.B. \ Bellicard, \ Phys. \ Rev. \ Lett. \ {\bf 19}, \ 1444 \ (1967).$

- [1967Be39] R.B. Begzhanov, A.A. Islamov, Yadern. Fiz. 5, 483 (1967); Soviet J. Nucl. Phys. 5, 339 (1967).
- [1967Be62] E.E. Berlovich, V.V. Lukashevich, Izv. Akad. Nauk SSSR, Ser. Fiz. 31, 1603 (1967); Bull. Acad. Sci. USSR, Phys. Ser. 31, 1643 (1968).
- [1967Br01] C. Broude, P.J.M. Smulders, T.K. Alexander, Nucl. Phys. A 90, 321 (1967).
- [1967BuZX] G.A. Burginyon, J.S. Greenberg, R.F. Casten, D.A. Bromley, Contrib. Intern. Conf. Nucl. Struct., Tokyo, 155 (1967).
- [1967Ca02] A.L. Catz, S. Amiel, Nucl. Phys. A 92, 222 (1967).
- [1967Ca08] R.F. Casten, J.S. Greenberg, G.A. Burginyon, D.A. Bromley, Phys. Rev. Lett. 18, 912 (1967).
- [1967Cl02] J.E. Clarkson, R.M. Diamond, F.S. Stephens, I. Perlman, Nucl. Phys. A 93, 272 (1967).
- [1967Cr01] H. Crannell, T.A. Griffy, L.R. Suelzle, M.R. Yearian, Nucl. Phys. A 90, 152 (1967).
- [1967DeZW] J.de Boer, A.M. Kleinfeld, R. Covello-Moro, H.P. Lie, Bull. Am. Phys. Soc. 12, No.4, 535, GD8 (1967).
- [1967Du07] M.A. Duguay, C.K. Bockelman, T.H. Curtis, R.A. Eisenstein, Phys. Rev. 163, 1259 (1967).
- [1967Gi02] P. Gilad, G. Goldring, R. Herber, R. Kalish, Nucl. Phys. A 91, 85 (1967); G.Goldring, Priv. Comm. (April 1972).
- [1967Gl02] J.E. Glenn, J.X. Saladin, Phys. Rev. Lett. 19, 33 (1967).
- [1967Ka16] R. Kalish, L. Grodzins, R.R. Borchers et al., Phys. Rev. 161, 1196 (1967); R.R. Borchers, Priv. Comm. (May 1972).
- [1967Ku07] J.D. Kurfess, R.P. Scharenberg, Phys. Rev. 161, 1185 (1967).
- [1967Li05] K.P. Lieb, H. Grawe, H. Ropke, Nucl. Phys. A 98, 145 (1967).
- [1967Si03] J.J. Simpson, D. Eccleshall, M.J.L. Yates, N.J. Freeman, Nucl. Phys. A 94, 177 (1967).
- [1967St03] R.G. Stokstad, I. Hall, G.D. Symons, J. de Boer, Nucl. Phys. A 92, 319 (1967).
- [1967St16] R.G. Stokstad, I. Hall, Nucl. Phys. A 99, 507 (1967).
- [1967TaZZ] G.K. Tandon, Bull. Am. Phys. Soc. 12, No.5, 683, DE14 (1967).
- [1967Wo06] P.J. Wolfe, R.P. Scharenberg, Phys. Rev. 160, 866 (1967).
- [1968An20] D.S. Andreev, O.F. Afonin, V.K. Bondarev et al., Izv. Akad. Nauk SSSR, Ser.Fiz. 32, 1671 (1968); Bull. Acad. Sci. USSR, Phys.Ser. 32, 1543 (1969).
- [1968Cr07] W.L. Creten, R.J. Jacobs, H.M. Ferdinande, Nucl. Phys. A 120, 126 (1968).
- [1968Cu05] W.M. Currie, C.H. Johnson, Nucl. Instr. Methods 63, 221 (1968).
- [1968Do12] K.W. Dolan, D.K. McDaniels, Phys. Rev. 175, 1446 (1968).
- [1968Ev03] D. Evers, G. Flugge, J. Morgenstern et~al., Phys. Letters ${\bf B}~{\bf 27},~423~(1968).$
- [1968Fi09] T.R. Fisher, S.S. Hanna, D.C. Healey, P. Paul, Phys. Rev. 176, 1130(1968)
- [1968Gi05] E.F. Gibson, K. Battleson, D.K. McDaniels, Phys. Rev. 172, 1004 (1968).
- [1968Ha18] O. Hausser, T.K. Alexander, C. Broude, CAN. J. Phys. 46, 1035 (1968).
- [1968Ka01] G. Kaye, Nucl. Phys. A 108, 625 (1968).
- [1968Ke04] R.J. Keddy, Y. Yoshizawa, B. Elbek et al., Nucl. Phys. A 113, 676 (1968) .
- [1968Ku03] H.W. Kugel, E.G. Funk, J.W. Mihelich, Phys. Rev. 165, 1352 (1968).
- [1968La26] J.M. Lagrange, G. Albouy, M. Pautrat et al., J. Phys. (Paris) 29, Suppl.No.1, Colloq.C1-191 (1968).
- [1968LaZZ] P.G. Lawson, Thesis, Oxford Univ. (1968); Quoted by 1976As04.
- $[1968 Li04] \;\; \text{K.P. Lieb, H. Ropke, H. Grawe} \;\; et \;\; al., \;\; \text{Nucl. Phys.} \;\; \textbf{A} \;\; \textbf{108}, \; 233 (1968).$
- $[1968Li12]\ H.\ Lindeman,\ G.A.P.\ Engelbertink,\ M.W.\ Ockeloen,\ H.S.\ Pruys,\ Nucl.\ Phys.\ {\bf A\ 122},\ 373(1968).$
- [1968Ma05] J.R. MacDonald, D.F.H. Start, R. Anderson et al., Nucl. Phys. A 108, 6 (1968).
- [1968Ma14] S.G. Malmskog, M. Hojeberg, Arkiv Fysik 35, 229 (1968).
- [1968Mc08] F.K. McGowan, R.L. Robinson, P.H. Stelson, W.T. Milner, Nucl. Phys. A 113, 529 (1968).
- [1968MiZZ] W.T. Milner, Thesis, Univ. Tennessee (1968); ORNL-TM-2121 (1968).
- [1968Pe02] G.A. Peterson, J. Alster, Phys. Rev. 166, 1136 (1968).
- [1968Ra32] B.V.N. Rao, K.M.M.S. Ayyangar, S. Jnanananda, Indian J. Pure Appl. Phys. 6, 358 (1968).
- [1968Ri09] F.W. Richter, J. Schutt, D. Wiegandt, Z. Physik 213, 202 (1968).
- [1968Ri16] F. Riess, P. Paul, J.B. Thomas, S.S. Hanna, Phys. Rev. 176, 1140 (1968).
- [1968Ro05] S.W. Robinson, R.D. Bent, Phys. Rev. 168, 1266 (1968).
- [1968Sc04] D. Schroeer, P.S. Jastram, Phys. Rev. 166, 1212 (1968).
- [1968Sc13] M. Schumacher, Phys. Rev. 171, 1279 (1968).
- $[1968Se02] \ \ B. \ Sethi, \ S.K. \ Mukherjee, \ Phys. \ Rev. \ {\bf 166}, \ 1227 \ (1968).$
- [1968SeZZ] G.G. Seaman, M.C. Bertin, J.W. Tape et al., Bull. Am. Phys. Soc. 13, No.11, 1384, BD15 (1968); Priv. Comm. (1969).
- [1968Si05] J.J. Simpson, U. Smilansky, J.P. Wurm, Phys. Lett. B 27, 633 (1968); Erratum Phys.Letters B 28, 422 (1969).

- [1968St04] M. Stroetzel, Phys. Letters B 26, 376 (1968).
- [1968St13] R.G. Stokstad, B. Persson, Phys. Rev. 170, 1072 (1968).
- [1968Ve01] E. Veje, B. Elbek, B. Herskind, M.C. Olesen, Nucl. Phys. A 109, 489 (1968).
- [1968Wa08] H.K. Walter, A. Weitsch, Z. Physik 211, 304 (1968).
- [1968Zi02] J.F. Ziegler, G.A. Peterson, Phys. Rev. 165, 1337 (1968).
- [1969Af01] V.D. Afanasev, N.G. Afanasev, I.S. Gulkarov et al., Yadern. Fiz. 10, 33 (1969); Soviet J. Nucl. Phys. 10, 18 (1970).
- [1969An08] J.H. Anderson, R.C. Ritter, Nucl. Phys. A 128, 305 (1969).
- [1969Av01] R. Avida, Y. Dar, P. Gilad et al., Nucl. Phys. A 127, 412 (1969).
- [1969Be31] R.A.L. Bell, J. L'Ecuyer, R.D. Gill et al., Nucl. Phys. A 133, 337 (1969).
- [1969Be34] R.A. Belt, H.W. Kugel, J.M. Jaklevich, E.G. Funk, Nucl. Phys. A 134, 225 (1969).
- [1969Be48] M.C. Bertin, N. Benczer-Koller, G.G. Seaman, J.R. MacDonald, Phys. Rev. 183, 964 (1969).
- [1969Bh01] K. Bharuth-Ram, K.P. Jackson, K.W. Jones, E.K. Warburton, Nucl. Phys. A 137, 262 (1969).
- [1969Bi09] M. Bister, A. Anttila, J. Rasanen, Can. J. Phys. 47, 2539 (1969).
- [1969Bi11] P.G. Bizzeti, A.M. Bizzeti-Sona, A. Cambi et al., Nuovo Cimento Lett. 2, 775 (1969).
- [1969Ca19] R.F. Casten, J.S. Greenberg, S.H. Sie et al., Phys. Rev. 187, 1532 (1969).
- [1969Ca24] L.E. Carlson, Priv. Comm., quoted by 1969Fl03 (1969).
- [1969Cl05] D.Cline, H.S.Gertzman, H.E.Gove et al., Nucl. Phys. A 133, 445 (1969).
- [1969Cu06] T.H. Curtis, R.A. Eisenstein, D.W. Madsen, C.K. Bockelman, Phys. Rev. 184, 1162 (1969).
- [1969Di02] R.M. Diamond, F.S. Stephens, W.H. Kelly, D. Ward, Phys. Rev. Letters 22, 546 (1969).
- [1969Ei03] R.A. Eisenstein, D.W. Madsen, H. Theissen et al., Phys. Rev. 188, 1815 (1969).
- [1969En04] G.A.P. Engelbertink, G. van Middelkoop, Nucl. Phys. A 138, 588 (1969).
- [1000Eno1] G.H.F. Engelberenni, G. van Middelhoop, 100E. 1 1115. 11 100,
- $[1969Fo07] \ \ M. \ Forker, \ H.F. \ Wagner, \ Nucl. \ Phys. \ {\bf A} \ {\bf 138}, \ 13 \ (1969).$
- $[1969Fo08] \ \ M.\ Forker,\ H.F.\ Wagner,\ G.\ Schmidt,\ Nucl.\ Phys.\ {\bf A\ 138},\ 97\ (1969).$
- [1969FuZX] E.G. Funk, PRIV. COMM., quoted by 1970Ra18 (1969).
- [1969Ga25] L.N. Galperin, A.Z. Ilyasov, I.K. Lemberg, G.A. Firsanov, YAD. FIZ. 9, 225 (1969); SOV. J. NUCL. PHYS. 9, 133 (1969).
- [1969Gl08] J.E. Glenn, R.J. Pryor, J.X. Saladin, Phys. Rev. 188, 1905 (1969).
- [1969GIZY] J.E. Glenn, COO-535-603, 28 (1969).
- [1969Gr03] H.Grawe, K.P.Lieb, Nucl. Phys. A 127, 13 (1969).
- [1969Ha02] R. Hartmann, K.P. Lieb, H. Ropke, Nucl. Phys. A 123, 437 (1969).
- $[1969 \text{Ha}31]\,$ O. Hausser, T.K. Alexander, D. Pelte et al., Phys. Rev. Lett. 23, 320 (1969).
- $[1969 Jo 10] \;\; \text{K.W. Jones, A.Z. Schwarzschild, E.K. Warburton, D.B. Fossan, Phys. Rev. } \textbf{178}, 1773 \; (1969).$
- $[1969 Ka 10] \;\; \text{C.D. Kavaloski, W.J. Kossler, Phys. Rev. } \textbf{180}, \, 971 \,\, (1969).$
- $[1969 \mathrm{KeZX}] \;\; \mathrm{J.R. \; Kerns, \; Thesis, \; Univ. Pittsburgh \; (1969); \; Diss. \; Abstr. \; Int. \; \mathbf{31B}, \; 336 \; (1970).}$
- [1969 Ko03] W.J. Kossler, J. Winkler, C.D. Kavaloski, Phys. Rev. $\boldsymbol{177},\,1725(1969).$
- [1969Me14] M.A. Meyer, N.S. Wolmarans, Nucl. Phys. A 136, 663 (1969).
- [1969Mi07] W.T. Milner, F.K. McGowan, P.H. Stelson et al., Nucl. Phys. A 129, 687 (1969).
- [1969Ni09] R.J. Nickles, Nucl. Phys. A 134, 308 (1969).
- [1969Pe08] D. Pelte, O. Hausser, T.K. Alexander et al., Phys. Lett. B 29, 660 (1969).
- [1969Pe11] D. Pelte, O. Hausser, T.K. Alexander, H.C. Evans, CAN. J. Phys. 47, 1929 (1969).
- [1969Po04] A.R. Poletti, A.D.W. Jones, J.A. Becker, R.E. McDonald, Phys. Rev. 181, 1606 (1969).
- [1969Ro05] R.L. Robinson, F.K. McGowan, P.H. Stelson et al., Nucl. Phys. A 124, 553 (1969).
- [1969Ro08] B.C. Robertson, R.A.I. Bell, J. L'Ecuyer et al., Nucl. Phys. A 126, 431 (1969).
- [1969Sa14] G.A. Savitskii, N.G. Afanasev, I.V. Andreeva et al., Izv. Akad. Nauk SSSR, Ser.Fiz. 33, 53 (1969); Bull. Acad. Sci. USSR, Phys.Ser. 33, 50 (1970).
- $[1969Sa27] \;\; \text{J.X. Saladin, J.E. Glenn, R.J. Pryor, Phys. Rev. } \textbf{186}, \, 1241 \,\, (1969).$
- [1969ScZV] D. Schwalm, B. Povh, Contrib. Intern. Conf. Properties Nucl. States, Suppl., Montreal, Canada, 15 (1969).
- $[1969\mathrm{Si}15]\,$ J.J. Simpson, U. Smilansky, D. Ashery, Nucl. Phys. A $138,\,529$ (1969).
- [1969Sp05] G.D. Sprouse, S.S. Hanna, Nucl. Phys. A137, 658 (1969).
- [1969Th01] M.J. Throop, Phys. Rev. 179, 1011 (1969).
- [1969Th03] J.P. Thibaud, M.M. Aleonard, D. Castera et al., Nucl. Phys. A 135, 281 (1969).
- [1969Ti01] O. Titze, Z. Physik **220**, 66 (1969).

- [1969To08] Y. Torizuka, Y. Kojima, M. Oyamada et al., Phys. Rev. 185, 1499 (1969).
- [1970Ab14] H. Abou-Leila, S.M. Darwish, A. Abd El-Haliem, Z. Awwad, Nucl. Phys. A 158, 568 (1970).
- [1970Af04] V.D. Afanasev, N.G. Afanasev, A.Y. Buki et al., YAD. FIZ. 12, 885 (1970); SOV. J. NUCL. PHYS. 12, 480 (1971).
- [1970AgZV] A.P. Agnihotry, K.P. Gopinathan, M.C. Joshi, K.G. Prasad, Proc. Nucl. Phys. And Solid State Phys. Symp., Nucl. Phys., Madurai, 161 (1970).
- [1970Al05] M.M. Aleonard, D. Castera, P. Hubert et al., Nucl. Phys. A 146, 90 (1970).
- [1970Al10] T.K. Alexander, A. Bell, Nucl. Instrum. Methods 81, 22 (1970).
- [1970BaYH] R.D. Barton, J.S. Wadden, V.K. Carriere, Bull. Amer. Phys. Soc. 15, No.6, 806, EE6 (1970).
- [1970Be07] J. Bellicard, P. Leconte, T.H. Curtis et al., Nucl. Phys. A 143, 213 (1970).
- [1970Be08] R. Beraud, I. Berkes, R. Chery et al., Phys. Rev. C 1, 303 (1970).
- [1970Be18] T. Bedike, N.G. Zaitseva, V.A. Morozov et al., YAD. Fiz. 11, 481 (1970); Sov. J. Nucl. Phys. 11, 269 (1970).
- [1970Be36] I. Ben-Zvi, P. Gilad, M.B. Goldberg et al., Nucl. Phys. A 151, 401 (1970); G.Goldring, Priv. Comm. (April 1972).
- [1970Be39] N. Benczer-Koller, G.G. Seaman, M.C. Bertin et al., Phys. Rev. C 2, 1037 (1970).
- [1970Bi08] M. Bini, P.G. Bizzeti, A.M. Bizzeti-Sona et al., LETT. NUOVO CIMENTO 3, 235 (1970).
- [1970Br18] F. Brandolini, C. Signorini, Nuovo Cimento 67 A, 247 (1970).
- [1970Br26] E.J. Bruton, J.A. Cameron, A.W. Gibb et al., Nucl. Phys. A 152, 495 (1970).
- [1970BrZP] R. Broda, J. Golczewski, A.Z. Hrynkiewicz et al., JINR-E6-5070 (1970).
- [1970Ch01] A. Christy, I. Hall, R.P. Harper et al., Nucl. Phys. A 142, 591 (1970).
- [1970Ch11] E. Cheifetz, R.C. Jared, S.G. Thompson, J.B. Wilhelmy, Phys. Rev. Lett. 25, 38 (1970).
- [1970Ch14] P.R. Christensen, G. Lovhoiden, J. Rasmussen, Nucl. Phys. A 149, 302 (1970).
- [1970ChZH] E. Cheifetz, R.C. Jared, S.G. Thompson, J.B. Wilhelmy, Proc. Int. Conf. Prop. Nuclei Far from Region of Beta-Stability, Leysin, Switzerland, 2, 883 (1970); CERN 70-30 (1970).
- [1970Co09] P.M. Cockburn, W.J. Stark, R.W. Krone, Phys. Rev. C 1, 1757 (1970).
- [1970Cu02] W.M. Currie, L.G. Earwaker, J. Martin, A.K. Sen Gupta, J. Phys. A 3, 73 (1970).
- [1970De01] P.R. de Kock, J.W. Koen, W.L. Mouton, Nucl. Phys. A 140, 190 (1970).
- [1970En01] G. Engler, Phys. Rev. C 1, 734 (1970).
- [1970ErZY] B.R. Erdal, M. Finger, R. Foucher et al., PROC. INT. CONF. PROP. NUCLEI FAR FROM REGION OF BETA-STABILITY, Leysin, Switzerland, 2, 1031 (1970); CERN-70-30 (1970).
- $[1970 Ge07] \;\; \text{H.S. Gertzman, D. Cline, H.E. Gove } \textit{et al., Nucl. Phys. } \textbf{A 151}, \, 273 \,\, (1970).$
- [1970Gr11] M.W. Greene, P.R. Alderson, D.C. Bailey et al., Nucl. Phys. A 148, 351 (1970).
- [1970Ha04] O. Hausser, B.W. Hooton, D. Pelte et al., CAN. J. PHYS. 48, 35 (1970).
- [1970Ha24] O. Hausser, D. Pelte, T.K. Alexander, H.C. Evans, Nucl. Phys. A 150, 417 (1970).
- [1970He01] D. Herrmann, J. Kalus, Nucl. Phys. A 140, 257 (1970).
- [1970Hi03] D. Hitlin, S. Bernow, S. Devons et al., Phys. Rev. C 1, 1184 (1970).
- [1970Hu14] F.C.P. Huang, D.K. McDaniels, Phys. Rev. C 2, 1342 (1970).
- [1970It01] K. Itoh, M. Oyamada, Y. Torizuka, Phys. Rev. C 2, 2181 (1970).
- [1970Jo20] W. John, F.W. Guy, J.J. Wesolowski, Phys. Rev. C 2, 1451 (1970).
- [1970Ka09] R. Kalish, R.R. Borchers, H.W. Kugel, Nucl. Phys. A 147, 161 (1970); R.R.Borchers, Priv. Comm. (May 1972).
- [1970KaZK] G. Kaspar, W. Knupfer, W. Ebert et al., Proc. Intern. Conf. Nucl. Reactions Induced by Heavy Ions, Heidelberg, Germany (1969); R.Bock, W.R.Hering, Eds, North-Holland Publishing Co., Amsterdam, 471 (1970).
- [1970Ke15] P.F. Kenealy, G.B. Beard, K. Parsons, Phys. Rev. C 2, 2009 (1970).
- [1970Kh05] V.M. Khvastunov, N.G. Afanasev, V.D. Afanasev et al., YAD. Fiz. 12, 9 (1970); Sov. J. Nucl. Phys. 12, 5 (1971).
- [1970Kl06] A.M. Kleinfeld, R. Covello-Moro, H. Ogata et al., Nucl. Phys. A 154, 499 (1970).
- [1970Kl12] A.M. Kleinfeld, J.D. Rogers, J. Gastebois et al., Nucl. Phys. A 158, 81 (1970).
- [1970LaZM] J.M. Lagrange, Thesis, Univ.Paris (1970); NP-18447 (1970); Priv. Comm. (1973).
- $[1970 Le17] \;\; \text{P.M.S. Lesser, D. Cline, J.D. Purvis, Nucl. Phys. } \textbf{A 151}, \, 257 \,\, (1970).$
- [1970Me08] F.R. Metzger, Nucl. Phys. A 158, 88 (1970).
- [1970Me09] M.W. Mekshes, N. Hershkowitz et al., Phys. Rev. C 2, 289 (1970).
- [1970Me18] F.R. Metzger, Nucl. Phys. A 148, 362 (1970).
- [1970MiZQ] W.T. Milner, F.K. McGowan, P.H. Stelson, R.L. Robinson, Bull. Amer. Phys. Soc. 15, No.11, 1358, DF11 (1970).
- [1970Mo39] V.A. Morozov, T.M. Muminov, A.B. Khalikulov, JINR-P6-5201 (1970).

- [1970Na05] K. Nakai, J.L. Quebert, F.S. Stephens, R.M. Diamond, Phys. Rev. Lett. 24, 903 (1970).
- [1970Na07] K. Nakai, F.S. Stephens, R.M. Diamond, Nucl. Phys. A 150, 114 (1970).
- [1970Pe15] R.J. Peterson, H. Theissen, W.J. Alston, Nucl. Phys. A153, 610 (1970).
- [1970Pr07] R.J. Pryor, F. Rosel, J.X. Saladin, K. Alder, Phys. Lett. B 32, 26 (1970).
- [1970Pr09] R.J. Pryor, J.X. Saladin, Phys. Rev. C 1, 1573 (1970).
- [1970Qu02] J.L. Quebert, K. Nakai, R.M. Diamond, F.S. Stephens, Nucl. Phys. A 150, 68 (1970).
- [1970Ra17] C.E. Ragan III, R.V. Poore, N.R. Roberson et al., Phys. Rev. C 1, 2012 (1970).
- [1970Ra18] R.L. Rasera, A. Li-Scholz, Phys. Rev. B 1, 1995 (1970).
- [1970RaZC] V.K. Rasmussen, PRIV. COMM., quoted by 1971Ma03 (1970).
- [1970Sa09] R.O. Sayer, P.H. Stelson, F.K. McGowan et al., Phys. Rev. C 1, 1525 (1970).
- [1970St10] P. Strehl, Z. Phys. 234, 416 (1970).
- [1970St17] S.G. Steadman, A.M. Kleinfeld, G.G. Seaman et al., Nucl. Phys. A 155, 1 (1970).
- [1970St20] P.H. Stelson, F.K. McGowan, R.L. Robinson, W.T. Milner, Phys. Rev. C 2, 2015 (1970).
- [1970StZP] D.F.H. Start, PRIV. COMM., quoted by 1971Ma03 (1970).
- [1970Sw03] C.P. Swann, Nucl. Phys. A 150, 300 (1970).
- [1970Th04] J.P. Thibaud, M.M. Aleonard, D. Castera et al., J. Phys. (Paris) 31, 131 (1970).
- [1970To08] H. Ton, W. Beens, S. Roodbergen, J. Blok, Nucl. Phys. A 155, 235 (1970).
- [1970Wa04] B. Wakefield, I.M. Naqib, R.P. Harper et al., Phys. Lett. B 31, 56 (1970).
- [1970Wa05] R.L. Watson, J.B. Wilhelmy, R.C. Jared et al., Nucl. Phys. A 141, 449 (1970).
- [1971Ab05] H. Abou-Leila, A. Abd El-Haliem, S.M. Darwish, Nucl. Phys. A 175, 663 (1971).
- [1971Ba59] J. Barrette, M. Barrette, A. Boutard et al., Nucl. Phys. A 172, 41 (1971).
- [1971Bb09] T. Badica, Stud. Cercet. Fiz. 23, 877 (1971).
- [1971Bo08] H.H. Bolotin, D.A. McClure, Phys. Rev. C 3, 797 (1971).
- [1971Bo13] P.D. Bond, J.D. McGervey, S. Jha, Nucl. Phys. A 163, 571 (1971).
- [1971Bo23] M. Bocciolini, P. Sona, N. Taccetti, Lett. Nuovo Cim. 1, 695 (1971).
- [1971BrYK] B.A. Brown, M. Marmor, D.B. Fossan, Proc. Topical Conf. Struct. of 1f7/2 Nuclei, R.A.Ricci, Ed., Editrice Compositori, Bologna, p.123 (1971).
- [1971Ca35] J.A. Cameron, Z. Zamori, CAN. J. Phys. 49, 2690 (1971).
- [1971Ch26] A. Charvet, Do Huu Phuoc, R. Duffait et al., J. Phys. (Paris) 32, 359 (1971).
- [1971ChZF] J. Charbonneau, N.V.De Castro Faria, J. L'Ecuyer, D. Vitoux, Bull. Amer. Phys. Soc. 16, No.4, 625, JH2 (1971).
- [1971Cr01] P.A. Crowley, J.R. Kerns, J.X. Saladin, Phys. Rev. C 3, 2049 (1971).
- [1971DaZM] W.G. Davies, J.S. Forster, I.M. Szoghy, D. Ward, AECL-3996, 16 (1971).
- [1971De29] N.V. de Castro Faria, J. Charbonneau, J. L'Ecuyer, R.J.A. Levesque, Nucl. Phys. A 174, 37 (1971).
- $[1971\mathrm{Di}02]\,$ R.M. Diamond, F.S. Stephens, K. Nakai, R. Nordhagen, Phys. Rev. C 3, 344 (1971).
- [1971Ej01] H. Ejiri, G.B. Hagemann, Nucl. Phys. A 161, 449 (1971).
- [1971El03] C. Ellegaard, P.D. Barnes, E.R. Flynn, G.J. Igo, Nucl. Phys. A 162, 1 (1971).
- [1971Fa14] J. Fagot, R. Lucas, H. Nifenecker, M. Schneeberger, Nucl. Instrum. Methods 95, 421 (1971).
- [1971Fo17] J.L.C. Ford, Jr., P.H. Stelson, C.E. Bemis et al., Phys. Rev. Lett. 27, 1232 (1971).
- [1971FoZV] J.S. Forster, G.C. Ball, W.G. Davies, Bull. Amer. Phys. Soc. 16, No.4, 555, EE8 (1971).
- [1971FoZW] J.L.C. Ford, Jr., P.H. Stelson, R.L. Robinson et al., Bull. Amer. Phys. Soc. 16, No.4, 515, BG11 (1971); Priv. Comm. (July 1971).
- $[1971 Ga01] \;\; \text{G.T. Garvey, K.W. Jones, L.E. Carlson} \;\; et \;\; al., \;\; \text{Nucl. Phys.} \;\; \textbf{A} \;\; \textbf{160}, \; 25 \;\; (1971).$
- [1971Gr31] E. Grosse, M. Dost, K. Haberkant $et~al.,~{\rm Nucl.}~{\rm Phys.}~{\bf A}~{\bf 174},~525~(1971).$
- [1971Ha08] R.P. Harper, A. Christy, I. Hall $et\ al.,\ {\tt Nucl.\ Phys.}\ {\bf A}\ {\bf 162},\ 161\ (1971).$
- $[1971 Ha12] \;\; R. \; Hartmann, \; H. \; Grawe, \; Nucl. \; Phys. \; {\bf A} \; {\bf 164}, \; 209 \; (1971).$
- [1971Ha26] O. Hausser, T.K. Alexander, A.B. McDonald et al., Nucl. Phys. A 168, 17 (1971).
- [1971Ha47] O. Hausser, T.K. Alexander, A.B. McDonald, W.T. Diamond, Nucl. Phys. A 175, 593 (1971).
- [1971HaXH] O. Hausser, D.L. Disdier, A.J. Ferguson, T.K. Alexander, AECL-4068, 12 (1971).
- [1971He08] J. Heisenberg, J.S. McCarthy, I. Sick, Nucl. Phys. A164, 353 (1971).
- $[1971 \text{Ho}14]\,$ A. Hoglund, S.G. Malmskog, A. Marelius et al., Nucl. Phys. A $\mathbf{169},\,49$ (1971).
- [1971HuZR] R.B. Huber, W. Kutschera, C. Signorini, J. Phys. (Paris) Suppl. C6-207 (1971).

- $[1971 In 02]\,$ F. Ingebretsen, B.W. Sargent, A.J. Ferguson $et~al.,~{\rm Nucl.~Phys.}$ A 161,~433~(1971).
- [1971ImZY] H. Imada, Thesis, Texas A and M Univ. (1971); Diss. Abstr. Int. B 32, 1772 (1971).
- [1971Ja10] A.N. James, P.R. Alderson, D.C. Bailey et al., Nucl. Phys. A 168, 56 (1971).
- [1971Ja15] A.N.James, P.R.Alderson, C.D.Bailey et al., Nucl. Phys. A 172, 401 (1971).
- [1971Ka03] R. Kalish, R.R. Borchers, H.W. Kugel, Nucl. Phys. A 161, 637 (1971).
- [1971Ma03] J.R. MacDonald, D.H. Wilkinson, D.E. Alburger, Phys. Rev. C 3, 219 (1971).
- $[1971 Ma27] \;\; \mathrm{D.W.\ Madsen,\ L.S.\ Cardman,\ J.R.\ Legg,\ C.K.\ Bockelman,\ Nucl.\ Phys.\ \mathbf{A\ 168},\ 97\ (1971).}$
- [1971Mc20] A.B. McDonald, T.K. Alexander, O. Hausser, G.T. Ewan, Can. J. Phys. 49, 2886 (1971).
- [1971Mi08] W.T. Milner, F.K. McGowan, R.L. Robinson et al., Nucl. Phys. A 177, 1 (1971).
- [1971MiZK] W.T. Mills, Priv. Comm., quoted by 1972Me04 (1971).
- [1971Na06] K. Nakai, F.S. Stephens, R.M. Diamond, Phys. Lett. **B 34**, 389 (1971).
- [1971NoZT] R.H. Nord, Thesis, Univ. Wisconsin (1971); Diss. Abstr. 32B, No.6, 3572 (1971).
- [1971Ob02] L.W. Oberley, N. Hershkowitz, S.A. Wender, A.B. Carpenter, Phys. Rev. C 3, 1585 (1971).
- [1971Pe11] R.J. Peterson, Ann. Phys. (N.Y.) 65, 125 (1971).
- [1971Re15] M.J. Renan, R.J. Keddy, Nuovo Cimento ${\bf 3}$ ${\bf A}$, 347 (1971).
- [1971RiZJ] L.L. Riedinger, G. Schilling, A.E. Rainis et al., Nucl. Struct. Lab., Univ. Notre Dame, Ann. Rep. 1971, 121 (1971).
- [1971Sh11] J.F. Sharpey-Schafer, P.R. Alderson, D.C. Bailey et al., Nucl. Phys. A 167, 602 (1971).
- [1971SiYA] S.H. Sie, J.S. Geiger, R.L. Graham et al., AECL-4068, 50 (1971).
- [1971Sp06] H. Spehl, N. Wertz, Z. Phys. 243, 431 (1971).
- [1971Sp12] S.W. Sprague, R.G. Arns, B.J. Brunner et al., Phys. Rev. C4, 2074 (1971).
- [1971Sw07] C.P. Swann, Phys. Rev. C 4, 1489 (1971).
- [1971Vi01] D. Vitoux, R.C. Haight, J.X. Saladin, Phys. Rev. C 3, 718 (1971).
- [1971WaZP] D. Ward, A. Christy, J.S. Geiger, R.L. Graham, AECL-3912, 17 (1971).
- [1971Yo02] D.H. Youngblood, R.L. Kozub, J.C. Hill, Nucl. Phys. A 166, 198 (1971).
- [1972ArZD] R.G. Arnold, Thesis, Univ. Boston (1972); Diss. Abst. Int. 33B, 1723 (1972).
- [1972Aw04] Z. Awwad, O.E. Badawy, M.R. El-Aasser, A.H. El-Farrash, Indian J. Pure Appl. Phys. 10, 870 (1972).
- [1972Ba93] S.I. Baker, C.R. Gossett, P.A. Treado et al., Nucl. Phys. A 196, 197 (1972).
- [1972Be53] I. Berkes, R. Rougny, M. Meyer-Levy et al., Phys. Rev. C 6, 1098 (1972).
- $[1972 Be 66]\,$ Z. Berant, R.A. Eisenstein, Y. Horowitz $et~al.,~{\rm Nucl.}$ Phys. A 196,~312 (1972).
- [1972BeVM] R.B. Begzhanov, T. Boranov, D.A. Gladyshev *et al.*, Program and Theses, Proc. 22nd Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Kiev, 128 (1972).
- $[1972\mathrm{Bi}17]\,$ M. Bini, P.G. Bizzeti, A.M. Bizzeti-Sona $et~al.,~\mathrm{Lett}.$ Nuovo Cim. 5, 913 (1972).
- [1972Bo04] B. Bochev, S.A. Karamian, T. Kutsarova et al., Compt. Rend. Acad. Bulg. Sci. 25, 905 (1972).
- [1972BrYV] W. Bruckner, D. Pelte, B. Povh et al., Contrib. Int. Conf. Nuclear Moments and Nuclear Structure, Osaka, Japan, 107 (1972).
- [1972Ca05] J.A. Cameron, A.W. Gibb, T. Taylor, Z. Zamori, CAN. J. Phys. 50, 475 (1972).
- $[1972Ca22] \;\; \text{J.M.G. Caraca, R.D. Gill, A.J. Cox, H.J. Rose, Nucl. Phys. } \mathbf{A} \; \mathbf{193}, \; 1 \; (1972).$
- [1972ClZN] R.G. Clark, Thesis, Iowa State Univ. (1972); See Also 1974ClZX.
- [1972Co13] W.F. Coetzee, M.A. Meyer, D. Reitmann, Nucl. Phys. A 185, 644 (1972).
- [1972CrZN] H. Crannell, P.L. Hallowell, J.T. O'Brien et al., Proc. Int. Conf. Nucl. Struct. Studies Using Electron Scattering and Photoreaction, Sendai, Japan, K.Shoda, H.Ui, Eds., Res.Rep.Lab.Nucl.Sci.Tohoku Univ. 5, Suppl. p.375 (1972).
- [1972Du05] J.L. Durell, P.R. Alderson, D.C. Bailey et al., J. Phys. (London) A 5, 302 (1972).
- [1972El08] T.W. Elze, J.R. Huizenga, Nucl. Phys. A 187, 545 (1972).
- [1972El20] M.R. El-Aasser, O.E. Badawy, Z. Awwad, A.H. El-Farrash, Z. NATURFORSCH. 27a, 1229 (1972).
- [1972Er04] K.A. Erb, J.E. Holden, I.Y. Lee et al., Phys. Rev. Lett. 29, 1010 (1972).
- [1972Fi12] M. Finger, R. Foucher, J.P. Husson et al., Nucl. Phys. A 188, 369 (1972).
- [1972Ga05] A. Gallmann, F. Haas, M. Toulemonde, CAN. J. Phys. 50, 278 (1972).
- $[1972 Gr04]\,$ H. Gruppelaar, P.J.M. Smulders, Nucl. Phys. A $\mathbf{179},\,737$ (1972).
- [1972Gr05] M.I. Green, P.F. Kenealy, G.B. Beard, Nucl. Instrum. Methods 99, 445 (1972).
- [1972GrYQ] J.S. Greenberg, A.H. Shaw, Contrib. Int. Conf. Nuclear Moments and Nuclear Structure, Osaka, Japan, 113 (1972).
- $[1972 Gu 03] \;\; \mathrm{D.K. \; Gupta, \; G.N. \; Rao, \; Nucl. \; Phys. \; \mathbf{A} \;\; \mathbf{182}, \; 669 \; (1972).}$

- [1972Ha59] O. Hausser, F.C. Khanna, D. Ward, Nucl. Phys. A 194, 113 (1972).
- [1972HaYA] O. Hausser, A.J. Ferguson, D.L. Disdier, AECL-4205, 10 (1972).
- [1972Ho40] G.A. Hokken, J.A.J.G. Hendricx, J. de Kogel, Nucl. Phys. A 194, 481 (1972).
- [1972HuZL] J.P. Husson, Thesis, Univ.Paris (1972); FRNC-TH-355 (1972).
- [1972Ka22] D.K. Kaipov, Y.G. Kosyak, L.N. Smirin, Y.K. Shubnyi, Izv. Akad. Nauk SSSR, Ser.Fiz. 36, 137 (1972); Bull. Acad. Sci. USSR, Phys.Ser. 36, 128 (1973).
- [1972KaXR] D.K. Kaipov, Y.G. Kosyak, D.N. Smirin, Y.K. Shubny, Program and Theses, Proc. 22nd Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Kiev, 48 (1972).
- [1972Ke16] J.R. Kerns, J.X. Saladin, Phys. Rev. C 6, 1016 (1972).
- [1972Ku14] W. Kutschera, W. Dehnhardt, O.C. Kistner et al., Phys. Rev. C 5, 1658 (1972).
- [1972La16] S.A. Lane, J.X. Saladin, Phys. Rev. C 6, 613 (1972).
- [1972Le19] P.M.S. Lesser, D. Cline, P. Goode, R.N. Horoshko, Nucl. Phys. A190, 597 (1972).
- [1972LeYB] J.R. Legg, Thesis, Yale Univ. (1972).
- [1972Li28] A.S. Litvinenko, N.G. Shevchenko, O.Y. Buki et al., UKR. Fiz. ZH. 17, 1197 (1972).
- [1972Lo01] P.C. Lopiparo, R.L. Rasera, M.E. Caspari, Nucl. Phys. A 178, 577 (1972).
- [1972Me04] F.R. Metzger, Nucl. Phys. A 182, 213 (1972).
- [1972Me09] M.A. Meyer, J.P. Reinecke, D. Reitmann, Nucl. Phys. A 185, 625 (1972); Erratum Nucl. Phys. A 196, 635 (1972).
- [1972Mo31] J.M. Moss, D.L. Hendrie, C. Glashausser, J. Thirion, Nucl. Phys. A194, 12 (1972).
- [1972Na06] A. Nakada, Y. Torizuka, J. Phys. Soc. Jap. 32, 1 (1972).
- [1972Pr18] J.G. Pronko, R.E.McDonald, Phys. Rev. C 6, 2065 (1972).
- [1972Ra14] S. Raman, R.L. Auble, W.T. Milner et al., AECL-4314, 9 (1972).
- [1972Ro20] C. Rolfs, R. Kraemer, F. Riess, E. Kuhlmann, Nucl. Phys. A 191, 209 (1972).
- [1972Sa09] E.A. Samworth, J.W. Olness, Phys. Rev. C 5, 1238 (1972).
- [1972Sa27] G.C. Salzman, A. Goswami, D.K. McDaniels, Nucl. Phys. A 192, 312 (1972).
- [1972Sa42] T.K. Saylor, J.X. Saladin, I.Y. Lee, K.A. Erb, Phys. Lett. B 42, 51 (1972).
- [1972Sh38] Y.K. Shubnyi, Y.A. Lysikov, Izv. Akad. Nauk SSSR, Ser. Fiz. 36, 2531 (1972); Bull. Acad. Sci. USSR, Phys. Ser. 36, 2199 (1973).
- [1972Si01] C.H. Sinex, R.S. Cox, C.M. Class, Nucl. Phys. A 178, 612 (1972).
- $[1972\mathrm{SiZI}]\,$ S.H. Sie, R.L. Graham, J.S. Geiger $et~al.,~\mathrm{AECL}\text{-}4205,~12~(1972).$
- [1972SiZP] S.H. Sie, J.S. Geiger, R.L. Graham et al., AECL-4147, 14 (1972).
- [1972Sn01] F.D. Snyder, Phys. Rev. C 6, 204 (1972).
- [1972Sz05] H. Sztark, J.L. Quebert, P. Gil, L. Marquez, J. Phys. (Paris) 33, 841 (1972).
- [1972WaYZ] D. Ward, I.M. Szoghy, J.S. Forster, W.G. Davies, AECL-4314, 9 (1972).
- [1972Yo01] D.H. Youngblood, R.L. Kozub, J.C. Hill, Nucl. Phys. A183, 197 (1972).
- [1973An01] N. Anyas-Weiss, R. Griffiths, N.A. Jelley et al., Nucl. Phys. A 201, 513 (1973).
- [1973Ba02] T.T. Bardin, J.A. Becker, T.R. Fisher, Phys. Rev. C 7, 190 (1973).
- [1973Be40] C.E. Bemis, Jr., P.H. Stelson, F.K. McGowan et al., Phys. Rev. C 8, 1934 (1973).
- [1973Be44] C.E. Bemis, Jr., F.K. McGowan, J.L.C. Ford et al., Phys. Rev. C 8, 1466 (1973).
- [1973Be49] J.C. Bergstrom, I.P. Auer, F.J. Kline, H.S. Caplan Nucl. Phys. A 213, 609 (1973).
- $[1973 \mathrm{BeYD}]~\mathrm{W.~Beens},~\mathrm{Thesis},~\mathrm{Vrije~Univ.},~\mathrm{Amsterdam}~(1973).$
- [1973Br02] W. Bruckner, J.G. Merdinger, D. Pelte et al., Phys. Rev. Lett. 30, 57 (1973).
- [1973Br33] C. Broude, F.A. Beck, P. Engelstein, Nucl. Phys. A 216, 603 (1973).
- [1973Ca29] A.B. Carpenter, N. Hershkowitz, Phys. Rev. C 8, 2302 (1973).
- [1973Ch13] P.R. Christensen, I. Chernov, E.E. Gross et al., Nucl. Phys. A 207, 433 (1973).
- [1973Ch26] R.C. Chopra, P.N. Tandon, S.H. Devare, H.G. Devare, Nucl. Phys. A 209, 461 (1973).
- [1973Ch28] A. Charvet, R. Chery, R. Duffait et al., Nucl. Phys. A 213, 117 (1973).
- [1973ClZF] D. Cline, P. Jennens, C.W. Towsley, H.S. Gertzman, Proc. Int. Conf. Nucl. Moments and Nucl. Struct., Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., 443 (1973); J. Phys. Soc. Japan 34 Suppl. (1973).
- $[1973 \text{Co}38] \ \text{A.J. Cox, J.M.G. Caraca, B. Schlenk} \ \textit{et al., Nucl. Phys.} \ \textbf{A 217}, \ 400 \ (1973) \ \text{Cox} \ \text{Automorphism} \ \text{Caraca} \ \text{Cox} \ \text{Caraca} \ \text{$
- [1973De09] W. Dehnhardt, O.C. Kistner, W. Kutschera, H.J. Sann, Phys. Rev. C7, 1471 (1973).
- $[1973 Di04] \ \, W.R. \ \, Dixon, \, R.S. \, Storey, \, J.J. \, Simpson, \, \, Nucl. \, \, Phys. \, \, {\bf A} \, \, {\bf 202}, \, 579 \, \, (1973).$

- $[1973 \mathrm{DoZB}]~\mathrm{R.~Doerr,~E.~Obst,~F.~Rauch~\it et~\it al.,~IKF-32,~22~(1973).}$
- [1973El06] C. Ellegaard, P.D. Barnes, R. Eisenstein et al., Nucl. Phys. A 206, 83 (1973).
- [1973Fi03] T.R. Fisher, T.T. Bardin, J.A. Becker et al., Phys. Rev. C 7, 1878 (1973).
- [1973Fi15] T.R. Fisher, P.D. Bond, Part. Nucl. 6, 119 (1973).
- [1973FrZN] I. Fraser, J.S. Greenberg, PRIV. COMM. (September 1973).
- [1973Gr05] J.S. Greenberg, Priv. Comm. (March 1973).
- [1973GrXX] M.I. Green, Thesis, Wayne State Univ. (1973); Diss. Abstr. Int. 34B, 2845 (1973).
- [1973Ha07] T. Hammer, H. Ejiri, G.B. Hagemann, Nucl. Phys. A 202, 321 (1973).
- [1973Ha10] R. Hartmann, H. Grawe, K. Kandler, Nucl. Phys. A 203, 401 (1973).
- [1973Ha13] P.L. Hallowell, W. Bertozzi, J. Heisenberg et al., Phys. Rev. C 7, 1396 (1973).
- [1973Ho05] K. Hosoyama, Y. Torizuka, Y. Kawazoe, H. Ui, Phys. Rev. Lett. 30, 388 (1973).
- [1973KaZV] D.K. Kaipov, Y.A. Lysikov, Y.K. Shubnyi, Program and Theses, Proc. 23rd Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Tbilisi, 46 (1973).
- [1973Ku10] W. Kutschera, R.B. Huber, C. Signorini, P. Blasi, Nucl. Phys. A210, 531 (1973).
- [1973Ku15] E. Kuhlmann, W. Albrecht, A. Hofmann, Nucl. Phys. A 213, 82 (1973).
- [1973Le15] F. Leccia, M.M. Aleonard, D. Castera et al., J.Phys.(Paris) 34, 147 (1973).
- [1973Le17] E.W. Lees, A. Johnston, S.W. Brain et al., J. Phys. (London) A 6, L116 (1973).
- [1973Li24] A.S. Litvinenko, N.G. Shevchenko, N.G. Afanasev et al., YAD. FIZ. 18, 250 (1973); SOV. J. NUCL. PHYS. 18, 128 (1974).
- [1973Mc16] J.D. McCullen, D.J. Donahue, Phys. Rev. C 8, 1406 (1973).
- [1973Ol02] J.W. Olness, E.K. Warburton, J.A. Becker, Phys. Rev. C 7, 2239 (1973).
- [1973Pi04] R. Pitthan, Z. Phys. 260, 283 (1973).
- [1973RaWV] F. Rauch, PRIV. COMM., quoted by 1973BeYD (1973).
- [1973Ro20] H. Ronsin, P. Beuzit, J. Delaunay et~al., Nucl. Phys. A ${\bf 207},\,577$ (1973).
- [1973Ru08] N. Rud, D. Ward, H.R. Andrews et al., Phys. Rev. Lett. 31, 1421 (1973).
- [1973Sc28] N. Schulz, J. Chevallier, B. Haas et al., Phys. Rev. C 8, 1779 (1973).
- [1973ScWZ] D. Schwalm, Thesis, Univ. Heidelberg (1973).
- [1973Si31] R.P. Singhal, H.S. Caplan, J.R. Moreira, T.E. Drake, CAN. J. PHYS. 51, 2125 (1973).
- [1973Sm01] G.J. Smith, P.C. Simms, Nucl. Phys. A 202, 409 (1973).
- [1973To07] C.W. Towsley, D. Cline, R.N. Horoshko, Nucl. Phys. A 204, 574 (1973).
- [1973ToXW] C.W. Towsley, R. Cook, D. Cline, R.N. Horoshko, Proc. Int. Conf. Nucl. Moments and Nucl. Struct., Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., 442 (1973); J. Phys. Soc. Jap. 34 Suppl. (1973).
- [1973WeYO] D. Werdecker, A.M. Kleinfeld, J.S. Greenberg, Proc. Int. Conf. Nucl. Moments and Nucl. Struct., Osaka, Japan (1972), H.Horie, K.Sugimoto, Eds., 195 (1973); J. Phys. Soc. Jap. 34 Suppl. (1973).
- [1974Aw03] Z. Awwad, A. Abdel-Haliem, M.R. El-Aasser, ACTA Phys. 37, 141 (1974).
- [1974Ba43] C. Baktash, J.X. Saladin, Phys. Rev. C 10, 1136 (1974).
- [1974Ba45] J. Barrette, M. Barrette, R. Haroutunian et al., Phys. Rev. C 10, 1166 (1974).
- [1974Ba80] J. Barrette, M. Barrette, G. Lamoureux et al., Nucl. Phys. A 235, 154 (1974).
- [1974Be18] R.A.I. Bell, J.V. Thompson, I.G. Graham, L.E. Carlson, Nucl. Phys. A 222, 477 (1974).
- $[1974Be25] \ Z. \ Berant, \ C. \ Broude, \ G. \ Engler, \ D.F.H. \ Start, \ Nucl. \ Phys. \ A \ 225, \ 55 \ (1974).$
- [1974Br04] B.A. Brown, D.B. Fossan, J.M. McDonald, K.A. Snover, Phys. Rev. C9, 1033 (1974).
- [1974Br31] W. Bruckner, D. Husar, D. Pelte et al., Nucl. Phys. A 231, 159 (1974).
- [1974Bu13] J. Burde, S. Eshhar, A. Ginzburg, E. Navon, Nucl. Phys. A 229, 387 (1974).
- [1974Ch09] Y.T. Cheng, A. Goswami, M.J. Throop, D.K. McDaniels, Phys. Rev. C 9, 1192 (1974).
- [1974De12] W. Dehnhardt, S.J. Mills, M. Muller-Veggian et~al., Nucl. Phys. A 225, 1 (1974).
- [1974El03] M.R. El-Aasser, Z. Awwad, ATOMKI KOZLEM. 16, 141 (1974).
- [1974Fi01] T.R. Fisher, T.T. Bardin, J.A. Becker, B.A. Watson, Phys. Rev. C 9, 598 (1974).
- [1974Fi05] S.P. Fivozinsky, S. Penner, J.W. Lightbody, Jr., D. Blum, Phys. Rev. C 9, 1533 (1974).
- $[1974 Fo13] \;\; \text{J.S. Forster, D. Ward, G.J. Costa} \;\; \textit{et al., Phys. Lett. } \mathbf{B} \;\; \mathbf{51}, \; 133 \;\; (1974).$
- $[1974 Gr06] \;\; \text{H. Grawe, R. Konig, Z. Phys. } \textbf{266}, \; 41 \; (1974).$
- $[1974 Gr 19] \;\; H. \;\; Grawe, \; U. \;\; Lohle, \; R. \;\; Konig, \;\; Z. \;\; Phys. \;\; \textbf{268}, \; 419 \;\; (1974).$
- [1974Gu11] G. Guillaume, B. Rastegar, P. Fintz, A. Gallmann, Nucl. Phys. A 227, 284 (1974).

- $[1974 \mathrm{Iv}01]\,$ M. Ivascu, D. Popescu, E. Dragulescu et al., Nucl. Phys. A $218,\,104$ (1974).
- [1974JaZN] R.C. Jared, H. Nifenecker, S.G. Thompson, LBL-2366, 38 (1974).
- [1974Jo02] P.M. Johnson, M.A. Meyer, D. Reitmann, Nucl. Phys. A 218, 333 (1974).
- [1974Jo10] A. Johnston, T.E. Drake, J. Phys. (London) A 7, 898 (1974).
- [1974Le13] P.M.S. Lesser, D. Cline, C. Kalbach-Cline, A. Bahnsen, Nucl. Phys. A 223, 563 (1974).
- [1974Le17] E.W. Lees, A. Johnston, S.W. Brain et al., J. Phys. (London) A 7, 936 (1974).
- [1974MaYP] R. Maas, C.W. de Jager, Proc. Int. Conf. Nucl. Struct. and Spectrosc., Amsterdam, H.P.Blok, A.E.L.Dieperink, Eds., Scholar's Press, Amsterdam 1, 204 (1974).
- [1974Mc17] A.B. McDonald, T.K. Alexander, O. Hausser et al., CAN. J. Phys. 52, 1381 (1974).
- [1974Me13] F.R. Metzger, Phys. Rev. C 9, 1525 (1974).
- [1974No08] E. Nolte, Y. Shida, W. Kutschera et al., Z. Phys. 268, 267 (1974).
- [1974Ol01] D.K. Olsen, A.R. Barnett, S.F. Biagi et al., Nucl. Phys. A 220, 541 (1974).
- [1974Ol02] A. Olin, O. Hausser, T.K. Alexander et al., Nucl. Phys. A 221, 555 (1974).
- [1974Po15] A.R. Poletti, B.A. Brown, D.B. Fossan, E.K. Warburton, Phys. Rev. C10, 2329 (1974).
- [1974Pr02] D. Proetel, R.M. Diamond, F.S. Stephens, Phys. Lett. B 48, 102 (1974).
- [1974Pr04] J.G. Pronko, T.T. Bardin, J.A. Becker et al., Phys. Rev. C 9, 1430 (1974); Erratum Phys. Rev. C 10, 1249 (1974).
- [1974Ra15] B. Rastegar, G. Guillaume, P. Fintz, A. Gallmann, Nucl. Phys. A 225, 80 (1974).
- [1974SaZH] R.O. Sayer, R.L. Robinson, N.C. Singhal et al., ORNL-4937, 117 (1974).
- [1974Sh12] A.H. Shaw, J.S. Greenberg, Phys. Rev. C 10, 263 (1974).
- [1974Si01] R.P. Singhal, S.W. Brain, W.A. Gillespie et al., Nucl. Phys. A 218, 189 (1974).
- [1974Sw05] C.P. Swann, J. Franklin Inst. 298, 321 (1974).
- [1974ThZG] T.F. Thorsteinsen, F. Videbaek, BUP-65 (1974).
- $[1974 \\ ToZJ] ~C.W.~Towsley,~Thesis,~Univ.Rochester~(1974);~Diss.Abstr.Int.~{\bf 35B},~1864~(1974).$
- [1974Wa04] B.A. Watson, J.A. Becker, T.R. Fisher, Phys. Rev. C9, 1200 (1974).
- [1974Wo01] H.J. Wollersheim, W. Wilcke, T.W. Elze, D. Pelte, Phys. Lett. B 48, 323 (1974).
- [1974Ye01] R. Yen, L.S. Cardman, D. Kalinsky et al., Nucl. Phys. A 235, 135 (1974).
- [1975Ba72] P. Barreau, P. Bertin, B. Bihoreau et al., J. Phys. (Paris), Colloq. 36, C5-77 (1975).
- [1975Be15] Z. Berant, C. Broude, G. Engler et al., Nucl. Phys. A 243, 519 (1975).
- [1975Bi03] S.F. Biagi, W.R. Phillips, A.R. Barnett, Nucl. Phys. A 242, 160 (1975).
- [1975Bo39] H. Bohn, P. Kienle, D. Proetel, R.L. Hershberger, Z. Phys. A 274, 327 (1975).
- [1975Bu08] P.A. Butler, J. Meyer-Ter-Vehn, D. Ward et al., Phys. Lett. B 56, 453 (1975).
- [1975DeXW] J.E.P. de Bie, C.W. de Jager, A.A.C. Klaasse et al., IKO PROGR. REPT. 1975, 3 (1975).
- [1975Eb01] J.L. Eberhardt, R.E. Horstman, H.A. Doubt, G. Van Middelkoop, Nucl. Phys. A 244, 1 (1975).
- [1975EdZY] L.-O. Edvardson, L.O. Norlin, Priv. Comm. (March 1975); UUIP-895 (1975).
- [1975Fr04] H.-G. Friederichs, A. Gelberg, B. Heits et al., Phys. Rev. Lett. 34, 745 (1975).
- [1975Go18] D.M. Gordon, L.S. Eytel, H. de Waard, D.E. Murnick, Phys. Rev. C 12, 628 (1975).
- [1975Gr04] H. Grawe, K. Holzer, K. Kandler, A.A. Pilt, Nucl. Phys. A 237, 18 (1975).
- [1975Gr30] R. Graetzer, S.M. Cohick, J.X. Saladin, Phys. Rev. C 12, 1462 (1975).
- [1975GuYV] G.M. Gusinskii, M.A. Ivanov, A.S. Mishin, Program and Theses, Proc. 25th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Leningrad, 380 (1975).
- [1975GuYW] G.M. Gusinskii, M.A. Ivanov, M.K. Kudoyarov et al., Program and Theses, Proc. 25th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Leningrad, 379 (1975).
- [1975Ha04] B. Haas, P. Taras, J.C. Merdinger, R. Vaillancourt, Nucl. Phys. A238, 253 (1975).
- [1975HaYU] E.C. Hagen, Thesis, Duke Univ. (1974); Diss. Abstr. Int. 35B, 4101 (1975).
- [1975He25] J.A.J. Hermans, G.A.P. Engelbertink, M.A. van Driel et al., Nucl. Phys. A 255, 221 (1975).
- [1975Ho15] R.E. Horstman, J.L. Eberhardt, H.A. Doubt et al., Nucl. Phys. A 248, 291 (1975).
- [1975JaYL] R.C. Jared, H. Nifenecker, E. Cheifetz et al., Priv. Comm. (1975).
- $[1975\mathrm{Ka}11]\,$ H. Karwowski, S. Majewski, B. Pietrzyk $et~al.,~\mathrm{J.~Phys.}$ (Paris) $\mathbf{36},~471$ (1975).
- $[1975 \text{Kl}07] \ \text{A.M. Kleinfeld, H.G. Maggi, D. Werdecker, Nucl. Phys. } \textbf{A 248}, \, 342 \,\, (1975).$
- [1975Kl09] A.M. Kleinfeld, K.P. Lieb, D. Werdecker, U. Smilansky, Phys. Rev. Lett. 35, 1329 (1975).
- [1975Kl10] F.J. Kline, I.P. Auer, J.C. Bergstrom, H.S. Caplan, Nucl. Phys. A 255, 435 (1975).

- [1975Le22] I.Y. Lee, J.X. Saladin, J. Holden et al., Phys. Rev. C 12, 1483 (1975).
- [1975Lo08] K.E.G. Lobner, G. Dannhauser, D.J. Donahue et al., Z. Phys. A 274, 251 (1975).
- [1975Mi08] H. Miska, H.D. Graf, A. Richter et al., Phys. Lett. 58 B, 155 (1975).
- [1979Sa05] S. Salem Vasconcelos, M.N. Rao, N. Ueta, C.R. Appoloni, Nucl. Phys. A 313, 333 (1979).
- [1975Si21] R.P. Singhal, S.W. Brain, C.S. Curran et al., J. Phys. (London) G 1, 558 (1975).
- [1975Th01] M.J.Throop, Y.T.Cheng, D.K.McDaniels, Nucl. Phys. A239, 333 (1975).
- [1975To06] C.W. Towsley, D. Cline, R.N. Horoshko, Nucl. Phys. A250, 381 (1975).
- [1975Tr08] W. Trautmann, D. Proetel, O. Hausser et al., Phys. Rev. Lett. 35, 1694 (1975).
- [1975Wa10] P. Wagner, M.A. Ali, J.P. Coffin, A. Gallmann, Phys. Rev. C 11, 1622 (1975).
- [1975Wo08] H.J. Wollersheim, W. Wilcke, T.W. Elze, Phys. Rev. C 11, 2008 (1975).
- [1976AlYY] A.A. Aleksandrov, M.A. Ivanov, V.G. Kiptilyi et al., Program and Theses, Proc. 26th Ann. Conf. Nucl. Spectrosc. At. Nuclei, Baku, 412 (1976).
- [1976As04] J. Asher, M.A. Grace, P.D. Johnston et al., J. Phys. (London) G2, 477 (1976).
- [1976As07] J. Asher, M.A. Grace, P.D. Johnston et al., Hyperfine Interactions 2, 378 (1976).
- [1976Ba06] F.T. Baker, T.H. Kruse, W. Hartwig et al., Nucl. Phys. A 258, 43 (1976).
- [1976Ba23] F.T. Baker, A. Scott, T.H. Kruse et al., Phys. Rev. Lett. 37, 193 (1976).
- [1976Ba35] F.T. Baker, A. Scott, T.H. Kruse et al., Nucl. Phys. A 266, 337 (1976).
- [1976Be64] R.B. Begzhanov, F.S. Akilov, A.K. Khalikov, M.S. Rakhmankulov, Izv. Akad. Nauk Uzb. SSR, Ser.Fiz.-Mat.Nauk No.4, 59 (1976).
- [1976Bo12] A. Bockisch, A.M. Kleinfeld, Nucl. Phys. A 261, 498 (1976).
- [1976Bo27] B. Bochev, S.A. Karamian, T. Kutsarova et al., Nucl. Phys. A 267, 344 (1976).
- [1976Bu20] D.K. Butt, M.A. Raoof, S.A. Raoof, J. Phys. (London) G 2, 823 (1976).
- [1976Ch11] A. Charvet, R. Duffait, T. Negadi et al., Phys. Rev. C13, 2237 (1976).
- [1976Es02] M.T. Esat, D.C. Kean, R.H. Spear, A.M. Baxter, Nucl. Phys. A 274, 237 (1976).
- [1976Fo12] J.S. Forster, G.C. Ball, C. Broude et al., Phys. Rev. C 14, 596 (1976).
- [1976Ha01] J.H. Hamilton, H.L. Crowell, R.L. Robinson et al., Phys. Rev. Lett. 36, 340 (1976).
- [1976He05] B. Heits, H.-G. Friederichs, A. Gelberg et al., Phys. Lett. B 61, 33 (1976).
- [1976KaYY] D.K. Kaipov, Yu.A. Lysikov, L.M. Dautov, N.N. Lashkul, Program and Theses, Proc. 26th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Baku, 62 (1976).
- [1976Kl04] A. Kluge, W. Thomas, Nucl. Instrum. Methods 134, 525 (1976).
- [1976Li19] J.W. Lightbody, Jr., J.W. Lightbody, S. Penner et al., Phys. Rev. C14, 952 (1976).
- [1976Mc02] A.B. McDonald, T.K. Alexander, C. Broude et al., Nucl. Phys. A 258, 152 (1976).
- [1976MoZB] E. Monnand, B. Fogelberg, Proc. Int. Conf. Nuclei Far from Stability, 3rd, Cargese, France, R.Klapisch, Ed., CERN-76-13, 503 (1976).
- [1976Ne06] R. Neuhausen, J.W. Lightbody, Jr., J.W. Lightbody et al., Nucl. Phys. A263, 249 (1976).
- [1976Pa13] P. Paradis, G. Lamoureux, R. Lecomte, S. Monaro, Phys. Rev. C 14, 835 (1976).
- [1976Ra03] V.K. Rasmussen, Phys. Rev. C 13, 631 (1976); Erratum Phys. Rev. C 13, 2596 (1976).
- [1976So03] J.R. Southon, L.K. Fifield, A.R. Poletti, J. Phys. (London) G 2, 117 (1976).
- [1977Al14] A.A.Aleksandrov, V.S.Zvonov, M.A.Ivanov et al., Izv. Akad. Nauk SSSR, Ser.Fiz. 41, 49 (1977); Bull. Acad. Sci. USSR, Phys.Ser. 41, No.1, 39 (1977).
- [1977Ar19] A. Arnesen, K. Johansson, E. Karlsson et al., Hyperfine Interactions 5, 81 (1977).
- [1977BeYM] A.M. Bergdolt, J. Chevallier, J.C. Merdinger et al., PROC. INT. CONF. NUCL. STRUCTURE, Tokyo, Japan, Int. Academic Printing Co., Ltd. Japan, 1, 359 (1977).
- [1977Bo14] B. Bochev, S. Iliev, R. Kalpakchieva et al., Nucl. Phys. A 282, 159 (1977).
- $[1977 Br16]\,$ S.W. Brain, A. Johnstons, W.A. Gillespie et al., J. Phys. (London) ${\bf G3},\,821$ (1977).
- [1977BrYO] J.F. Bruandet, Tsan Ung Chan, C. Morand et al., Int. Symp. High-Spin States, Nucl. Struct., Dresden, L.Funke, Ed., ZfK-336, p.119 (1977).
- [1977Ca14] Y. Cauchois, H. ben Abdelaziz, Y. Heno et al., C.R. ACAD. Sci., Ser. B 284, 65 (1977).
- $[1977\mathrm{Co}10]\,$ D.F. Coope, L.E. Cannell, M.K. Brussel, Phys. Rev. C $\mathbf{15},\,1977$ (1977).
- [1977Di07] W.R. Dixon, R.S. Storey, J.J. Simpson, Phys. Rev. ${\bf C}$ 15, 1896 (1977).
- [1977Es02] M.T. Esat, D.C. Kean, R.H. Spear et al., Phys. Lett. B 72, 49 (1977).
- [1977Fi01] H. Fischer, D. Kamke, H.J. Kittling et al., Phys. Rev. C 15, 921 (1977) .

- $[1977\mathrm{Fi}09]\,$ J.M. Finn, H. Crannell, P.L. Hallowell $et~al.,~\mathrm{Nucl.}$ Phys. A 290,~99~(1977).
- [1977Fl10] C. Flaum, J. Barrette, M.J. LeVine, C.E. Thorn, Phys. Rev. Lett. 39, 446 (1977).
- [1977Ga06] M.G. Gavrilov, A.B. Davydov, M.M. Korotkov, Yad. Fiz. 25, 240 (1977); Sov. J. Nucl. Phys. 25, 131 (1977).
- [1977Gi13] W.A. Gillespie, M.W.S. Macauley, A. Johnston et al., J. Phys. (London) G 3, L-169 (1977).
- [1977Gu08] G.M. Gusinskii, M.A. Ivanov, I.K. Lemberg et al., Izv. Akad. Nauk SSSR, Ser. Fiz. 41, 66 (1977); Bull. Acad. Sci. USSR, Phys. Ser. 41, No.1, 52 (1977).
- [1977He12] J.A.J. Hermans, G.A.P. Engelbertink, L.P. Ekstrom et al., Nucl. Phys. A 284, 307 (1977).
- [1977Ho01] R.E. Horstman, J.L. Eberhardt, P.C. Zalm et al., Nucl. Phys. A 275, 237 (1977).
- [1977Ho10] M. Hoshi, Y. Yoshizawa, J. Phys. Soc. Jap. 42, 1106 (1977).
- [1977HoZF] R. Hofmann, H.G. Andresen, B. Dreher et al., PROC. INT. CONF. NUCL. STRUCTURE, Tokyo, Japan, Int. Academic Printing Co., Ltd.Japan, 1, 387 (1977).
- [1977Hu10] D. Husar, S.J. Mills, H. Graf et al., Nucl. Phys. A 292, 267 (1977).
- [1977Jo05] N.R. Johnson, P.P. Hubert, E. Eichler et al., Phys. Rev. C 15, 1325 (1977).
- [1977Kl05] A.M. Kleinfeld, A. Bockisch, K.P. Lieb, Nucl. Phys. A 283, 526 (1977).
- [1977La15] H. Lancman, A.P.M. van't Westende, H.D. Graber, Nucl. Phys. A 291, 293 (1977).
- [1977La16] J. Lange, A.T. Kandil, J. Neuber et al., Nucl. Phys. A 292, 301 (1977).
- [1977Le11] R. Lecomte, P. Paradis, J. Barrette et al., Nucl. Phys. A 284, 123 (1977).
- [1977LiZS] J.S. Lilley, A.R. Barnett, M. Franey et al., Bull. Amer. Phys. Soc. 22, No.4, 552, BJ11 (1977).
- [1977Me01] F.R. Metzger, Phys. Rev. C 15, 193 (1977).
- [1977Me10] F.R. Metzger, Phys. Rev. C 15, 2253 (1977).
- [1977MiZM] V.K. Mittal, D.K. Avasthi, I.M. Govil, Proc. Nucl. Phys. and Solid State Phys. Symp., Nucl. Phys., Pune, 20 B, p.151 (1977).
- [1977Mo20] C. Morand, J.F. Bruandet, A. Giorni, Tsan Ung Chan, J. Phys. (Paris) 38, 1319 (1977).
- [1977Na01] A. Nakada, N. Haik, J. Alster et al., Phys. Rev. Lett. 38, 584 (1977).
- [1977Ne05] R. Neuhausen, Nucl. Phys. A282, 125 (1977).
- [1977Og03] M. Ogawa, E. Arai, J. Phys. Soc. Jap. 42, 376 (1977).
- [1977Ra01] D.C. Radford, A.R. Poletti et al., Nucl. Phys. A 275, 141 (1977).
- [1977Ro08] R.M. Ronningen, J.H. Hamilton, A.V. Ramayya et al., Phys. Rev. C 15, 1671 (1977).
- [1977Ro16] R.M. Ronningen, R.B. Piercey, A.V. Ramayya et al., Phys. Rev. C 16, 571 (1977).
- [1977Ro26] R.M. Ronningen, J.H. Hamilton, L. Varnell et al., Phys. Rev. C 16, 2208 (1977).
- [1977Ro27] R.M. Ronningen, R.B. Piercey, J.H. Hamilton et al., Phys. Rev. C 16, 2218 (1977).
- [1977Sa04] M. Samuel, U. Smilansky, B.A. Watson et al., Nucl. Phys. A 279, 210 (1977).
- [1977Sc33] R. Schormann, H. Fischer, E. Kuhlmann, Phys. Rev. C 16, 2165 (1977).
- [1977Sc36] D. Schwalm, E.K. Warburton, J.W. Olness, Nucl. Phys. A 293, 425 (1977).
- [1977Sw03] C.P. Swann, Phys. Rev. C 15, 1967 (1977).
- [1977Vo07] P.B. Vold, D. Cline, P. Russo et al., Phys. Rev. Lett. 39, 325 (1977).
- [1977Wa10] E.K.Warburton, J.W.Olness, A.M.Nathan et al., Phys. Rev. C16, 1027 (1977).
- $[1977 Wo02] \;\; \text{H.J. Wollersheim, T.W. Elze, Nucl. Phys. A $\bf 278, 87 \; (1977).}$
- [1978Ad03] I. Adam, W. Andrejtscheff, K.Y. Gromov et al., Nucl. Phys. A 311, 188 (1978).
- [1978Ar07] R.G. Arthur, R.P. Singhal, S.W. Brain et~al., J. Phys. (London) ${\bf G}~{\bf 4},\,961$ (1978).
- [1978Av02] M. Avrigeanu, V. Avrigeanu, D. Bucurescu et al., J. Phys. (London) G 4, 261 (1978).
- [1978Ba16] H. Backe, L. Richter, R. Willwater et al., Z. Phys. A 285, 159 (1978).
- [1978Ba38] C. Baktash, J.X. Saladin, J.J. O'Brien, J.G. Alessi, Phys. Rev. C 18, 131 (1978).
- [1978Be10] M.J. Bechara, O. Dietzsch, M. Samuel, U. Smilansky, Phys. Rev. C 17, 628 (1978).
- [1978Bo35] H.H. Bolotin, A.E. Stuchbery, K. Amos, I. Morrison, Nucl. Phys. A311, 75 (1978).
- [1978DeYT] G. de Villiers, J.W. Koen, W.J. Naude, N.J.A. Rust, SUNI-55, SOUTH. UNIV. NUCL. INST., (S.Africa), 1977 Ann.Rept., p.21 (1978).
- [1978DuZY] E.H. du Marchie Van Voorthuysen, M.J.A. de Voigt, J.F.W. Jansen, KVI Ann. Rept. 1977, 47 (1978).
- [1978Fa08] C. Fahlander, L. Hasselgren, G. Possnert, J.E. Thun, Phys. Scr. 18, 47 (1978).
- [1978He13] H.P. Hellmeister, E. Schmidt, M. Uhrmacher et al., Phys. Rev. C 17, 2113 (1978).
- $[1978 Jo04] \ A.M.R.\ Joye,\ A.M.\ Baxter,\ S.\ Hinds\ {\it et\ al.},\ Phys.\ Lett.\ {\bf B\ 72},\ 307\ (1978).$

- [1978Ke11] D.L. Kennedy, H.H. Bolotin, I. Morrison, K. Amos, Nucl. Phys. A 308, 14 (1978).
- [1978Ki09] G. Kindleben, T.W. Elze, Z. Phys. A 286, 415 (1978).
- [1978KIZR] D.L. Kennedy, H.H. Bolotin, I. Morrison, K. Amos, UM-P-88, 9 (1978).
- [1978Le22] R. Lecomte, S. Landsberger, P. Paradis, S. Monaro, Phys. Rev. C 18, 2801 (1978).
- [1978Li13] B.J. Linard, D.L. Kennedy, I. Morrison et al., Nucl. Phys. A 302, 214 (1978).
- [1978Me08] F.R. Metzger, Phys. Rev. C 17, 939 (1978).
- [1978Me16] F.R. Metzger, Phys. Rev. C 18, 1603 (1978).
- [1978Og03] M. Ogawa, R. Broda, K. Zell et al., Phys. Rev. Lett. 41, 289 (1978).
- [1978Oh04] H. Ohnuma, J. Kasagi, Y. Iritani, N. Kishida, J.Phys.Soc.Jpn. 45, 1092 (1978).
- [1978Po04] V.N. Polishchuk, N.G. Shevchenko, N.G. Afanasev et al., YAD. Fiz. 27, 1145 (1978); Sov. J. Nucl. Phys. 27, 607 (1978).
- [1978Ul01] G. Ulfert, D. Habs, V. Metag, H.J. Specht, Nucl. Instrum. Methods 148, 369 (1978).
- [1978Ya02] S.W. Yates, N.R. Johnson, L.L. Riedinger, A.C. Kahler, Phys. Rev. C 17, 634 (1978).
- [1978Ya11] Y. Yamazaki, E.B. Shera, M.V. Hoehn, R.M. Steffen, Phys. Rev. C 18, 1474 (1978).
- [1979Az01] R.E. Azuma, G.L. Borchert, L.C. Carraz et al., Phys. Lett. B 86, 5 (1979).
- [1979Be41] D.J. Beale, A.R. Poletti, J.R. Southon, Aust. J. Phys. 32, 195 (1979).
- [1979Bo16] A. Bockisch, K. Bharuth-Ram, A.M. Kleinfeld, K.P. Lieb, Z. Phys. A 291, 245 (1979).
- [1979Bo28] A. Bockisch, M. Miller, A.M. Kleinfeld et al., Z. Phys. A 292, 265 (1979).
- [1979Bo29] B. Bochev, S. Iliev, R. Kalpakchieva et al., Yad. Fiz. 30, 593 (1979); Sov. J. Nucl. Phys. 30, 305 (1979).
- [1979Bo31] H.H. Bolotin, I. Katayama, H. Sakai et al., J. Phys. Soc. Jpn. 47, 1397 (1979).
- [1979DuZY] E.H. du Marchie van Voorthuysen, W. Moonen, J.F.W. Jansen, M.J.A. de Voigt, KVI Ann.Rept., 1978, 63 (1979).
- [1979Ek03] L.P. Ekstrom, G.D. Jones, F. Kearns et~al., J. Phys.(London) ${\bf G5}$, 803 (1979).
- [1979Fe05] M.P. Fewell, S. Hinds, D.C. Kean, T.H. Zabel, Nucl. Phys. A 319, 214 (1979).
- [1979Fe06] M.P. Fewell, A.M. Baxter, D.C. Kean et al., Nucl. Phys. A 321, 457 (1979).
- [1979Fe08] M.P. Fewell, D.C. Kean, R.H. Spear et al., Phys. Rev. Lett. 43, 1463 (1979).
- [1979Fo02] J.S. Forster, T.K. Alexander, G.C. Ball et al., Nucl. Phys. A 313, 397 (1979).
- [1979He07] H.P. Hellmeister, U. Kaup, J. Keinonen et al., Phys. Lett. B 85, 34 (1979).
- [1979Ho23] M.V. Hoehn, E.B. Shera, Phys. Rev. C 20, 1934 (1979).
- [1979Ki17] V.G. Kiptilyi, I.Kh. Lemberg, A.S. Mishin, A.A. Pasternak, Izv. Akad. Nauk SSSR, Ser.Fiz. 43, 2276 (1979); Bull. Acad. Sci. USSR, Phys.Ser. 43, No.11, 26 (1979).
- [1979Ma13] X.K. Maruyama, F.J. Kline, J.W. Lightbody et al., Phys. Rev. C 19, 1624 (1979).
- [1979Mo01] C. Morand, J.F. Bruandet, B. Chambon $\it{et~al.}$, Nucl. Phys. A $\it{313}$, 45 (1979).
- $[1979Pa11]\ \ P.\ Paradis,\ R.\ Lecomte,\ S.\ Landsberger,\ S.\ Monaro,\ Phys.\ Rev.\ {\bf C}\ {\bf 20},\ 1201\ (1979).$
- $[1979Po01] \ A.R.\ Poletti,\ L.K.\ Fifield,\ J.\ Asher,\ B.E.\ Cooke,\ J.\ Phys.\ (London)\ \mathbf{G5},\ 575\ (1979).$
- [1979Po04] R.J. Powers, P. Barreau, B. Bihoreau et al., Nucl. Phys. A 316, 295 (1979).
- [1979Ri06] L. Richter, Z. Phys. A 290, 213 (1979).
- [1979Se03] G. Seiler-Clark, D. Husar, R. Novotny et al., Phys. Lett. $\bf B$ 80, 345 (1979).
- [1979Wa23] R. Wadsworth, L.P. Ekstrom, G.D. Jones et al., J. Phys. (London) G5, 1761 (1979).
- [1980Ah01] I. Ahmad, A.M. Friedman, S.W. Yates, Phys. Rev. C 21, 874 (1980).
- [1980Ba40] G.C. Ball, O. Hausser, T.K. Alexander et al., Nucl. Phys. A 349, 271 (1980).
- [1980Bi14] E. Bitterwolf, P. Betz, A. Burkard et al., Z. Phys. A 298, 279 (1980)
- [1980Ch22] T. Chapuran, R. Vodhanel, M.K. Brussel, Phys. Rev. C 22, 1420 (1980).
- [1980ChZM] E. Cheifetz, H.A. Selic, A. Wolf et al., Proc. Conf. Nucl. Spectr. Fission Products, Grenoble, 1979, 193 (1980).
- [1980Ek03] L.P. Ekstrom, G.D. Jones, F. Kearns $et~al.,~\mathrm{J.~Phys.~(London)}~\mathbf{G}~\mathbf{6},~1415~(1980).$
- [1980FaZW] C. Fahlander, A. Backlin, L. Hasselgren et al., Proc. 6th European Phys. Soc. Nucl. Div. Conf. on Structure of Medium-Heavy Nuclei, Rhodes, Greece, 1979, 291 (1980).
- [1980HiZV] J.H. Hirata, O. Dietzsch, Proc. Int. Conf. on Nucl. Phys., Berkeley, 102 (1980).
- [1980KaZT] T.Katou, Y.Tendow, H.Kumagai et al., Proc. Int. Conf. on Nucl. Phys., Berkeley, 751 (1980).
- [1980Ke04] D.L. Kennedy, A.E. Stuchbery, H.H. Bolotin, Nucl. Instrum. Methods 171, 361 (1980).
- [1980La01] S. Landsberger, R. Lecomte, P. Paradis, S. Monaro, Phys. Rev. C 21, 588 (1980).
- $[1980 Le16]\,$ R. Lecomte, M. Irshad, S. Landsberger et al., Phys. Rev. C 22, 1530 (1980).
- [1980Li14] B.J. Lieb, H.S. Plendl, H.O. Funsten et al., Phys. Rev. C 22, 1612 (1980).

- [1980LuZT] M. Luontama, A. Backlin, L. Westerberg et al., JYFL Ann. Rept., 1980, 44 (1980).
- [1980Mi16] C. Michel, Y. El Masri, R. Holzmann et al., Z. Phys. A 298, 213 (1980).
- [1980Ru01] A.J. Rutten, A. Holthuizen, J.A.G. De Raedt et al., Nucl. Phys. A 344, 294 (1980).
- [1980Sc13] F. Schussler, J.A. Pinston, E. Monnand et al., Nucl. Phys. A 339, 415 (1980).
- [1980Sc25] D.E.C. Scherpenzeel, G.A.P. Engelbertink, H.J.M. Aarts et al., Nucl. Phys. A 349, 513 (1980).
- [1980Sp05] R.H. Spear, M.T. Esat, M.P. Fewell et al., Nucl. Phys. A 345, 252 (1980).
- [1980Sp09] R.H. Spear, M.P. Fewell, Aust. J. Phys. 33, 509 (1980); Corrigendum Aust. J. Phys. 34, 609 (1981).
- [1981Ah02] J. Ahlert, M. Schumacher, Z. Phys. A301, 75 (1981).
- [1981Bo32] H.H. Bolotin, A.E. Stuchbery, I. Morrison et al., Nucl. Phys. A 370, 146 (1981).
- [1981Ca01] C.M. Cartwright, P.D. Forsyth, I. Hall et al., J. Phys. (London) G 7, 65 (1981).
- [1981Ca10] Y. Cauchois, H. Ben Abdelaziz, R. Kherouf, C. Schloesing-Moller, J. Phys. (London) G 7, 1539 (1981).
- [1981De03] A.P.de Lima, A.V. Ramayya, J.H. Hamilton et al., Phys. Rev. C 23, 213 (1981); Erratum Phys.Rev. C 23, 2380 (1981).
- [1981DeYW] A. Dewald, U. Kaup, W. Gast et al., Proc. Int. Conf. Nuclei Far from Stability, Helsingor, Denmark, 2, 418 (1981); CERN-81-09 (1981).
- [1981Dy01] K. Dybdal, J.S. Forster, P. Hornshoj et al., Nucl. Phys. A 359, 431 (1981).
- [1981Es03] M.T. Esat, M.P. Fewell, R.H. Spear et al., Nucl. Phys. A 362, 227 (1981).
- [1981Fu03] L. Funke, J. Doring, F. Dubbers et al., Nucl. Phys. A 355, 228 (1981).
- [1981Ho22] M.V. Hoehn, E.B. Shera, H.D. Wohlfahrt et al., Phys. Rev. C 24, 1667 (1981).
- [1981Is14] H.A. Ismail, A. El-Naem, S.A. El-Malalk et al., Rev. Roum. Phys. 26, 461 (1981).
- [1981Ji03] Jiang Cheng-lie, S. Pontoppidan, Phys. Rev. C 24, 1350 (1981).
- [1981Jo03] N.-G. Jonsson, A. Backlin, J. Kantele et al., Nucl. Phys. A 371, 333 (1981).
- [1981Le02] M.J. LeVine, E.K. Warburton, D. Schwalm, Phys. Rev. C23, 244 (1981).
- [1981Wa09] N.J. Ward, L.P. Ekstrom, G.D. Jones et al., J. Phys. (London) G7, 815 (1981).
- [1981Yo07] Y. Yoshizawa, B. Herskind, M. Hoshi, J. Phys. Soc. Jpn. 50, 2151 (1981).
- [1981Zh07] U.Yu. Zhovliev, M.F. Kudoyarov, I.Kh. Lemberg, A.A. Pasternak, Izv. AKAD. NAUK SSSR, Ser. Fiz. 45, 1879 (1981).
- [1982Al15] T.K. Alexander, G.C. Ball, W.G. Davies et al., Phys. Lett. B 113, 132 (1982).
- [1982Al22] T.K. Alexander, G.C. Ball, J.S. Forster et al., Phys. Rev. Lett. 49, 438 (1982).
- [1982An06] D.S. Andreev, K.I. Erokhina, I.Kh. Lemberg et al., Izv. Akad. Nauk SSSR, Ser. Fiz. 46, 30 (1982).
- [1982Ba06] G.C. Ball, T.K. Alexander, W.G. Davies et al., Nucl. Phys. A 377, 268 (1982).
- [1982Be38] J.A. Becker, J.B. Carlson, R.G. Lanier $et~al.,~{\rm Phys.}~{\rm Rev.}~{\bf C}~{\bf 26},~914~(1982).$
- [1982De05] A. Dewald, U. Kaup, W. Gast et al., Phys. Rev. C 25, 226 (1982).
- [1982De36] S. Della Negra, H. Gauvin, D. Jacquet, Y. Le Beyec, Z. Phys. A 307, 305 (1982).
- [1982GaZH] K.F.W. Gast, Thesis, Univ.Koln (1982).
- [1982He03] J. Heisenberg, J. Lichtenstadt, C.N. Papanicolas, J.S. McCarthy, Phys. Rev. C 25, 2292 (1982).
- [1982HiZT] T. Higo, S. Matsuki, T. Oshawa et al., Contrib. Intern. Symp. Dynamics of Nucl. Collective Motion, Yamanishi, Japan, 27 (1982).
- [1982Jo
04] N.R. Johnson, I.Y. Lee, F.K. McGowan et~al., Phys. Rev. C
 ${\bf 26},~1004~(1982).$
- [1982Ke01] J. Keinonen, K.P. Lieb, H.P. Hellmeister et al., Nucl. Phys. A 376, 246 (1982).
- [1982Li08] C.J. Lister, B.J. Varley, H.G. Price, J.W. Olness, Phys. Rev. Lett. 49, 308 (1982).
- [1982No04] B.E. Norum, M.V. Hynes, H. Miska et al., Phys. Rev. C 25, 1778 (1982).
- [1982Pa03] T. Paradellis, C.A. Kalfas, Phys. Rev. C 25, 350 (1982).
- [1982Pa10] A. Pakkanen, Y.H. Chung, P.J. Daly et al., Phys. Rev. Lett. 48, 1530 (1982).
- [1982Ro05] S. Rozak, E.G. Funk, J.W. Mihelich, Phys. Rev. C 25, 3000 (1982).
- [1982Sp02] K.-H. Speidel, P.N. Tandon, V. Mertens et al., Nucl. Phys. A 378, 130 (1982).
- [1982Sp05] R.H. Spear, T.H. Zabel, M.T. Esat et al., Nucl. Phys. A 378, 559 (1982).
- [1983Bi08] E. Bitterwolf, A. Burkard, P. Betz et al., Z. Phys. A 313, 123 (1983).
- [1983El02] M.S.S. El-Daghmah, N.M. Stewart, Z. Phys. A 309, 219 (1983).
- [1983El03] D.V. Elenkov, D.P. Lefterov, G.Kh. Tumbev, Izv. Akad. Nauk SSSR, Ser. Fiz. 47, 56 (1983).
- [1983Ga11] M. Gai, J.F. Ennis, M. Ruscev et al., Phys.Rev.Lett. 51, 646 (1983).
- [1983He21] F.W. Hersman, W. Bertozzi, T.N. Buti et al., Phys. Lett. B 132, 47 (1983).
- [1983Kl09] R. Klein, P. Grabmayr, Y. Kawazoe et al., Nuovo Cim. 76 A, 369 (1983).

- [1983Ko01] R.L. Kozub, J. Lin, J.F. Mateja et al., Phys. Rev. C 27, 158 (1983).
- [1983La08] D.B. Laubacher, Y. Tanaka, R.M. Steffen et al., Phys. Rev. C 27, 1772 (1983).
- [1983Li02] J.W. Lightbody, Jr., J.W. Lightbody, J.B. Bellicard et al., Phys. Rev. C27, 113 (1983).
- [1983MaYT] G. Mamane, Thesis, Weizmann Inst.Science, Rehovot (1983).
- [1983Pr08] H.G. Price, C.J. Lister, B.J. Varley et al., Phys. Rev. Lett. 51, 1842 (1983).
- [1983Ra17] M. Rahman, H.P. Nottrodt, F. Rauch, Nucl. Phys. A 401, 253 (1983).
- [1984Al06] A. Alzner, D. Best, E. Bodenstedt et al., Z. Phys. A 316, 87 (1984).
- [1984Be20] M.J. Bechara, O. Dietzsch, J.H. Hirata, Phys. Rev. C 29, 1672 (1984).
- [1984Bh03] R.K. Bhalla, A.R. Poletti, Nucl. Phys. A 420, 96 (1984).
- [1984Dr02] G.D. Dracoulis, G.D. Sprouse, O.C. Kistner, M.H. Rafailovich, Phys. Rev. C 29, 1576 (1984).
- [1984Ef01] A.D. Efimov, K.I. Erokhina, V.G. Kiptilyi et al., Izv. Akad. Nauk SSSR, Ser. Fiz. 48, 10 (1984).
- [1984El12] D. Elenkov, D. Lefterov, G. Toumbev, Nucl. Instrum. Methods 228, 62 (1984).
- [1984EnZY] J.F. Ennis, M. Gai, D.A. Bromley et al., Bull. Am. Phys. Soc. 29, No.7, 1050, DC10 (1984).
- [1984Fe08] M.P. Fewell, Nucl. Phys. A 425, 373 (1984).
- [1984He02] J. Heisenberg, J. Dawson, T. Milliman et al., Phys. Rev. C 29, 97 (1984).
- [1984Ke10] P. Kemnitz, P. Ojeda, J. Doring et al., Nucl. Phys. A 425, 493 (1984).
- [1984Mu19] S.J. Mundy, J. Lukasiak, W.R. Phillips, Nucl. Phys. A 426, 144 (1984).
- [1984Pa02] C.N. Papanicolas, J. Heisenberg, J. Lichtenstadt et al., Phys. Rev. Lett. 52, 247 (1984).
- [1984Re10] W. Reuter, E.B. Shera, M.V. Hoehn et al., Phys. Rev. C 30, 1465 (1984).
- [1984Ro01] J. Roth, L. Cleemann, J. Eberth et al., J. Phys. (London) G 10, L25 (1984).
- [1984Ta10] T. Tanaka, R.M. Steffen, E.B. Shera et al., Phys. Rev. C 30, 350 (1984).
- [1984To10] D.M. Todd, R. Arvaeinejad, D.J.G. Love et al., J. Phys. (London) G 10, 1407 (1984).
- [1984Ve07] W.J. Vermeer, M.T. Esat, J.A. Kuehne et al., Aust. J. Phys. 37, 123 (1984).
- [1984We17] J.C. Wells, N.R. Johnson, J. Hattula et al., Phys. Rev. C 30, 1532 (1984).
- [1984Wo10] B. Wormann, K.P. Lieb, R. Diller et al., Nucl. Phys. A 431, 170 (1984).
- [1984ZoZZ] A.E. Zobov, V.G. Kiptily, I.Kh. Lemberg *et al.*, Program and Theses, Proc. 34th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Alma-Ata, 73 (1984).
- [1985Al18] T.K. Alexander, G.C. Ball, D. Horn et al., Nucl. Phys. A 444, 285 (1985).
- [1985Az02] F. Azgui, H. Emling, E. Grosse et al., Nucl. Phys. A 439, 573 (1985).
- [1985AzZY] F. Azgui, Thesis, Univ. Louis Pasteur de Strasbourg (1985); CRN/PN 85 31 (1985).
- [1985Bo31] D. Bohle, A. Richter, K. Heyde et al., Phys. Rev. Lett. 55, 1661 (1985).
- [1985Bo32] W. Bonin, H. Backe, M. Dahlinger et al., Z. Phys. A 322, 59 (1985).
- $[1985 Bu 01] \; \text{ S.M. Burnett, A.M. Baxter, S. Hinds } \textit{et al., Nucl. Phys. A 432}, \, 514 \,\, (1985).$
- [1985ChZY] A. Chaudhury, M.W. Drigert, E.G. Funk et al., Bull. Am. Phys. Soc. 30, No.4, 742, DE9 (1985).
- [1985Fe03] M.P. Fewell, G.J. Gyapong, R.H. Spear et~al., Phys. Lett. **B 157**, 353 (1985).
- $[1985 Lu06]\,$ S. Lunardi, F. Scarlassara, F. Soramel et~al.,~Z. Phys. A 321,~177~(1985) .
- [1985Si01] K.P. Singh, D.C. Tayal, G. Singh, H.S. Hans, Phys. Rev. C 31, 79 (1985).
- [1985VoZY] P. von Brentano, PRIV.COMM. (June 1985).
- [1985Wi01] G. Winter, F. Dubbers, J. Doring et al., J. Phys. (London) G 11, 277 (1985).
- [1985Wi06] J.E. Wise, J.S. McCarthy, R. Altemus et al., Phys. Rev. C 31, 1699 (1985).
- [1985Wo06] U. Worsdorfer, H.J. Emrich, H. Miska et al., Nucl. Phys. A 438, 711 (1985).
- [1986Bi13] J. Billowes, Hyperfine Interactions 30, 265 (1986).
- [1986Cz02] T. Czosnyka, D. Cline, L. Hasselgren et al., Nucl. Phys. A 458, 123 (1986).
- $[1986 Dr05] \; \text{ G.D. Dracoulis, A.E. Stuchbery, A.P. Byrne } \textit{et al., J. Phys. (London) } \mathbf{G} \; \mathbf{12}, \\ \text{L97 (1986)}.$
- $[1986 Ga21] \;\; \text{U. Garg, A. Chaudhury, M.W. Drigert} \;\; et \;\; al., \;\; \text{Phys. Lett.} \;\; \textbf{B} \;\; \textbf{180}, \; 319 \;\; (1986).$
- [1986Gy04] G.J. Gyapong, R.H. Spear, M.T. Esat et~al., Nucl. Phys. A 458, 165 (1986).
- [1986He09] F.W. Hersman, W. Bertozzi, T.N. Buti et al., Phys. Rev. C 33, 1905 (1986).
- [1986He17] J. Heese, K.P. Lieb, L. Luhmann et al., Z. Phys. A 325, 45 (1986).
- [1986Ma22] G. Mamane, E. Cheifetz, E. Dafni et al., Nucl. Phys. A 454, 213 (1986).
- [1986Ma39] A. Makishima, M. Adachi, H. Taketani, M. Ishii, Phys. Rev. C 34, 576 (1986).
- [1986Os02] M. Oshima, N.R. Johnson, F.K. McGowan et al., Phys. Rev. C 33, 1988 (1986).

- [1986Ra07] M.N. Rao, N.R. Johnson, F.K. McGowan et al., Phys. Rev. Lett. 57, 667 (1986).
- [1986Ro15] P.J. Rothschild, A.M. Baxter, S.M. Burnett et al., Phys. Rev. C 34, 732 (1986).
- [1986Sc18] P. Schuler, Ch. Lauterbach, Y.K. Agarwal et al., Phys. Lett. B 174, 241 (1986).
- [1987Bi13] J. Billowes, K.P. Lieb, J.W. Noe et al., Phys. Rev. C 36, 974 (1987).
- [1987Dr08] G.D. Dracoulis, A.P. Byrne, A.E. Stuchbery et al., Nucl. Phys. A 467, 305 (1987).
- [1987Ga12] J. Gascon, F. Banville, P. Taras et al., Nucl. Phys. A 470, 230 (1987).
- [1987Ga14] J. Gascon, P. Taras, P. van Esbroek et al., Nucl. Phys. A 472, 558 (1987).
- [1987Gy01] G.J. Gyapong, R.H. Spear, M.P. Fewell et al., Nucl. Phys. A 470, 415 (1987).
- [1987IsZX] T. Ishii, M. Ishii, K. Yanagida, M. Ogawa, Japan Atomic Energy Res. Inst. Tandem Linac VDG, Ann. Rept., 1986, 167 (1987).
- [1987MiZL] T.E. Milliman, Thesis, Univ. New Hampshire (1987).
- [1987Oh05] H. Ohm, G. Lhersonneau, K. Sistemich et al., Z. Phys. A 327, 483 (1987).
- [1987Sc07] R. Schwengner, G. Winter, J. Doring et al., Z. Phys. A 326, 287 (1987).
- [1987Wa02] R. Wadsworth, J.M. O'Donnell, D.L. Watson et al., J. Phys. (London) G 13, 205 (1987).
- [1988Ah01] A. Ahmad, G. Bomar, H. Crowell et al., Phys. Rev. C 37, 1836 (1988).
- [1988Bi03] P.J. Bishop, M.J. Godfrey, A.J. Kirwan et al., J. Phys. (London) G 14, 995 (1988).
- [1988Bo08] W. Boeglin, P. Egelhof, I. Sick et al., Nucl. Phys. A 477, 399 (1988).
- [1988Br10] M.R. Braunstein, J.J. Kraushaar, R.P. Michel et al., Phys. Rev. C 37, 1870 (1988).
- [1988DoZU] G.A. Dostemesova, D.K. Kaipov, Yu.G. Kosyak, Program and Theses, Proc. 38th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Baku, 59 (1988).
- [1988Fa07] C. Fahlander, A. Backlin, L. Hasselgren et al., Nucl. Phys. A 485, 327 (1988).
- [1988Fe01] M.P. Fewell, N.R. Johnson, F.K. McGowan $et\ al.$, Phys. Rev. C 37, 101 (1988).
- [1988Ga33] M. Gai, J.F. Ennis, D.A. Bromley et al., Phys. Lett. B 215, 242 (1988).
- [1988Ka21] W. Karle, M. Knopp, K.-H. Speidel, Nucl. Instrum. Methods Phys. Res. A 271, 507 (1988).
- [1988Ku01] A.I. Kucharska, J. Billowes, M.A. Grace, J. Phys. (London) G 14, 65 (1988).
- [1988Ku33] A. Kuronen, J. Raisanen, J. Keinonen et al., Nucl. Instrum. Methods Phys. Res. B35, 1 (1988).
- [1988Li22] C.S. Lim, R.H. Spear, W.J. Vermeer et al., Nucl. Phys. A 485, 399 (1988).
- [1988Lu04] Lu Xiting, Ban Yong, Liu Hongtao et al., Nucl. Instrum. Methods Phys. Res. A272, 909 (1988).
- [1988Mo08] R. Moscrop, M. Campbell, W. Gelletly et al., Nucl. Phys. A 481, 559 (1988).
- [1988MyZY] T. Mylaeus, J. Busch, J. Eberth et al., HMI-466, 210 (1988).
- [1988PeZW] B.A. Peterson, G.A. Rebka, S. Kowalski et al., Bull. Am. Phys. Soc. 33, No.4, 1097, KI2 (1988).
- [1988Sa32] S. Salem-Vasconcelos, M.J. Bechara, J.H. Hirata, O. Dietzsch, Phys. Rev. C38, 2439 (1988).
- [1988So06] F. Soramel, S. Lunardi, S. Beghini et al., Phys. Rev. C 38, 537 (1988).
- [1988Ve08] W.J. Vermeer, C.S. Lim, R.H. Spear, Phys. Rev. C 38, 2982 (1988).
- $[1989 {\rm Ad} 01]\,$ J. Adam, M. Honusek, A. Spalek $et~al.,~{\rm Z.~Phys.}$ A 332,~143 (1989).
- $[1989 Bu 07] \; \; \text{S.M. Burnett, A.M. Baxter, G.J. Gyapong} \; \textit{et al., Nucl. Phys. A } \; \textbf{494}, \; 102 \; (1989).$
- [1989BuZP] A.J.C. Burghardt, Thesis, Univ.Amsterdam (1989); INIS-MF-11407 (1989).
- [1989Ga24] Yu.P. Gangrsky, S.G. Zemlyanoi, N.N. Kolesnikov et al., YAD. Fiz. 50, 1217 (1989).
- [1989Ge09] M.K. Georgieva, D.V. Elenkov, D.P. Lefterov, G.H. Toumbev, Fiz. Elem. Chastits At. Yadra 20, 930 (1989); Sov. J. Part. Nucl. 20, 393 (1989).
- [1989It02] K. Itoh, Y.M. Shin, W.J. Gerace, Y. Torizuka, Nucl. Phys. A 492, 426 (1989).
- [1989Ke04] J. Keinonen, P. Tikkanen, A. Kuronen et al., Nucl. Phys. A 493, 124 (1989).
- [1989Ki01] A.J. Kirwan, P.J. Bishop, D.J.G. Love et al., J. Phys. (London) G 15, 85 (1989).
- [1989Ko40] B. Kotlinski, D. Cline, A. Backlin, D. Clark, Nucl. Phys. A 503, 575 (1989).
- [1989Ku04] R. Kulessa, R. Bengtsson, H. Bohn et al., Phys. Lett. B 218, 421 (1989).
- [1989Lh01] G. Lhersonneau, H. Gabelmann, N. Kaffrell et al., Z. Phys. A 332, 243 (1989).
- [1989Lo01] G. Lo Bianco, K.P. Schmittgen, K.O. Zell, P. v.Brentano, Z. Phys. A 332, 103 (1989).
- $[1989 Lo08]\,$ M. Loiselet, O. Naviliat-Cuncic, J. Vervier, Nucl. Phys. A $496,\,559$ (1989).
- [1989Ma33] H. Mach, M. Moszynski, R.F. Casten et al., Phys. Rev. Lett. 63, 143 (1989).
- [1989Ma38] H. Mach, R.L. Gill, M. Moszynski, Nucl. Instrum. Methods Phys. Res. A 280, 49 (1989).
- [1989Ma47] H. Mach, M. Moszynski, R.L. Gill et al., Phys. Lett. B 230, 21 (1989).

- [1989Mo06] M. Moszynski, H. Mach, Nucl. Instrum. Methods Phys. Res. A 277, 407 (1989).
- [1989Mo10] R. Moscrop, M. Campbell, W. Gelletly et al., Nucl. Phys. A 499, 565 (1989).
- [1989Mu13] M. Murzel, S.C. Pancholi, U. Birkental et al., Z. Phys. A 334, 125 (1989).
- [1989Oh06] H. Ohm, M. Liang, G. Molnar, K. Sistemich, Z. Phys. A 334, 519 (1989).
- [1989Sc06] K. Schiffer, S. Harissopulos, A. Dewald et al., J. Phys. (London) G 15, L85 (1989).
- [1989Sp03] R.H. Spear, A.M. Baxter, S.M. Burnett, C.L. Miller, Aust. J. Phys. 42, 41 (1989).
- [1989Sp07] R.H. Spear, W.J. Vermeer, S.M. Burnett et al., Aust. J. Phys. 42, 345 (1989).
- [1989SvZZ] L.E. Svensson, Thesis, Uppsala Univ. (1989).
- [1989VoZT] D.A. Volkov, A.I. Kovalenko, A.I. Levon *et al.*, Program and Thesis, Proc. 39th Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Tashkent, 74 (1989).
- [1989Wu04] C.Y. Wu, D. Cline, E.G. Vogt et al., Phys. Rev. C 40, R3 (1989); Erratum Phys.Rev. C 40, 2431 (1989).
- [1990De04] M.J.A. De Voigt, R. Kaczarowski, H.J. Riezebos et al., Nucl. Phys. A 507, 472 (1990).
- [1990DeZN] A. Dewald, P. Petkov, R. Wrzal et al., Proc. Intern. Conf. Nuclear Structure, 24th Zakopane School on Physics, Zakopane, Poland, 28 April-12 May, 1990, 152 (1990).
- [1990Ga22] G. Garcia Bermudez, M.A. Cardona, A. Filevich, Nucl. Instrum. Methods Phys. Res. A 292, 367 (1990).
- [1990He04] J. Heese, K.P. Lieb, S. Ulbig et al., Phys. Rev. C 41, 603 (1990).
- [1990Ka11] R. Kaczarowski, U. Garg, A. Chaudhury et al., Phys. Rev. C 41, 2069 (1990).
- [1990Ko30] B. Kotlinski, D. Cline, A. Backlin et al., Nucl. Phys. A 517, 365 (1990).
- [1990Ko38] B. Kotlinski, T. Czosnyka, D. Cline et al., Nucl. Phys. A 519, 646 (1990).
- [1990Lh01] G. Lhersonneau, H. Gabelmann, N. Kaffrell et al., Z. Phys. A 337, 143 (1990).
- [1990Ma25] H. Mach, W. Nazarewicz, D. Kusnezov et al., Phys. Rev. C 41, R2469 (1990).
- [1990Pi04] H.H. Pitz, R.D. Heil, U. Kneissl et al., Nucl. Phys. A 509, 587 (1990); Errata Nucl. Phys. A 514, 749 (1990).
- [1990Ro10] H. Rotter, J. Doring, L. Funke et al., Nucl. Phys. A 514, 401 (1990).
- [1990Ta12] S.L. Tabor, P.D. Cottle, J.W. Holcomb et al., Phys. Rev. C 41, 2658 (1990).
- [1990Wa13] Y. Wang, J. Rapaport, Nucl. Phys. A 517, 301 (1990).
- [1990WeZZ] J. Wei, K.B. Beard, J.C. Walpe et al., Bull. Am. Phys. Soc. 35, No.4, 1016, H6 7 (1990).
- [1991Ba38] D. Bazzacco, F. Brandolini, K. Loewenich et al., Nucl. Phys. A 533, 541 (1991).
- [1991He03] M. Hellstrom, H. Mach, B. Fogelberg et al., Phys. Rev. C 43, 1462 (1991).
- [1991Ib01] R.Ibbotson, B.Kotlinski, D.Cline et al., Nucl. Phys. A 530, 199 (1991).
- [1991Ki13] W. Kim, J.R. Calarco, J.P. Connelly et al., Phys. Rev. C 44, 2400 (1991).
- [1991Li39] M. Liang, H. Ohm, B. De Sutter et al., Z. Phys. A 340, 223 (1991).
- $[1991 \mathrm{Ma05}] \;\; \mathrm{H.\;Mach,\;F.K.\;Wohn,\;G.\;Molnar\;\it{et\;al.},\;Nucl.\;Phys.\;\mathbf{A}\;\mathbf{523},\;197\;(1991).}$
- $[1991 \\ \text{McO4}] \;\; \text{F.K. McGowan, N.R. Johnson, I.Y. Lee} \;\; et \;\; al., \;\; \text{Nucl. Phys.} \;\; \textbf{A} \;\; \textbf{530}, \; 490 \;\; (1991).$
- $[1991Pe07] \;\; \text{R.J. Peterson, J.J. Kraushaar, M.R. Braunstein, J.H. Mitchell, Phys. Rev. } \textbf{C} \;\; \textbf{44}, \; 136 \;\; (1991).$
- [1991ViZW] I.N. Vishnevsky, M.F. Kudoyarov, E.V. Kuzmin et al., Program and Thesis, Proc. 41st Ann. Conf. Nucl. Spectrosc. Struct. At. Nuclei, Minsk, 71 (1991).
- $[1991 We15] \ \ J. \ Wesseling, \ C.W. \ de \ Jager, \ J.B. \ van \ der \ Laan \ et \ al., \ Nucl. \ Phys. \ {\bf A \ 535}, \ 285 \ (1991).$
- $[1991 Wu05] \;\; \text{C.Y. Wu, D. Cline, E.G. Vogt} \;\; et \;\; al., \;\; \text{Nucl. Phys.} \;\; \textbf{A} \;\; \textbf{533}, \; 359 \;\; (1991).$
- [1992De29] C.C. Dey, N.R. Das, B.K. Sinha, R. Bhattacharya, CAN. J. Phys. **70**, 268 (1992).
- [1992De60] A. Dewald, Prog. Part. Nucl. Phys. 28, 409 (1992).
- [1992Dr05] Ch. Droste, T. Morek, S.G. Rohozinski et al., J. Phys. (London) G 18, 1763 (1992).
- [1992Fa01] C. Fahlander, I. Thorslund, B. Varnestig et al., Nucl. Phys. A 537, 183 (1992).
- [1992Fa05] C. Fahlander, B. Varnestig, A. Backlin et al., Nucl. Phys. A 541, 157 (1992).
- [1992Ki10] W. Kim, B.L. Miller, J.R. Calarco et al., Phys. Rev. C 45, 2290 (1992).
- [1992Ki20] W. Kim, J.P. Connelly, J.H. Heisenberg et al., Phys. Rev. C 46, 1656 (1992).
- [1992Li14] C.S. Lim, R.H. Spear, M.P. Fewell, G.J. Gyapong, Nucl. Phys. A 548, 308 (1992).
- [1992MaZR] P.F. Mantica, P.K. Joshi, S.J. Robinson *et al.*, Contrib. 6th Intern. Conf. on Nuclei Far from Stability + 9th Intern. Conf. on Atomic Masses and Fundamental Constant, Bernkastel-Kues, Germany, PE27 (1992).
- $[1992 \text{Mc} 02] \;\; \text{F.K. McGowan, N.R. Johnson, C. Baktash} \;\; \textit{et al., Nucl. Phys.} \;\; \textbf{A 539}, \; 276 \;\; (1992).$
- [1992Mo13] T. Morikawa, M. Oshima, T. Sekine et al., Phys. Rev. C 46, R6 (1992).
- $[1992 Pe06]\,$ P. Petkov, S. Harissopulos, A. Dewald $et~al.,~{\rm Nucl.~Phys.}$ A 543,~589~(1992).

- [1992Po09] V.Yu. Ponomarev, W.T.A. Borghols, S.A. Fayans et al., Nucl. Phys. A 549, 180 (1992).
- [1992Va06] J.R. Vanhoy, M.T. McEllistrem, S.F. Hicks et al., Phys. Rev. C 45, 1628 (1992).
- [1992Wi06] J.E. Wise, J.P. Connelly, F.W. Hersman et al., Phys. Rev. C 45, 2701 (1992).
- [1993Be03] T. Belgya, D. Seckel, E.L. Johnson et al., Phys. Rev. C 47, 392 (1993).
- [1993Ch05] W.-T. Chou, D.S. Brenner, R.F. Casten, R.L. Gill, Phys.Rev. C 47, 157 (1993).
- [1993Ch41] A.A. Chishti, P. Chowdhury, D.J. Blumenthal et al., Phys. Rev. C 48, 2607 (1993).
- [1993Ga16] R.A. Gatenby, E.L. Johnson, E.M. Baum et al., Nucl. Phys. A 560, 633 (1993).
- [1993Ho12] D.J. Horen, R.L. Auble, C.Y. Wu et al., Phys. Rev. C 48, 433 (1993).
- [1993Pe10] R. Perrino, N. Blasi, R. De Leo et al., Nucl. Phys. A 561, 343 (1993).
- [1993Pi16] M. Piiparinen, R. Julin, S. Juutinen et al., Nucl. Phys. A 565, 671 (1993).
- [1993Sa06] R.K.J. Sandor, H.P. Blok, M. Girod et al., Nucl. Phys. A 551, 349 (1993).
- [1993Sa38] G.P.S. Sahota, V.K. Mittal, H.S. Sahota, J. Phys. Soc. Jpn. 62, 2958 (1993).
- [1993SaZT] P. Sala da Milano, Thesis, Universitat Kohn (1993).
- [1993Se08] T. Seo, Nucl. Instrum. Methods Phys. Res. A 325, 176 (1993).
- [1993Sp01] K.-H. Speidel, H. Busch, S. Kremeyer et al., Nucl. Phys. A 552, 140 (1993).
- $[1993\mathrm{Sr}01]\,$ J. Srebrny, T. Czosnyka, W. Karczmarczyk et al., Nucl. Phys. A $\mathbf{557},\,663\mathrm{c}$ (1993).
- [1993Su16] M. Sugawara, H. Kusakari, T. Morikawa et al., Nucl. Phys. A 557, 653c (1993).
- [1993Wo05] H.J. Wollersheim, H. Emling, H. Grein et al., Nucl. Phys. A 556, 261 (1993).
- [1994Ch28] S. Chattopadhyay, H.C. Jain, M.L. Jhingan, C.R. Praharaj, Phys. Rev. C 50, 93 (1994).
- [1994Go25] K. Govaert, L. Govor, E. Jacobs et al., Phys. Lett. B 335, 113 (1994).
- [1994Jo13] P.K. Joshi, E.F. Zganjar, D. Rupnik et al., Int. J. Mod. Phys. E 3, 757 (1994).
- [1994Mc06] F.K. McGowan, N.R. Johnson, M.N. Rao et al., Nucl. Phys. A 580, 335 (1994).
- [1994Pe02] P. Petkov, R. Kruecken, A. Dewald et al., Nucl. Phys. A 568, 572 (1994).
- $[1994 \mathrm{Th} 01]\,$ I. Thorslund, C. Fahlander, J. Nyberg et al., Nucl. Phys. A $\mathbf{568},\,306$ (1994).
- [1995An15] S.S. Anderssen, A.E. Stuchbery, S. Kuyucak, Nucl. Phys. A 593, 212 (1995).
- [1995Ef01] A.D. Efimov, M.F. Kudoyarov, A.S. Li, Yad. Fiz. 58, No 1, 3 (1995); Phys. Atomic Nuclei 58, 1 (1995).
- $[1995 \\ He25] \ \text{R.-D. Herzberg, I. Bauske, P. von Brentano} \ et \ al., \ \\ \text{Nucl. Phys.} \ \mathbf{A} \ \mathbf{592}, \ 211 \ (1995).$
- [1995Ka29] A.E. Kavka, C. Fahlander, A. Backlin et al., Nucl. Phys. A 593, 177 (1995).
- $[1995\mathrm{Ma}03]\,$ H. Mach, B. Fogelberg, Phys. Rev. C $\mathbf{51},\,509$ (1995).
- [1995Ma96] A. Makishima, T. Ishii, M. Ogawa, M. Ishii, Nucl. Instrum. Methods Phys. Res. A 363, 591 (1995).
- $[1995 \text{Mo16}]\,$ T. Motobayashi, Y. Ikeda, Y. Ando et al., Phys.Lett. B $346,\,9$ (1995).
- $[1995\mathrm{Sc}24]\,$ S. Schoedder, G. Lhersonneau, A. Wohr et al., Z. Phys. A $352,\,237$ (1995).
- $[1995 \mathrm{Sv}01]$ L.E. Svensson, C. Fahlander, L. Hasselgren et al., Nucl. Phys. A 584, 547 (1995).
- [1995Va25] J.R. Vanhoy, J.M. Anthony, B.M. Haas et al., Phys. Rev. C 52, 2387 (1995).
- [1995Vi05] A. Virtanen, N.R. Johnson, F.K. McGowan et al., Nucl. Phys. A 591, 145 (1995).
- [1995Wa25] J.C. Walpe, B.F. Davis, S. Naguleswaran et al., Phys. Rev. C 52, 1792 (1995).
- [1995Za01] N.V. Zamfir, R.L. Gill, D.S. Brenner et al., Phys. Rev. C 51, 98 (1995).
- [1996Al20] I. Alfter, E. Bodenstedt, W. Knichel et al., Z. Phys. A 355, 363 (1996).
- $[1996\mathrm{Ch}02]\,$ S. Chattopadhyay, H.C. Jain, J.A. Sheikh, Phys. Rev. C ${\bf 53},\,1001$ (1996).
- $[1996\mathrm{De}50]\,$ A. Dewald, D. Weil, R. Krucken $et~al.,~\mathrm{Phys.}$ Rev. C $54,~\mathrm{R2}119$ (1996).
- [1996Go36] L.C. Gomes, L.B. Horodynski-Matsushigue, T. Borello-Lewin et al., Phys. Rev. C 54, 2296 (1996).
- [1996Jo05] G.D. Johns, K.A. Christian, R.A. Kaye et al., Phys. Rev. C 53, 1541 (1996).
- $[1996\mathrm{Ma16}]\,$ P.F. Mantica, W.B. Walters, Phys. Rev. C $\mathbf{53},$ R2586 (1996).
- $[1996\text{Pe}25]\,$ H. Penttila, P. Dendooven, A. Honkanen et al., Phys. Rev. C 54, 2760 (1996).
- [1996Sc31] H. Scheit, T. Glasmacher, B.A. Brown et al., Phys. Rev. Lett. 77, 3967 (1996).
- [1996Wu07] C.Y. Wu, D. Cline, T. Czosnyka et al., Nucl. Phys. A 607, 178 (1996).
- [1997Bb08] C.J. Barton, R.L. Gill, R.F. Casten et al., Nucl. Instrum. Methods Phys. Res. A 391, 289 (1997).
- [1997Gl02] T. Glasmacher, B.A. Brown, M.J. Chromik et al., Phys. Lett. B 395, 163 (1997).
- [1997Ib01] R.W. Ibbotson, C.A. White, T. Czosnyka et al., Nucl. Phys. A 619, 213 (1997).
- $[1997 \mathrm{Ke} 07]\,$ J.H. Kelley, T. Suomijarvi, S.E. Hirzebruch $et~al.,~\mathrm{PHYS}.~\mathrm{Rev}.~\mathbf{C}$ 56, R1206 (1997).

- [1997Pa07] S.D. Paul, H.C. Jain, J.A. Sheikh, Phys. Rev. C 55, 1563 (1997).
- [1998De29] J. DeGraaf, M. Cromaz, T.E. Drake et al., Phys. Rev. C 58, 164 (1998); Erratum Phys.Rev. C 59, 1818 (1999).
- [1998Go03] I.M. Govil, A. Kumar, H. Iyer et al., Phys. Rev. C 57, 632 (1998).
- [1998Gu09] K. Gulda, and the ISOLDE Collaboration, Nucl. Phys. A 636, 28 (1998).
- [1998Hi01] J.H. Hirata, S. Salem-Vasconcelos, M.J. Bechara et al., Phys. Rev. C 57, 76 (1998).
- [1998Ib01] R.W. Ibbotson, T. Glasmacher, B.A. Brown et al., Phys. Rev. Lett. 80, 2081 (1998).
- [1998Ka19] R.A. Kaye, J.B. Adams, A. Hale et al., Phys. Rev. C 57, 2189 (1998).
- [1998Ka31] A. Kangasmaki, P. Tikkanen, J. Keinonen et al., Phys. Rev. C 58, 699 (1998).
- [1998LhZZ] G. Lhersonneau, P. Dendooven, A. Honkanen et al., JYFL ANN. REPT., 1997, 21 (1998).
- [1998Si25] K.P. Singh, D.C. Tayal, H.S. Hans, Phys. Rev. C58, 1980 (1998).
- [1998Sk01] S. Skoda, F. Becker, T. Burkardt et al., Nucl. Phys. A 633, 565 (1998).
- [1998StZX] O. Stuch, K. Jessen, A. Dewald et al., Contrib. Nuclear Structure '98, Gatlinburg, 128 (1998).
- [1998Uc01] K. Uchiyama, K. Furuno, T. Shizuma et al., Eur. Phys. J. A 2, 13 (1998).
- [1998We02] L. Weissman, M. Hass, C. Broude, Phys. Rev. C 57, 621 (1998).
- [1998YaZR] Y. Yanagisawa, T. Motobayashi, S. Shimoura et al., PROC.CONF ON EXOTIC NUCLEI AND ATOMIC MASSES, Bellaire, Michigan, June 23-27, 1998, 610 (1998); AIP CONF. PROC. 455 (1998).
- [1999Au01] T. Aumann, D. Aleksandrov, L. Axelsson et al., Phys. Rev. C 59, 1252 (1999).
- [1999Co23] P.D. Cottle, M. Fauerbach, T. Glasmacher et al., Phys. Rev. C 60, 031301 (1999).
- [1999Kl11] T. Klemme, A. Fitzler, A. Dewald et al., Phys. Rev. C 60, 034301 (1999).
- [1999Li18] A. Lindroth, B. Fogelberg, H. Mach et al., Phys. Rev. Lett. 82, 4783 (1999).
- [1999Ma63] F. Marechal, T. Suomijarvi, Y. Blumenfeld et al., Phys. Rev. C 60, 034615 (1999).
- [1999Pr09] B.V. Pritychenko, T. Glasmacher, P.D. Cottle et al., Phys. Lett. B 461, 322 (1999); Erratum Phys. Lett. B 467, 309 (1999).
- [1999To04] Y. Toh, S. Yamada, A. Taniguchi, Y. Kawase, Eur. Phys. J. A 4, 233 (1999).
- [2000Br05] J. Bryssinck, L. Govor, V.Yu. Ponomarev et al., Phys. Rev. C 61, 024309 (2000).
- [2000En08] J. Enders, P. von Brentano, J. Eberth et al., Nucl. Phys. A 674, 3 (2000).
- [2000Er06] R. Ernst, K.-H. Speidel, O. Kenn et al., Phys. Rev. C 62, 024305 (2000); Comment Phys. Rev. C 64, 069801 (2001).
- [2000Er01] R. Ernst, K.-H. Speidel, O. Kenn et al., Phys. Rev. Lett. 84, 416 (2000).
- [2000Ga08] A. Gade, I. Wiedenhover, J. Gableske et al., Nucl. Phys. A 665, 268 (2000).
- [2000Iw02] H. Iwasaki, T. Motobayashi, H. Akiyoshi et al., Phys. Lett. 481B, 7 (2000).
- [2000Kh02] B. Kharraja, U. Garg, S.S. Ghugre $et~al.,~{\rm Phys.}~{\rm Rev.}~{\bf C}$ **61**, 024301 (2000).
- [2000 Pe
20] P. Petkov, A. Dewald, R. Kuhn et al., Phys. Rev.
C ${\bf 62},\,014314$ (2000).
- $[2000\mathrm{Ri}15]\,$ L.A. Riley, P.D. Cottle, M. Fauerbach $et~al.,~\mathrm{Phys.}$ Rev. C $\mathbf{62},~034306$ (2000).
- [2000Sp08] K.-H. Speidel, R. Ernst, O. Kenn et~al., Phys. Rev. C 62, 031301 (2000).
- $[2000\mathrm{St07}]\,$ O. Stuch, K. Jessen, R.S. Chakrawarthy $et~al.,~\mathrm{Phys.}$ Rev. C $\mathbf{61},~044325$ (2000).
- $[2000\mathrm{Th}11]\,$ P.G. Thirolf, B.V. Pritychenko, B.A. Brown et al., Phys. Lett. **B 485**, 16 (2000).
- [2000To12] Y. Toh, T. Czosnyka, M. Oshima et al., Eur. Phys. J. A 9, 353 (2000).
- [2001Ch56] V. Chiste, A. Gillibert, A. Lepine-Szily et al., Phys. Lett. B 514, 233 (2001).
- [2001Co20] P.D. Cottle, B.V. Pritychenko, J.A. Church et al., Phys. Rev. C 64, 057304 (2001).
- [2001Ga52] J. Gableske, A. Dewald, H. Tiesler et al., Nucl. Phys. A 691, 551 (2001).
- [2001Ge07] J. Genevey, J.A. Pinston, C. Foin et al., Phys. Rev. C 63, 054315 (2001).
- [2001Ha09] S. Harissopulos, A. Dewald, A. Gelberg et al., Nucl. Phys. A 683, 157 (2001).
- [2001Iw07] H. Iwasaki, T. Motobayashi, H. Sakurai et al., Phys. Lett. B 522, 227 (2001).
- [2001Ke02] O. Kenn, K.-H. Speidel, R. Ernst et al., Phys. Rev. C 63, 021302 (2001).
- [2001 Ke
08] O. Kenn, K.-H. Speidel, R. Ernst $et~al.,~{\rm Phys.}$ Rev. C
 ${\bf 63},~064306~(2001).$
- [2001Li24] K.P. Lieb, D. Kast, A. Jungclaus $et~al.,~{\rm Phys.}~{\rm Rev.}~{\bf C}$ 63, 054304 (2001).
- $[2001 \mathrm{Me}20] \ \mathrm{T.J.} \ \mathrm{Mertzimekis}, \ \mathrm{N.} \ \mathrm{Benczer\text{-}Koller}, \ \mathrm{J.} \ \mathrm{Holden} \ \mathit{et} \ \mathit{al.}, \ \mathrm{Phys.} \ \mathrm{Rev.} \ \mathbf{C} \ \mathbf{64}, \ 024314 \ (2001).$
- [2001Mu19] G.A. Muller, A. Jungclaus, O. Yordanov et al., Phys. Rev. C 64, 014305 (2001).
- [2001Mu25] G. Mukherjee, H.C. Jain, R. Palit et al., Phys. Rev. C 64, 034316 (2001).
- [2001Pa03] R. Palit, H.C. Jain, P.K. Joshi et al., Phys. Rev. C 63, 024313 (2001).
- [2001RyZZ] N. Ryezayeva, Thesis, Technische Universitat Darmstadt, Germany (2001).
- [2001Wu03] C.Y. Wu, D. Cline, A.B. Hayes et al., Phys. Rev. C 64, 014307 (2001); Comment Phys. Rev. C 66, 039801 (2002).

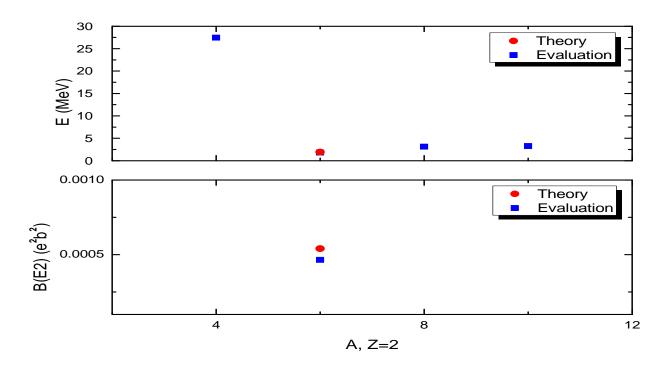
- [2002Ba28] M. Babilon, T. Hartmann, P. Mohr et al., Phys. Rev. C 65, 037303 (2002).
- [2002Co09] P.D. Cottle, Z. Hu, B.V. Pritychenko et al., Phys. Rev. Lett. 88, 172502 (2002).
- [2002De26] G. de Angelis, A. Gadea, E. Farnea et al., Phys. Lett. **B 535**, 93 (2002).
- [2002Go36] I.M. Govil, A. Kumar, H. Iyer et al., Phys. Rev. C 66, 064318 (2002).
- [2002Ha13] T. Hartmann, J. Enders, P. Mohr et al., Phys. Rev. C 65, 034301 (2002).
- [2002Ja02] G. Jakob, N. Benczer-Koller, G. Kumbartzki et al., Phys. Rev. C 65, 024316 (2002).
- [2002Jo07] P.K. Joshi, H.C. Jain, R. Palit et al., Nucl. Phys. A 700, 59 (2002).
- [2002Ka80] S. Kanno, T. Gomi, T. Motobayashi et al., Prog. Theor. Phys. (Kyoto), Suppl. 146, 575 (2002).
- [2002Ke02] O. Kenn, K.-H. Speidel, R. Ernst et al., Phys. Rev. C65, 034308 (2002).
- [2002Kl07] H. Klein, A.F. Lisetskiy, N. Pietralla et al., Phys. Rev. C 65, 044315 (2002).
- [2002Le17] S. Leenhardt, O. Sorlin, M.G. Porquet et al., Eur. Phys. J. A 14, 1 (2002).
- [2002Os07] A. Osa, T. Czosnyka, Y. Utsuno et al., Phys. Lett. B 546, 48 (2002).
- [2002Pa19] A.A. Pasternak, J. Srebrny, A.D. Efimov et al., Eur. Phys. J. A 13, 435 (2002).
- [2002Ra21] D.C. Radford, C. Baktash, J.R. Beene et al., Phys. Rev. Lett. 88, 222501 (2002).
- [2002Sh09] S.L. Shepherd, J. Simpson, A. Dewald et al., Phys. Rev. C 65, 034320 (2002).
- [2002Sm10] A.G. Smith, R.M. Wall, D. Patel et al., J.Phys.(London) G 28, 2307 (2002).
- [2002So03] O. Sorlin, S. Leenhardt, C. Donzaud et al., Phys. Rev. Lett. 88, 092501 (2002).
- [2002We15] V. Werner, D. Belic, P. von Brentano et al., Phys. Lett. B 550, 140 (2002).
- $[2002\mathrm{Zi06}]\,$ M. Zielinska, T. Czosnyka, J. Choinski $et~al.,~\mathrm{Nucl.}$ Phys. A 712,~3~(2002).
- [2003Ba01] C.J. Barton, M.A. Caprio, D. Shapira et al., Phys. Lett. **B 551**, 269 (2003).
- [2003Ca03] M.A. Caprio, N.V. Zamfir, E.A. McCutchan et al., Eur. Phys. J. A 16, 177 (2003).
- [2003De24] A. Dewald, R. Peusquens, B. Saha et al., Phys. Rev. C 68, 034314 (2003).
- [2003En07] J. Enders, P. von Brentano, J. Eberth et al., Nucl. Phys. A 724, 243 (2003).
- [2003Ga20] A. Gade, D. Bazin, C.M. Campbell et al., Phys. Rev. C 68, 014302 (2003).
- [2003Ha15] T. Hayakawa, Y. Toh, M. Oshima et al., Phys. Rev. C 67, 064310 (2003).
- [2003Ko51] M.Koizumi, A.Seki, Y.Toh et al., Eur. Phys. J. A 18, 87 (2003).
- $[2003 \mathrm{Ku}11]~$ G. Kumbartzki, N. Benczer-Koller, J. Holden $\mathit{et~al.},~$ Phys. Lett. B 562,~193~(2003).
- [2003Mo02] O. Moller, K. Jessen, A. Dewald et al., Phys. Rev. C 67, 011301 (2003).
- [2003Po02] Zs. Podolyak, P.G. Bizzeti, A.M. Bizzeti-Sona et al., Eur. Phys. J. A 17, 29 (2003).
- $[2003 \text{Ri}08]\,$ L.A. Riley, P.D. Cottle, M. Brown-Hayes et~al.,~Phys. Rev. C 68,~044309 (2003).
- $[2003\mathrm{Sc}19]\,$ S. Schielke, K.-H. Speidel, O. Kenn et $\mathit{al.},\,$ Phys.Lett. B $567,\,153$ (2003).
- $[2003Sc21]\,$ S.Schielke, D.Hohn, K.-H.Speidel $et~al.,~{\rm Phys.}$ Lett. B ${\bf 571},~29$ (2003).
- [2003Sp04] K.-H. Speidel, S. Schielke, O. Kenn $et\ al.$, Phys. Rev. C 68, 061302 (2003).
- $[2003 Ya05]\,$ Y. Yanagisawa, M. Notani, H. Sakurai et al., Phys. Lett. B 566, 84 (2003).
- [2004Im01] N. Imai, H.J. Ong, N. Aoi et al., Phys. Rev. Lett. 92, 062501 (2004); Comment Phys.Rev.Lett. 94, 199201 (2005).
- [2004Ko03] M. Koizumi, A. Seki, Y. Toh et al., Nucl. Phys. A730, 46 (2004).
- [2004Ra27] D.C. Radford, C. Baktash, J.R. Beene et al., Nucl. Phys. A 746, 83c (2004).
- [2004Sa47] B. Saha, A. Dewald, O. Moller et al., Phys. Rev. C 70, 034313 (2004); Erratum Phys. Rev. C 71, 039902 (2005); Comment Phys. Rev. C 72, 029801 (2005).
- [2004Yu07] K.L. Yurkewicz, D. Bazin, B.A. Brown et al., Phys. Rev. C 70, 034301 (2004).
- [2004Yu10] K.L. Yurkewicz, D. Bazin, B.A. Brown et al., Phys. Rev. C 70, 054319 (2004).
- [2005Bb09] A. Banu, J. Gerl, C. Fahlander et al., Phys. Rev. C 72, 061305 (2005).
- [2005Bi02] D.C. Biswas, A.G. Smith, R.M. Wall et al., Phys. Rev. C 71, 011301 (2005); Erratum Phys. Rev. C 71, 019901 (2005).
- [2005Bu29] A. Burger, T.R. Saito, H. Grawe et al., Phys. Lett. B 622, 29 (2005).
- $[2005{\rm Ch}66]\ \ {\rm J.A.\ Church,\ C.M.\ Campbell,\ D.-C.\ Dinca\ \it{et\ al.,\ Phys.\ Rev.\ C\ 72,\ 054320\ (2005).}$
- $[2005 \text{Di}05] \;\; \text{D.-C. Dinca, R.V.F. Janssens, A. Gade} \; \textit{et al., Phys. Rev. } \mathbf{C} \; \mathbf{71}, \, 041302 \; (2005).$
- [2005Fo17] D. Fong, J.K. Hwang, A.V. Ramayya et al., Eur. Phys. J. A 25, Supplement 1, 465 (2005).
- [2005Ga22] A. Gade, D. Bazin, A. Becerril et al., Phys. Rev. Lett. 95, 022502 (2005); Erratum Phys. Rev. Lett. 96, 189901 (2006).
- [2005Go43] A. Gorgen, E. Clement, A. Chatillon et al., Eur. Phys. J. A 26, 153 (2005).
- [2005Hi04] S.F. Hicks, G.K. Alexander, C.A. Aubin et al., Phys. Rev. C 71, 034307 (2005).
- [2005Iw02] H. Iwasaki, T. Motobayashi, H. Sakurai et al., Phys. Lett. B 620, 118 (2005).

- [2005Iw03] H. Iwasaki, N. Aoi, S. Takeuchi et al., Eur. Phys. J. A 25, Supplement 1, 415 (2005).
- [2005Le12] J. Leske, K.-H. Speidel, S. Schielke et al., Phys. Rev. C 71, 034303 (2005).
- [2005Le19] J. Leske, K.-H. Speidel, S. Schielke et al., Phys. Rev. C 71, 044316 (2005).
- [2005Le38] J. Leske, K.-H. Speidel, S. Schielke et al., Phys. Rev. C 72, 044301 (2005).
- [2005Ma81] H. Mach, P.M. Walker, R. Julin et al., J. Phys. (London) G 31, S1421 (2005).
- [2005Mo20] O. Moller, N. Warr, J. Jolie et al., Phys. Rev. C 71, 064324 (2005).
- [2005Mo33] O. Moller, P. Petkov, B. Melon et al., Phys. Rev. C 72, 034306 (2005).
- [2005Ni11] O. Niedermaier, H. Scheit, V. Bildstein et al., Phys. Rev. Lett. 94, 172501 (2005).
- $[2005\mathrm{NiZS}]~\mathrm{O.T.}$ Niedermaier, Thesis, Univ. Heidelberg, Germany (2005).
- [2005Pa23] E. Padilla-Rodal, A. Galindo-Uribarri, C. Baktash et al., Phys. Rev. Lett. 94, 122501 (2005).
- [2005Va31] R.L. Varner, J.R. Beene, C. Baktash et al., Eur. Phys. J. A 25, Supplement 1, 391 (2005).
- [2005Ya26] K. Yamada, T. Motobayashi, N. Aoi et al., Eur. Phys. J. A 25, Supplement 1, 409 (2005).
- [2006Be04] E. Becheva, Y. Blumenfeld, E. Khan et al., Phys. Rev. Lett. 96, 012501 (2006).
- [2006Be18] F. Becker, A. Petrovici, J. Iwanicki et al., Nucl. Phys. A 770, 107 (2006).
- [2006Ch26] A. Chester, P. Adrich, A. Becerril et al., Nucl. Instrum. Methods Phys. Res. A 562, 230 (2006).
- [2006Co20] A. Costin, T. Ahn, B. Bochev et al., Phys. Rev. C 74, 067301 (2006).
- [2006Ek01] A. Ekstrom, J. Cederkall, A. Hurst et al., Phys. Scr. T 125, 190 (2006).
- [2006El03] Z. Elekes, Zs. Dombradi, A. Saito et al., Phys. Rev. C 73, 044314 (2006).
- [2006El05] Z. Elekes, Zs. Dombradi, N. Aoi et al., Phys. Rev. C 74, 017306 (2006).
- [2006Gr16] T. Grahn, A. Dewald, O. Moller et al., Phys. Rev. Lett. 97, 062501 (2006).
- [2006Hw01] J.K. Hwang, A.V. Ramayya, J.H. Hamilton et al., Phys. Rev. C 73, 044316 (2006).
- [2006Je04] K. Jessen, O. Moller, A. Dewald et al., Phys. Rev. C 74, 021304 (2006).
- [2006KrZV] Th.Kroll, and the REX-ISOLDE and MINIBALL Collaborations, PROC. FRONTIERS IN NUCLEAR STRUCTURE, ASTROPHYSICS, AND REACTIONS, Isle of Kos, Greece, 12-17 Sept. 2005, S.V Harissopulos, P.Demetriou, R.Julin, Eds., 119 (2006); AIP CONF. PROC. 831 (2006).
- $[2006 Le 24] \;\; \text{J. Leske, K.-H. Speidel, S. Schielke} \; \textit{et al., Phys. Rev. } \mathbf{C} \; \mathbf{73}, \; 064305 \; (2006).$
- [2006Le31] J. Leske, K.-H. Speidel, S. Schielke et al., Phys. Rev. C 74, 024315 (2006).
- [2006Mo22] O. Moller, A. Dewald, P. Petkov et al., Phys. Rev. C 74, 024313 (2006).
- [2006Mu04] W.F. Mueller, M.P. Carpenter, J.A. Church et al., Phys. Rev. C 73, 014316 (2006).
- [2006Pe13] O. Perru, O. Sorlin, S. Franchoo et al., Phys. Rev. Lett. 96, 232501 (2006).
- [2006Sp01] K.-H. Speidel, S. Schielke, J. Leske et al., Phys. Lett. B 632, 207 (2006).
- [2006Sp02] K.-H. Speidel, J. Leske, S. Schielke et al., Phys. Lett. B 633, 219 (2006).
- [2006Sr01] J. Srebrny, T. Czosnyka, Ch. Droste et al., Nucl. Phys. A 766, 25 (2006).
- [2006YaZV] K. Yamada, N. Iwasa, S. Bishop et al., RIKEN ACCELERATOR PROGRESS REPORT 2005, 55 (2006).
- [2007Bo17] N. Boelaert, A. Dewald, C. Fransen et al., Phys. Rev. C 75, 054311 (2007); Erratum Phys. Rev. C 77, 019901 (2008).
- [2007Ca35] C.M. Campbell, N. Aoi, D. Bazin et al., Phys. Lett. B 652, 169 (2007); Addendum Phys.Lett. B 656, 272 (2007).
- [2007Ce02] J. Cederkall, A. Ekstrom, C. Fahlander et al., Phys. Rev. Lett. 98, 172501 (2007).
- [2007Cl02] E. Clement, A. Gorgen, W. Korten et~al., Phys. Rev. C 75, 054313 (2007).
- $[2007\text{Gi06}]\,$ J. Gibelin, D. Beaumel, T. Motobayashi et al., Phys. Rev. C 75, 057306 (2007).
- [2007Hu03] A.M. Hurst, P.A. Butler, D.G. Jenkins et al., Phys. Rev. Lett. 98, 072501 (2007).
- [2007Ko23] J.J. Kolata, H. Amro, F.D. Becchetti et al., Phys. Rev. C 75, 031302 (2007).
- [2007Kr12] Th.Kroll, on behalf of the MINIBALL and REX-ISOLDE Collaborations, Phys. Atomic Nuclei 70, 1369 (2007).
- [2007Kr19] Th. Kroll, T. Behrens, R. Krucken et al., Eur. Phys. J. Special Topics 150, 127 (2007).
- $[2007\mathrm{Or04}] \ \mathrm{J.N.\ Orce,\ S.N.\ Choudry,\ B.\ Crider\ \mathit{et\ al.,\ Phys.\ Rev.\ C\ 76},\ 021302\ (2007);\ \mathrm{Erratum\ Phys.\ Rev.\ C\ 77},\ 029902\ (2008).$
- [2007St16] K. Starosta, A. Dewald, A. Dunomes et al., Phys. Rev. Lett. 99, 042503 (2007).
- $[2007\mathrm{Su}20]\,$ T. Sugimoto, T. Nakamura, Y. Kondo $et~al.,~\mathrm{Phys.}$ Lett. $\mathbf B$ $\mathbf 654,~160$ (2007).
- [2007Va20] J. Van de Walle, F. Aksouh, F. Ames et al., Phys. Rev. Lett. 99, 142501 (2007).
- $[2007 \text{Va} 22] \ \text{C. Vaman, C. Andreoiu, D. Bazin } \textit{et al., Phys. Rev. Lett. } \textbf{99}, \, 162501 \,\, (2007).$
- [2008Br18] N. Bree, I. Stefanescu, P.A. Butler et~al., Phys. Rev. C 78, 047301 (2008).
- $[2008\mathrm{De}30]\,$ A. Dewald, K. Starosta, P. Petkov $et~al.,~\mathrm{Phys.}$ Rev. C $\mathbf{78},~051302$ (2008).
- [2008Do19] P. Doornenbal, P. Reiter, H. Grawe et al., Phys. Rev. C 78, 031303 (2008).

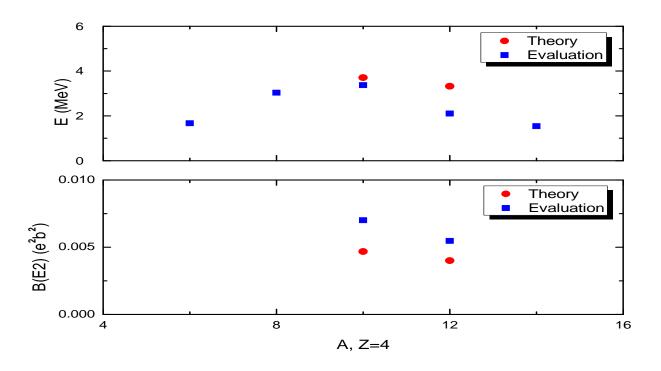
- [2008Ek01] A. Ekstrom, J. Cederkall, C. Fahlander et al., Phys. Rev. Lett. 101, 012502 (2008).
- [2008EkZZ] A. Ekstrom, J. Cederkall, C. Fahlander *et al.*, Proc. Frontiers in Nuclear Structure, and Reactions (FINUSTAR 2), Crete, Greece, 10-14 Sept. 2007, P.Demetriou, R.Julin, S.V.Harissopulos, Eds. 296 (2008); AIP Conf. Proc 1012 (2008).
- $[2008Go25] \ \text{L.I. Govor, A.M. Demidov, V.A. Kurkin, I.V. Mikhailov, Phys. Atomic Nuclei {\it \bf 71}, 1339 (2008); Yad. Fiz. {\it \bf 71}, 1367 (2008).$
- [2008Gr04] T. Grahn, A. Dewald, O. Moller et al., Nucl. Phys. A 801, 83 (2008).
- [2008Iw04] N. Iwasa, T. Motobayashi, S. Bishop *et al.*, Phys. Rev. C 78, 024306 (2008); Publishers's Note Phys. Rev. C 78, 029902 (2008).
- [2008KrZZ] Th.Kroll, for the REX-ISOLDE and MINIBALL collaborations, Proc. Frontiers in Nuclear Structure, and Reactions (FINUSTAR 2), Crete, Greece, 10-14 Sept. 2007, P.Demetriou, R.Julin, S.V.Harissopulos, Eds. 84 (2008); AIP Conf. Proc. 1012 (2008).
- [2008Lj01] J. Ljungvall, A. Gorgen, M. Girod et al., Phys. Rev. Lett. 100, 102502 (2008).
- [2008On02] H.J. Ong, N. Imai, D. Suzuki et al., Phys. Rev. C 78, 014308 (2008).
- [2008Or02] J.N. Orce, B. Crider, S. Mukhopadhyay et al., Phys. Rev. C 77, 064301 (2008).
- $[2008Sa05] \ \ M. \ Sanchez-Vega, \ H. \ Mach, \ R.B.E. \ Taylor \ et \ al., \ Eur. \ Phys. \ J. \ {\bf A \ 35}, \ 159 \ (2008).$
- [2008Sa35] T.R. Saito, N. Saito, K. Starosta et al., Phys. Lett. B 669, 19 (2008).
- [2008Sh23] T. Shizuma, T. Hayakawa, H. Ohgaki et al., Phys. Rev. C 78, 061303 (2008).
- [2008Sp01] K.-H.Speidel, S.Schielke, J.Leske et al., Phys. Lett. B 659, 101 (2008).
- [2008Sp04] K.-H. Speidel, S. Schielke, J. Leske et al., Phys. Rev. C 78, 017304 (2008).
- [2008Wi04] M. Wiedeking, P. Fallon, A.O. Macchiavelli et al., Phys. Rev. Lett. 100, 152501 (2008).
- [2009Ao01] N. Aoi, E. Takeshita, H. Suzuki et al., Phys. Rev. Lett. 102, 012502 (2009).
- [2009Ek01] A. Ekstrom, J. Cederkall, D.D. DiJulio et al., Phys. Rev. C 80, 054302 (2009).
- [2009El03] Z. Elekes, Zs. Dombradi, T. Aiba et al., Phys. Rev. C 79, 011302 (2009).
- [2009FrZZ] C. Fransen, A. Blazhev, A. Dewald *et al.*, Proc. 13th Intern. Symposium on Capture Gamma-Ray Spectroscopy and Related Topics, Cologne, Germany, 25-29 Aug.2008, J.Jolie, A.Zilges, N.Warr, A.Blazhev, Eds., 529 (2009); AIP Conf. Proc. **1090** (2009).
- [2009Gr08] T. Grahn, A. Dewald, P.T. Greenlees et al., Phys. Rev. C 80, 014323 (2009).
- [2009Gr09] T. Grahn, A. Petts, M. Scheck et al., Phys. Rev. C 80, 014324 (2009).
- [2009Im01] N. Imai, N. Aoi, H.J. Ong et al., Phys. Lett. B 673, 179 (2009).
- [2009Mc02] E.A. McCutchan, C.J. Lister, R.B. Wiringa et al., Phys. Rev. Lett. 103, 192501 (2009).
- [2009Me23] D. Mengoni, J.J. Valiente-Dobon, E. Farnea et al., Eur. Phys. J. A 42, 387 (2009).
- [2009MuZU] D. Mucher, Thesis Koln Universitat (2009).
- [2009MuZW] D. Mucher, J. Iwanicki, J. Jolie et al., Proc. 13th Intern.Symposium on Capture Gamma-Ray Spectroscopy and Related Topics, Cologne, Germany, 25-29 Aug.2008, J.Jolie, A.Zilges, N.Warr, A.Blazhev, Eds., 587 (2009); AIP Conf.Proc. 1090 (2009).
- [2009Ob02] A. Obertelli, T. Baugher, D. Bazin et al., Phys. Rev. C 80, 031304 (2009).
- [2009Ra28] D. Radeck, A. Blazhev, M. Albers et al., Phys. Rev. C 80, 044331 (2009).
- [2009Re20] J.-M. Regis, Th. Materna, S. Christen et al., Nucl. Instrum. Methods Phys. Res. A 606, 466 (2009).
- [2009Va01] J. Van de Walle, F. Aksouh, T. Behrens et al., Phys. Rev. C 79, 014309 (2009).
- [2009Va06] J.J. Valiente-Dobon, D. Mengoni, A. Gadea et al., Phys. Rev. Lett. 102, 242502 (2009).
- [2009Zi01] M. Zielinska, A. Gorgen, E. Clement et al., Phys. Rev. C 80, 014317 (2009).
- [2010Ao01] N. Aoi, S. Kanno, S. Takeuchi et al., Phys. Lett. B 692 302 (2010).
- [2010Be30] L. Bettermann, J.-M. Regis, T. Materna $et\ al.$, Phys. Rev. C 82, 044310 (2010).
- [2010Bi11] P.G. Bizzeti, A.M. Bizzeti-Sona, D. Tonev et al., Phys. Rev. C 82, 054311 (2010).
- [2010Ga14] A. Gade, T. Baugher, D. Bazin et al., Phys. Rev. C 81, 064326 (2010).
- [2010Ku07] R. Kumar, P. Doornenbal, A. Jhingan et al., Phys. Rev. C 81, 024306 (2010).
- [2010Lj01] J. Ljungvall, A. Gorgen, A. Obertelli et al., Phys. Rev. C 81, 061301 (2010).
- [2010Me07] D. Mengoni, J.J. Valiente-Dobon, A. Gadea et al., Phys. Rev. C 82, 024308 (2010).
- [2010NaZY] D. Nagae, T. Ishii, R. Takahashi et al., Proc. Intern. Symposium Exotic Nuclei, Sochi, (Russia), 28 Sept.-2 Oct. 2009, Yu.E.Penionzhkevich, S.M.Lukyanov, Eds., 156 (2010); AIP Conf. Proc. 1224 (2010).
- [2010Ru12] M. Rudigier, J.-M. Regis, J. Jolie et al., Nucl. Phys. A 847, 89 (2010).
- [2010Sc03] M. Scheck, T. Grahn, A. Petts $et~al.,~{\rm Phys.}~{\rm Rev.}~{\bf C}~{\bf 81},~014310~(2010).$
- [2010We12] V. Werner, J.R. Terry, M. Bunce, Z. Berant, J. Phys.: Conf. Ser. **205**, 012025 (2010).
- [2011Al25] J.M. Allmond, D.C. Radford, C. Baktash $et~al.,~{\rm Phys.}~{\rm Rev.}~{\bf C}~{\bf 84},~061303~(2011).$

- [2011An04] V. Anagnostatou, P.H. Regan, M.R. Bunce et al., Acta Phys. Pol. B 42, 807 (2011).
- [2011Ba37] T. Back, C. Qi, F. Ghazi Moradi et al., Phys. Rev. C 84, 041306 (2011).
- [2011Ch05] A. Chakraborty, J.N. Orce, S.F. Ashley et al., Phys. Rev. C 83, 034316 (2011).
- [2011Cl03] E. Clement, G. De France, J.M. Casandjian et al., INT. J. Mod. Phys. E 20, 415 (2011).
- [2011Da21] M. Danchev, G. Rainovski, N. Pietralla et al., Phys. Rev. C 84, 061306 (2011).
- [2011Di07] D.D. DiJulio, J. Cederkall, C. Fahlander et al., Eur. Phys. J. A 47, 25 (2011).
- [2011Ju01] A. Jungclaus, J. Walker, J. Leske et al., Phys. Lett. B 695, 110 (2011).
- [2011Ku05] R.Kumar, P.Doornenbal, A.Jhingan et al., ACTA PHYS. POL. B 42, 813 (2011).
- [2011Mc01] E.A. McCutchan, C.J. Lister, T. Ahn et al., Phys. Rev. C 83, 024310 (2011).
- [2011Ni03] M. Niikura, B. Mouginot, F. Azaiez et al., ACTA PHYS. POL. B 42, 537 (2011).
- [2011Pe21] M. Petri, P. Fallon, A.O. Macchiavelli et al., Phys. Rev. Lett. 107, 102501 (2011).
- [2011Pr10] M.G. Procter, D.M. Cullen, P. Ruotsalainen et al., Phys. Rev. C 84, 024314 (2011).
- [2011ReZZ] J.-M.Regis, Thesis Univ. Cologne (2011).
- [2011Ro02] W. Rother, A. Dewald, H. Iwasaki et al., Phys. Rev. Lett. 106, 022502 (2011).
- [2011Ro53] W. Rother, A. Dewald, G. Pascovici et al., Nucl. Instrum. Methods Phys. Res. A 654, 196 (2011).
- [2011We08] V. Werner, N. Cooper, M. Bonett-Matiz et al., J. Phys.: Conf. Ser. 312, 092062 (2011).
- [2012Al03] M. Albers, N. Warr, K. Nomura et al., Phys. Rev. Lett. 108, 062701 (2012); Erratum Phys. Rev. Lett. 109, 209904 (2012).
- [2012An17] V. Anagnostatou, P.H. Regan, V. Werner et al., APPL. RADIAT. ISOT. 70, 1321 (2012).
- [2012Ba31] T. Baugher, A. Gade, R.V.F. Janssens et al., Phys. Rev. C 86, 011305 (2012), Erratum Phys.Rev. C 86, 049902 (2012).
- [2012Ba40] C. Bauer, T. Behrens, V. Bildstein et al., Phys. Rev. C 86, 034310 (2012).
- [2012Gl01] K.A. Gladnishki, P. Petkov, A. Dewald et al., Nucl. Phys. A 877, 19 (2012).
- [2012Ku14] G.J. Kumbartzki, K.-H. Speidel, N. Benczer-Koller et al., Phys. Rev. C 85, 044322 (2012).
- [2012Ku24] G.J. Kumbartzki, N. Benczer-Koller, D.A. Torres et al., Phys. Rev. C 86, 034319 (2012).
- [2012Le05] A. Lemasson, H. Iwasaki, C. Morse et al., Phys. Rev. C 85, 041303 (2012).
- [2012Li45] K.-A.Li, Y.-L.Ye, H.Scheit et al., Chin. Phys. Lett. 29, 102301 (2012).
- [2012Li50] C.B. Li, X.G. Wu, X.F. Li et al., Phys. Rev. C 86, 057303 (2012).
- $[2012\mathrm{Lu}03]~$ R. Luttke, E.A. McCutchan, V. Werner $\mathit{et~al.},~\mathrm{Phys.}$ Rev. C 85,~017301 (2012).
- $[2012 \mathrm{MaZP}] \ \mathrm{P.J.R.} \ \mathrm{Mason}, \ \mathrm{Zs.} \ \mathrm{Podolyak}, \ \mathrm{N.} \ \mathrm{Marginean} \ \mathit{et al.}, \ \mathrm{AIP} \ \mathrm{Conf.} \ \mathrm{Proc.} \ \mathbf{1491}, \ 93 \ (2012).$
- $[2012 \text{Mc}03] \;\; \text{E.A. McCutchan, C.J. Lister, Steven C. Pieper, } \textit{et al., Phys. Rev. } \textbf{C} \;\; \textbf{86}, \, 014312 \;\; (2012).$
- [2012Mo11] D. Montanari, S. Leoni, D. Mengoni et al., Phys. Rev. ${\bf C}$ 85, 044301 (2012).
- $[2012\mathrm{Ni09}]\,$ M. Niikura, B. Mouginot, S. Franchoo $et~al.,~\mathrm{Phys.}$ Rev. C $\mathbf{85},\,054321$ (2012).
- [2012Pe16] M. Petri, S. Paschalis, R.M. Clark et al., Phys. Rev. C 86, 044329 (2012).
- [2012Ra03] D. Radeck, V. Werner, G. Ilie et al., Phys. Rev. C 85, 014301 (2012).
- [2012St03] I. Strojek, W. Czarnacki, W. Gawlikowicz et al., Acta Phys. Pol. B 43, 339 (2012).
- [2012To01] D.A. Torres, G.J. Kumbartzki, Y.Y. Sharon et al., Phys. Rev. C 85, 017305 (2012).
- [2012To06] Y. Togano, Y. Yamada, N. Iwasa et al., Phys. Rev. Lett. 108, 222501 (2012).
- [2012Ts03] K. Tshoo, Y. Satou, H. Bhang et al., Phys. Rev. Lett. 109, 022501 (2012).
- [2012Vo05] P. Voss, T. Baugher, D. Bazin et al., Phys. Rev. C 86, 011303 (2012).
- [2012Wa16] J.C. Walpe, U. Garg, S. Naguleswaran et al., Phys. Rev. C 85, 057302 (2012).
- $[2012 \text{Wio5}] \ \text{R. Winkler, A. Gade, T. Baugher} \ \textit{et al., Phys. Rev. Lett.} \ \textbf{108}, \ 182501 \ (2012).$
- $[2013Al05] \;\; \text{M.Albers, K.Nomura, N.Warr} \; et \; al., \; \text{Nucl. Phys.} \; \textbf{A} \; \textbf{899}, \; 1 \; (2013).$
- [2013Ba38] C. Bauer, G. Rainovski, N. Pietralla et al., Phys. Rev. C 88, 021302 (2013).
- [2013Ba57] V.M. Bader, A. Gade, D. Weisshaar et~al., Phys. Rev. C 88, 051301(R) (2013).
- $[2013\text{Ce}01]\,$ I. Celikovic, A. Dijon, E. Clement et~al.,~Acta Phys. Pol. B 44, 375 (2013).
- [2013Co23] A. Corsi, J.-P. Delaroche, A. Obertelli et al., Phys. Rev. C 85, 044311 (2013).
- [2013Cr02] H.L. Crawford, R.M. Clark, P. Fallon et al., Phys. Rev. Lett. 110, 242701 (2013).
- [2013DoZY] P. Doornenbal, S. Takeuchi, N. Aoi et al., ARXIV 1305.2877 (2013).
- [2013Ga23] L.P. Gaffney, P.A. Butler, M. Scheck et al., NATURE 497, 199 (2013).
- [2013Gu13] G. Guastalla, D.D. DiJulio, M. Gorska et al., Phys. Rev. Lett. 110, 172501 (2013).
- [2013Lo04] C. Louchart, A. Obertelli, A. Gorgen et al., Phys. Rev. C 87, 054302 (2013).

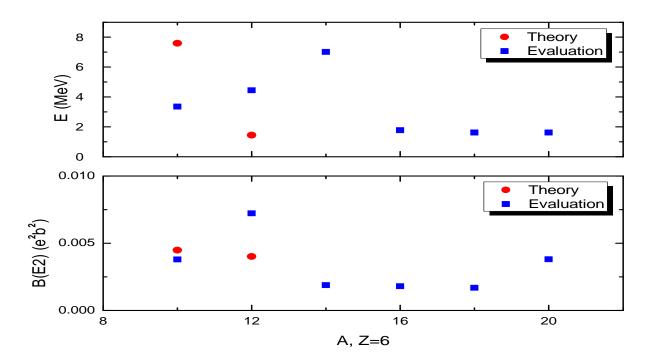
- [2013Ma66] P.J.R. Mason, Zs. Podolyak, N. Marginean et al., Phys. Rev. C 88, 044391 (2013).
- [2013Pe16] E.E. Peters, A. Chakraborty, B.P. Crider et al., Phys. Rev. C 88, 024317 (2013).
- [2013Sc01] A. Scheikh-Obeid, O. Burda, M. Chernykh et al., Phys. Rev. C 87, 014337 (2013).
- [2013Sc20] M. Scheck, V.Yu. Ponomarev, M. Fritzsche et al., Phys. Rev. C 88, 044304 (2013).
- [2013St24] A.E. Stuchbery, J.M. Allmond, A. Galindo-Uribarri et al., Phys. Rev. C 88, 051304(R) (2013).
- [2013Su20] H.Suzuki, N.Aoi, E.Takeshita et al., Phys. Rev. C 88, 024326 (2013).
- [2014Al20] J.M. Allmond, B.A. Brown, A.E. Stuchbery et al., Phys.Rev. C 90, 034309 (2014).
- [2014Br05] N. Bree, K. Wrzosek-Lipska, A. Petts et al., Phys.Rev.Lett. 112, 162701 (2014).
- $[2014\mathrm{Ca}10]$ S.Calinescu, L.Caceres, S.Grevy et al., ACTA Phys.Pol. **B 45**, 199 (2014).
- [2014Do19] P. Doornenbal, S. Takeuchi, N. Aoi et al., Phys. Rev. C 90, 061302(R) (2014).
- [2014Ga04] L.P. Gaffney, M. Hackstein, R.D. Page et al., Phys.Rev. C 89, 024307 (2014).
- [2014Il01] S. Ilieva, M. Thurauf, Th. Kroll et al., Phys.Rev. C 89, 014313 (2014).
- [2014Iw01] H. Iwasaki, A. Lemasson, C. Morse et al., Phys.Rev.Lett. 112, 142502 (2014).
- [2014Li45] C.B. Li, F.Q. Chen, X.G. Wu $et~al.,~{\rm Phys.Rev.}~{\bf C}~{\bf 90},~047302~(2014).$
- [2014Ma85] T. Marchi, G. de Angelis, J.J. Valiente-Dobon et al., Phys.Rev.Lett. 113, 182501 (2014).
- $[2014\mathrm{Mi}09]\,$ S. Michimasa, Y. Yanagisawa, K. Inafuku et al., Phys. Rev. C 89, 054307 (2014).
- [2014Na15] F. Naqvi, V. Werner, P. Petkov et al., Phys. Lett. B 728, 303 (2014).
- [2014Ni09] A.J. Nichols, R. Wadsworth, H. Iwasaki et al., Phys.Lett. B 733, 52 (2014).
- [2014Pl01] C. Plaisir, L. Gaudefroy, V. Meot et al., Phys.Rev. C 89, 021302 (2014).
- [2014Re15] J.-M. Regis, J. Jolie, N. Saed-Samii et al., Phys. Rev. C 90, 067301 (2014).
- [2014Ri04] L.A. Riley, M.L. Agiorgousis, T.R. Baugher et al., Phys. Rev. C 90, 011305 (2014).
- [2014Sa49] M. Saxena, R. Kumar, A. Jhingan et al., Phys.Rev. C 90, 024316 (2014).
- [2015Be25] F.L. Bello Garrote, A. Gorgen, J. Mierzejewski et al., Phys.Rev. C 92, 024317 (2015).
- [2015Br03] F. Browne, A.M. Bruce, T. Sumikama et al., ACTA PHYS.POL. B 46, 721 (2015).
- [2015Br10] T. Braunroth, A. Dewald, H. Iwasaki et al., Phys.Rev. C 92, 034306 (2015).
- [2015BrP] A.M. Bruce, T. Sumikama, I. Nishizuka et al., Phys. Lett. B (2015), in Press.
- [2015Do04] M. Doncel, T. Back, D.M. Cullen et al. Phys. Rev. C 91, 061304 (2015).
- [2015Ga19] L.P. Gaffney, A.P. Robinson, D.G. Jenkins et al., Phys. Rev. C 91, 064313 (2015).
- $[2015 Jo01]\,$ J. Jolie, J.-M. Regis, D. Wilmsen $et~al.,~{\rm Nucl.~Phys.}$ A ${\bf 934},~1~(2015).$
- [2015KeZZ] N. Kesteloot, Thesis, Katholieke Universiteit Leuven Belgium (2015); N. Kesteloot, B. Bastin, K. Auranen et al., Phys.Rev. C (2015), in Press.
- [2015Li28] K. Li, Y. Ye, T. Motobayashi et al., Phys. Rev. C 92, 014608 (2015)
- [2015Pa14] S. Pascu, D. Bucurescu, Gh. Cata-Danil et al., Phys. Rev. C 91, 034321 (2015).
- $[2015\mathrm{Ru}03]\,$ M. Rudigier, K. Nomura, M. Dannhoff $et~al.,~\mathrm{Phys.}$ Rev. C $\mathbf{91},~044301$ (2015).
- $[2015\mathrm{St}08]\,$ R. Stegmann, C. Bauer, G. Rainovski et al., Phys. Rev. C $\mathbf{91},\,054326$ (2015).



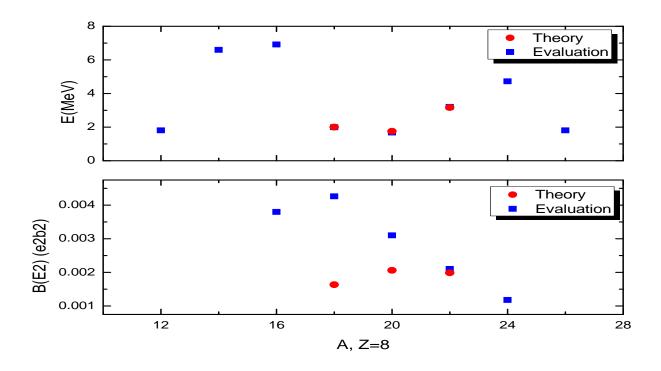
Graph 1. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for He nuclei.



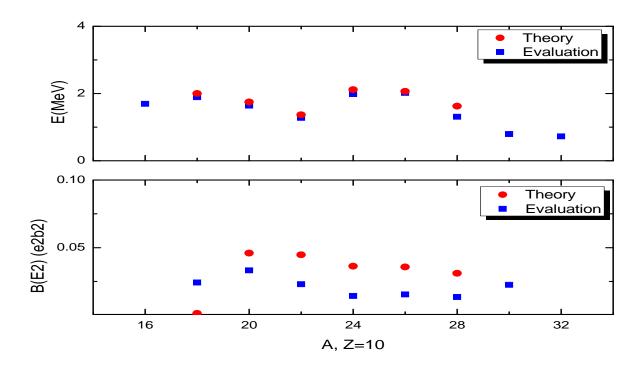
Graph 2. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Be nuclei.



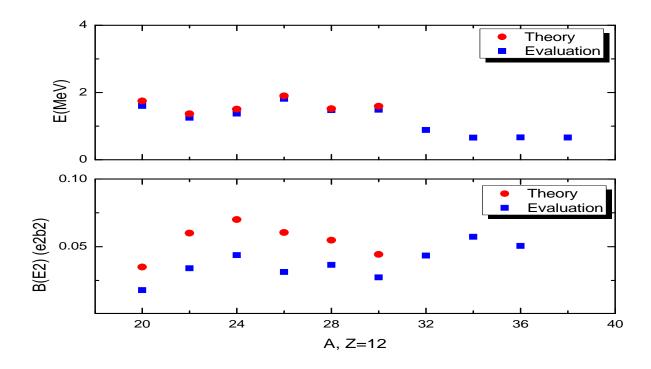
Graph 3. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for C nuclei.



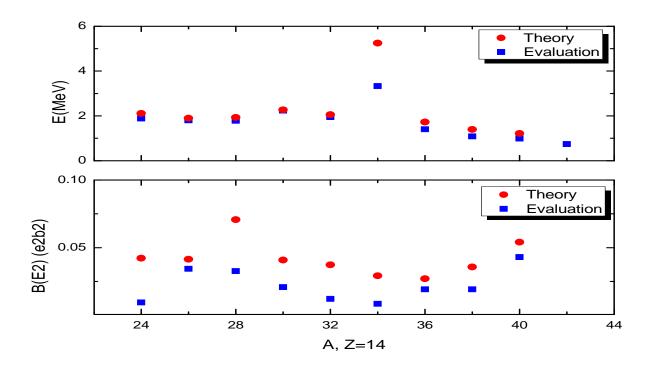
Graph 4. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for O nuclei.



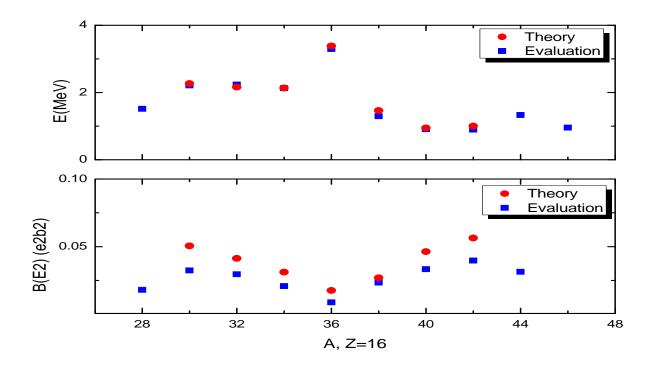
Graph 5. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ne nuclei.



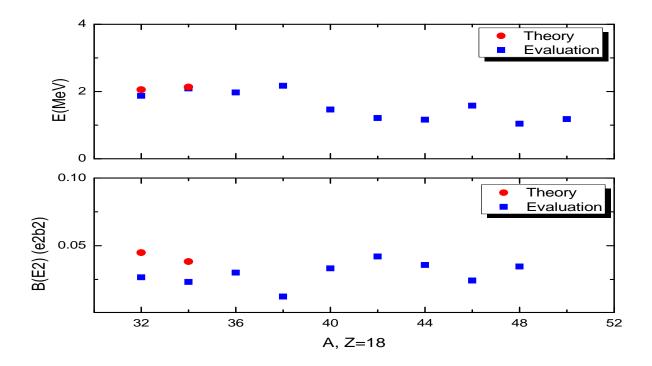
Graph 6. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Mg nuclei.



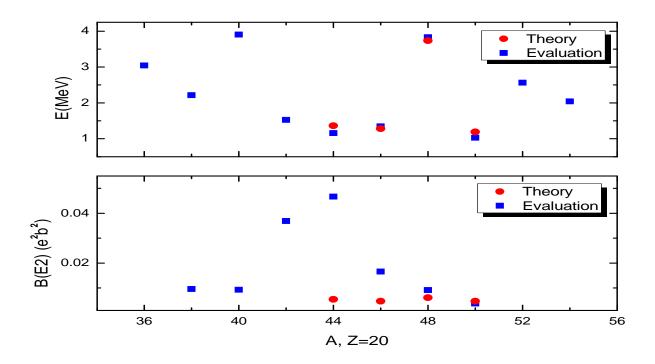
Graph 7. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Si nuclei.



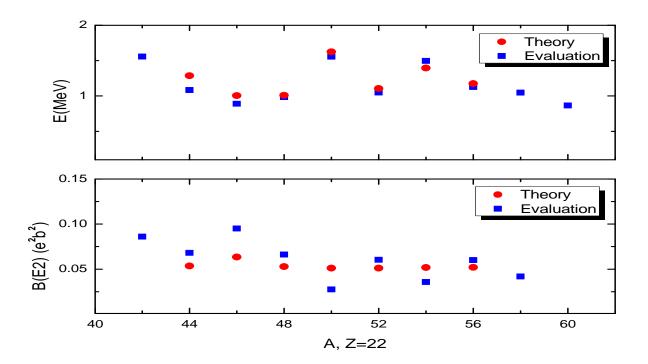
Graph 8. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for S nuclei.



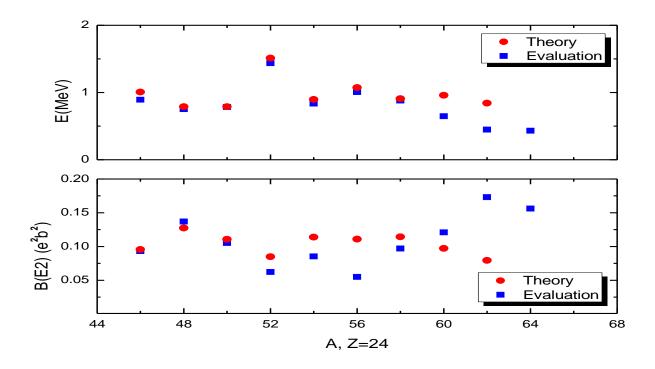
Graph 9. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Ar nuclei.



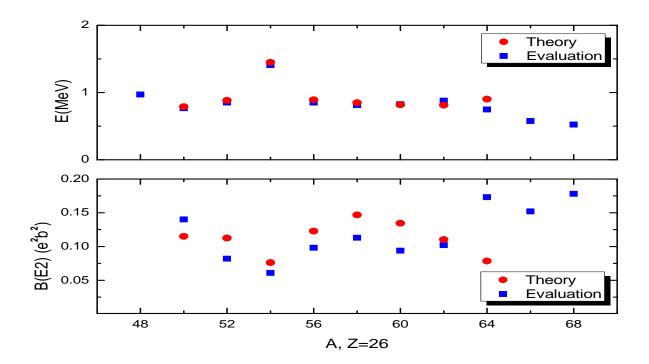
Graph 10. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ca nuclei.



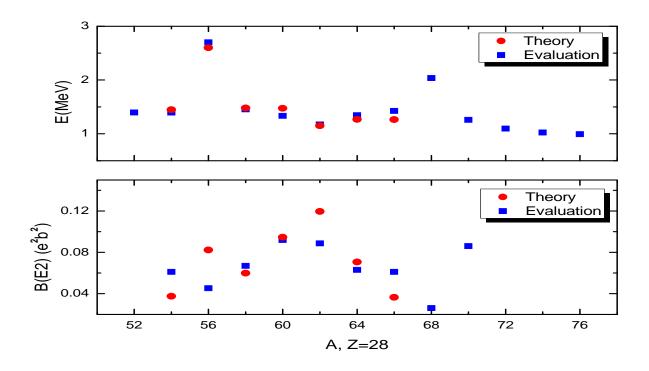
Graph 11. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ti nuclei.



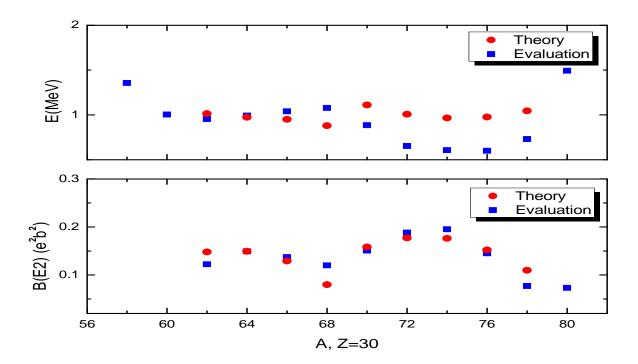
Graph 12. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Cr nuclei.



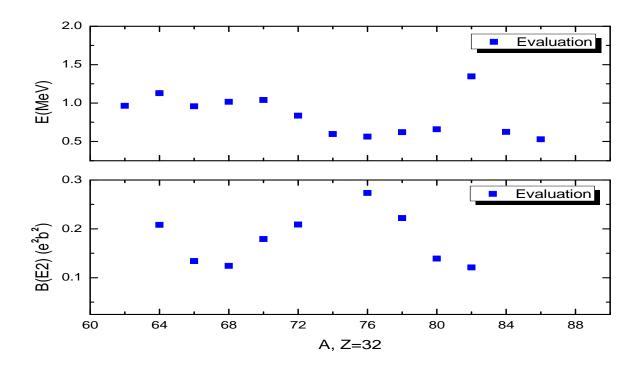
Graph 13. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Fe nuclei.



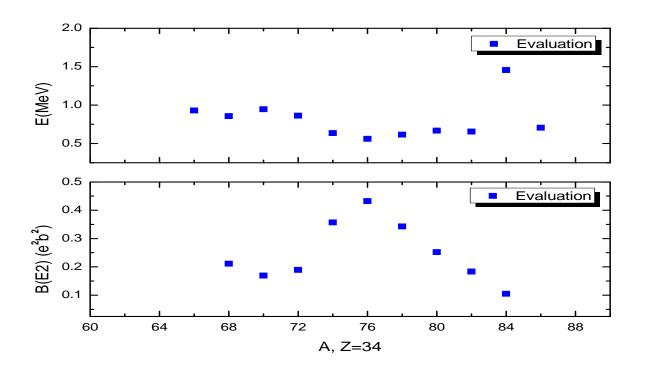
Graph 14. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Ni nuclei.



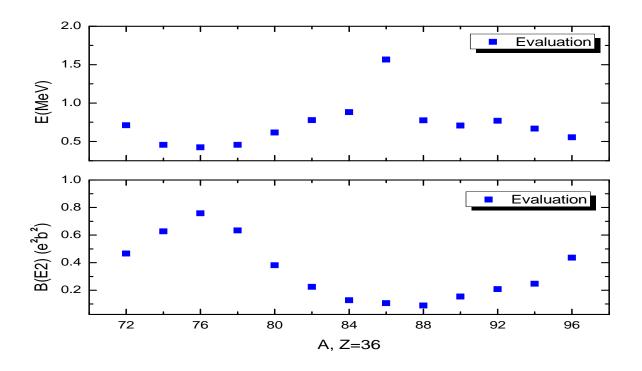
Graph 15. Evaluated and shell model calculated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Zn nuclei.



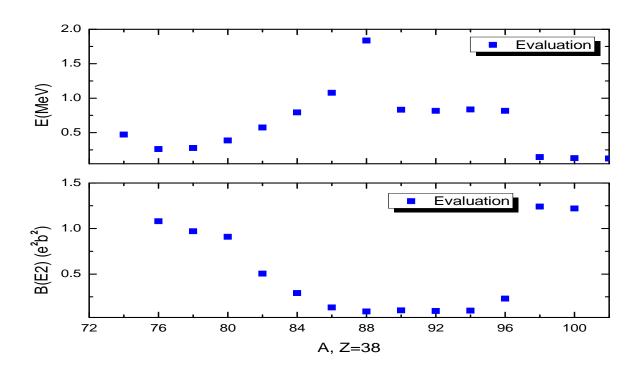
Graph 16. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ge nuclei.



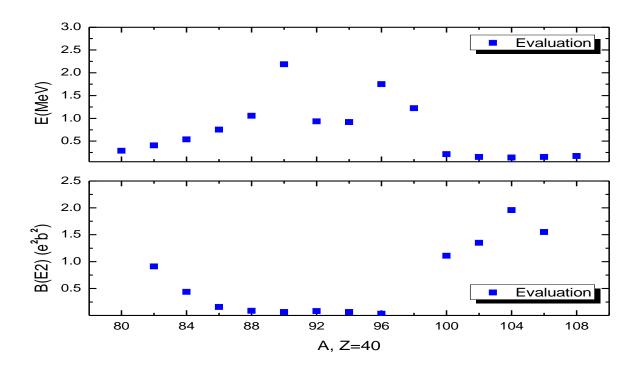
Graph 17. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Se nuclei.



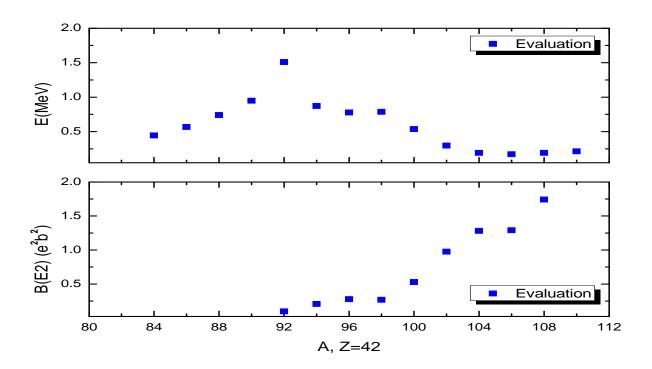
Graph 18. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Kr nuclei.



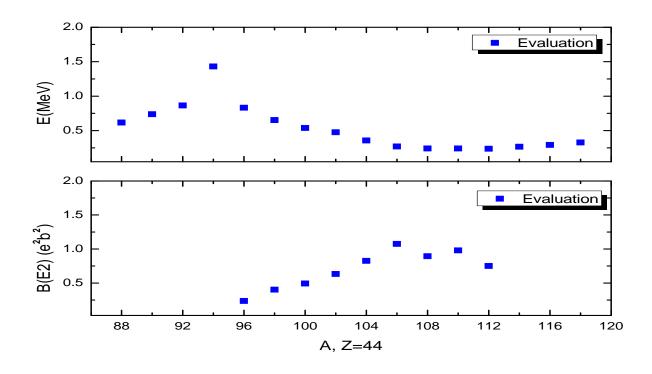
Graph 19. Evaluated energies, $E(2_1^+)$, and $B(E;\, 0_1^+ \to 2_1^+)$ values for Sr nuclei.



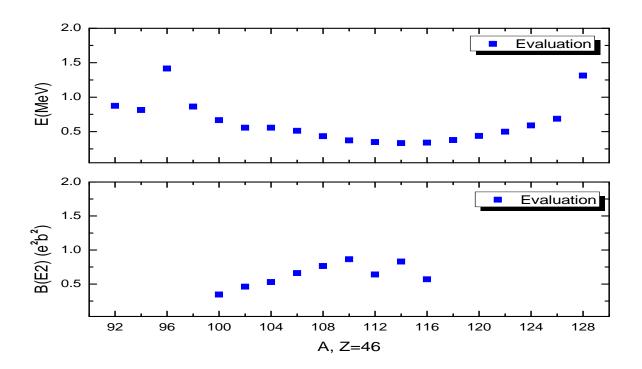
Graph 20. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Zr nuclei.



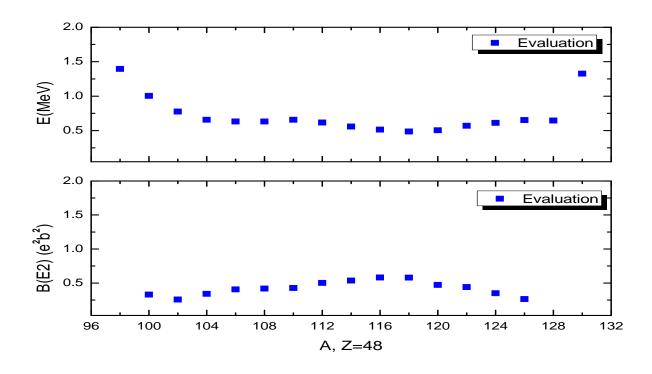
Graph 21. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Mo nuclei.



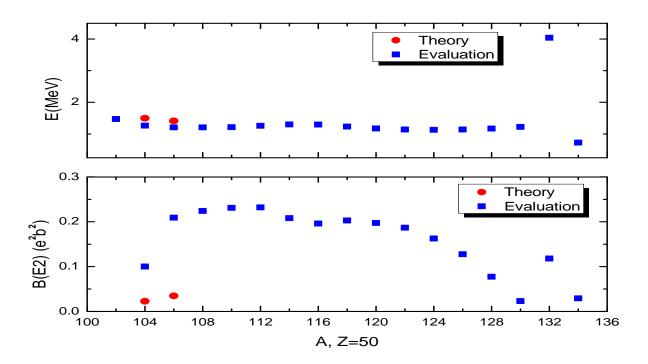
Graph 22. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ru nuclei.



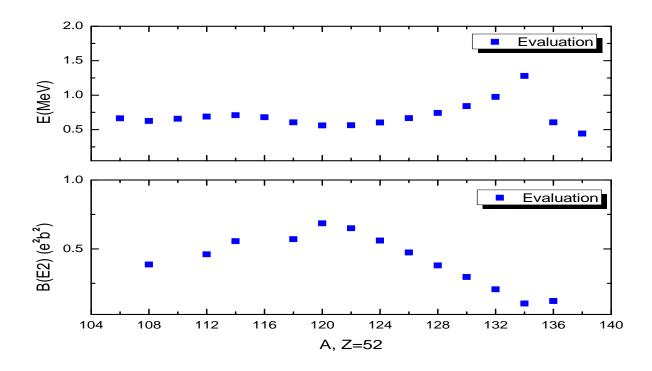
Graph 23. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Pd nuclei.



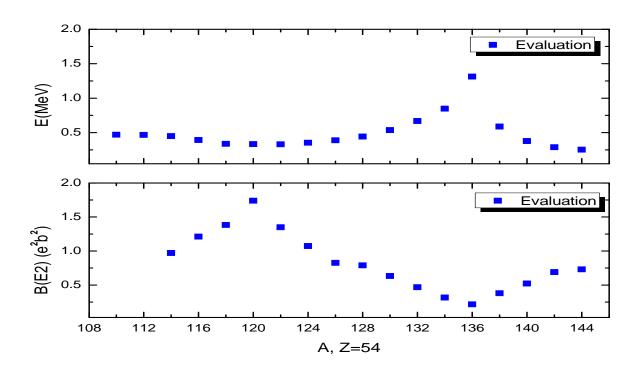
Graph 24. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Cd nuclei.



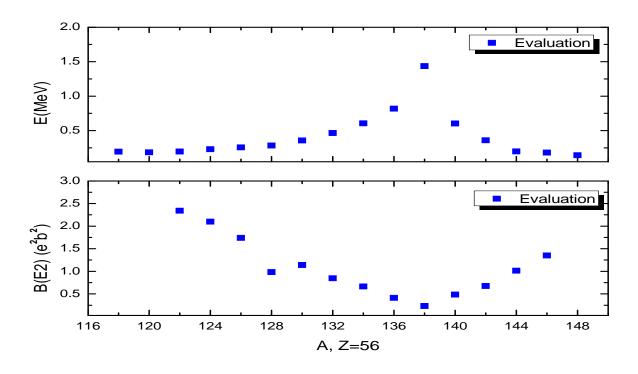
Graph 25. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Sn nuclei.



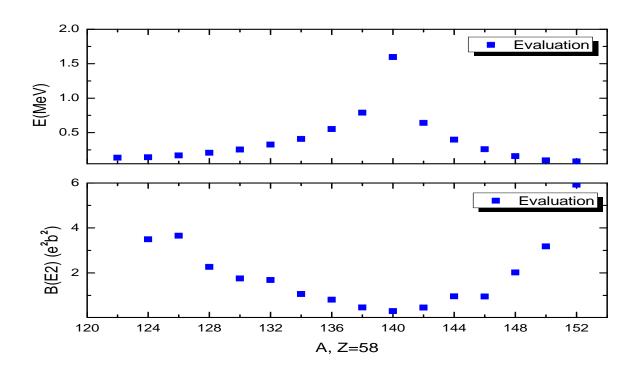
Graph 26. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Te nuclei.



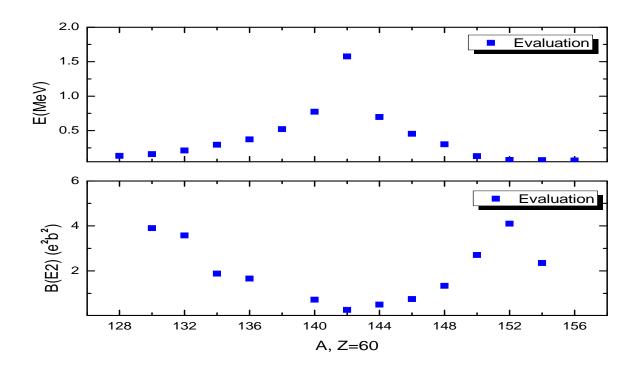
Graph 27. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Xe nuclei.



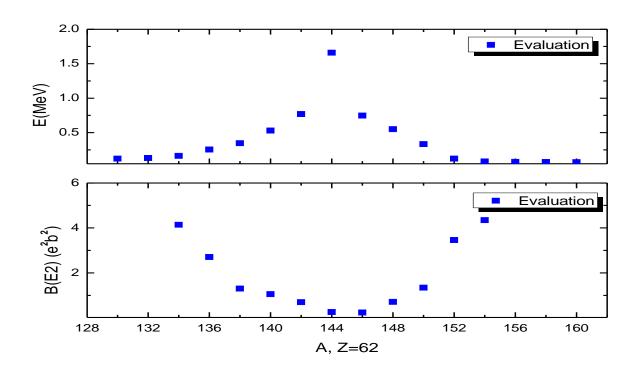
Graph 28. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Ba nuclei.



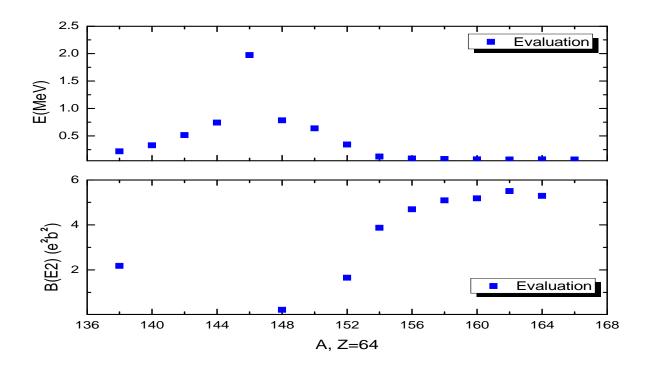
Graph 29. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Ce nuclei.



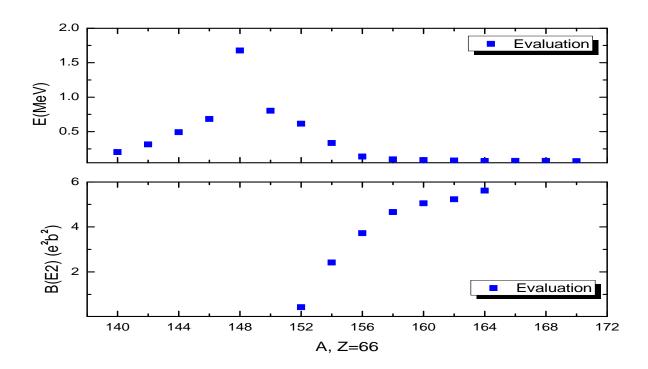
Graph 30. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Nd nuclei.



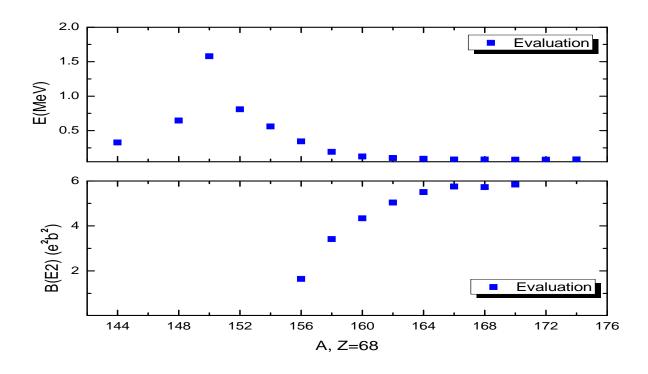
Graph 31. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Sm nuclei.



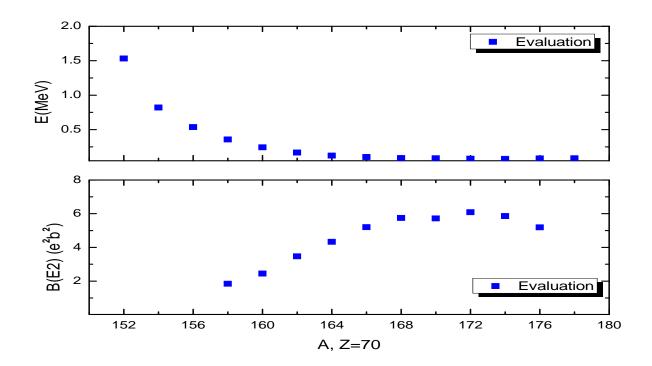
Graph 32. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Gd nuclei.



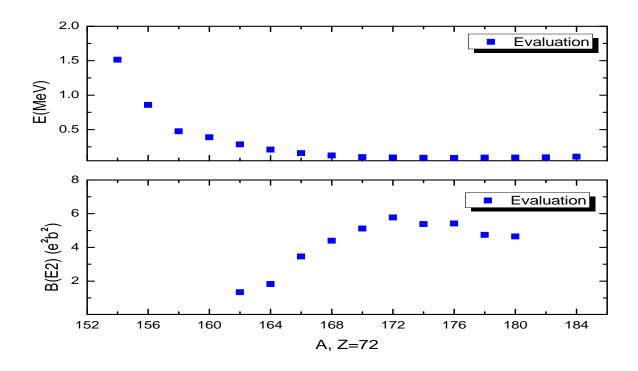
Graph 33. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Dy nuclei.



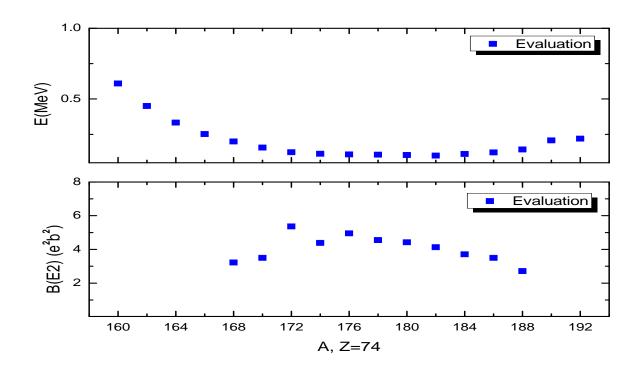
Graph 34. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Er nuclei.



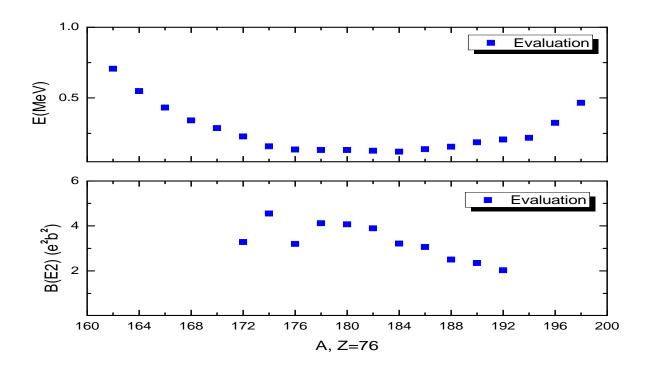
Graph 35. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Yb nuclei.



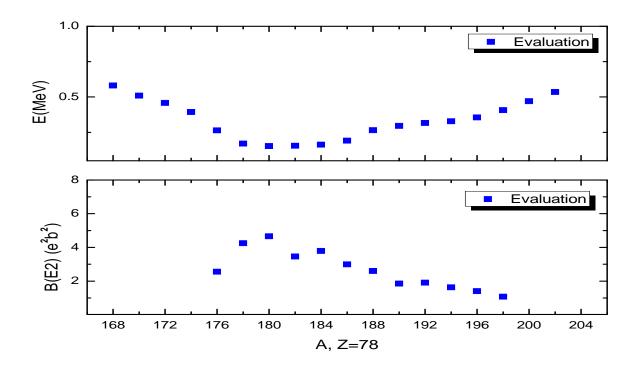
Graph 36. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Hf nuclei.



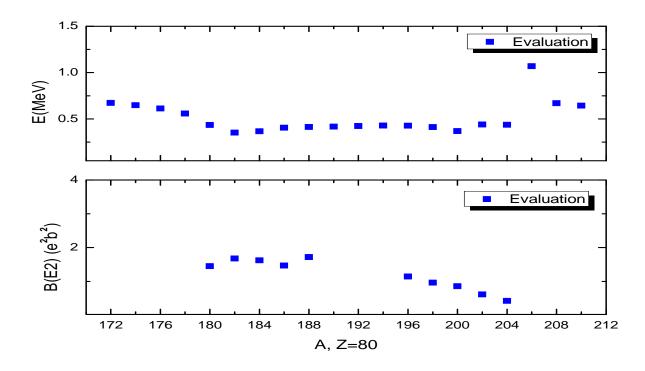
Graph 37. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for W nuclei.



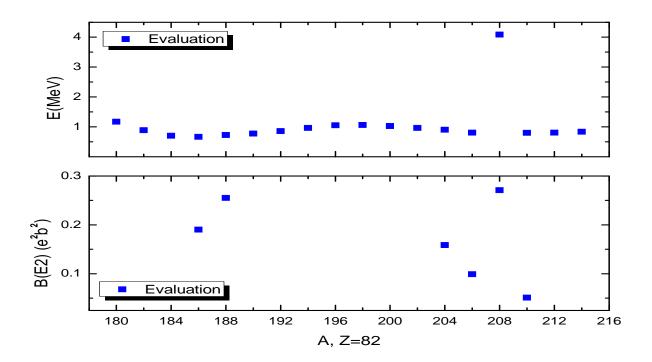
Graph 38. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Os nuclei.



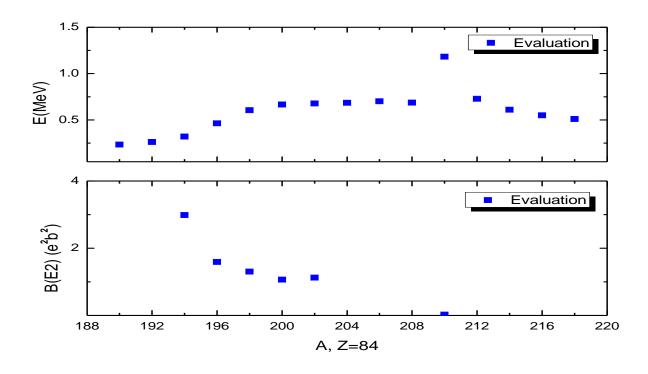
Graph 39. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Pt nuclei.



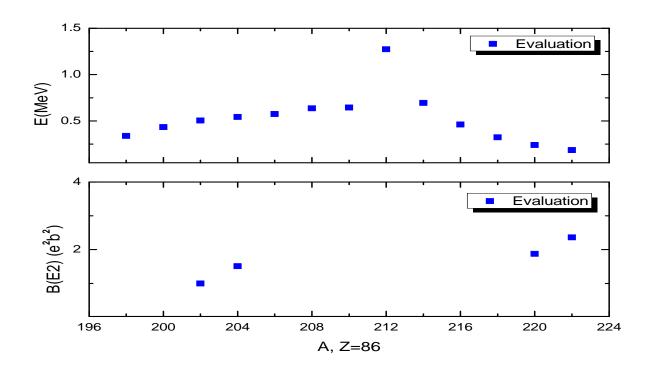
Graph 40. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Hg nuclei.



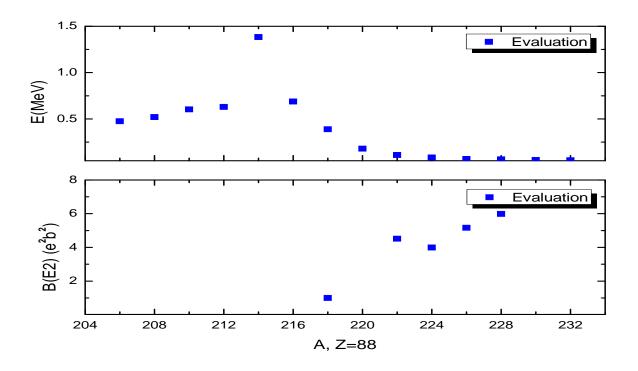
Graph 41. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Pb nuclei.



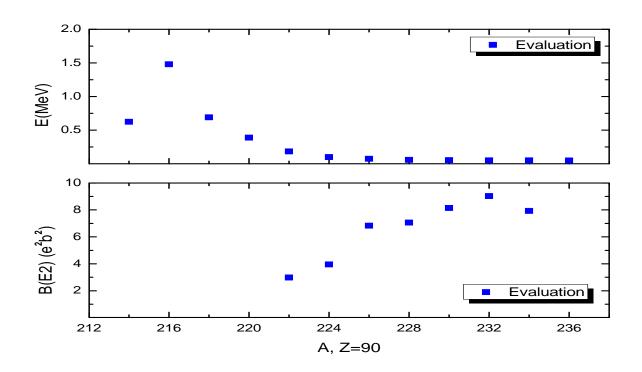
Graph 42. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Po nuclei.



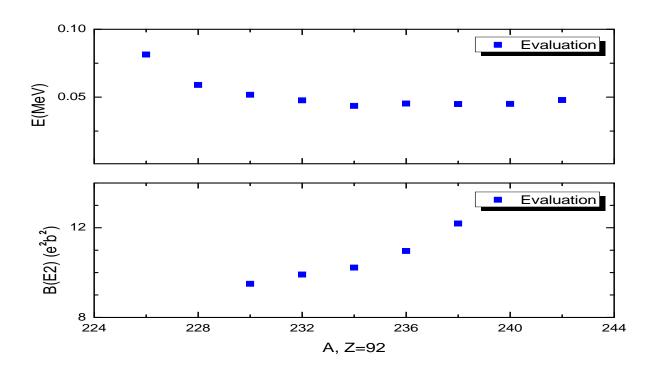
Graph 43. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Rn nuclei.

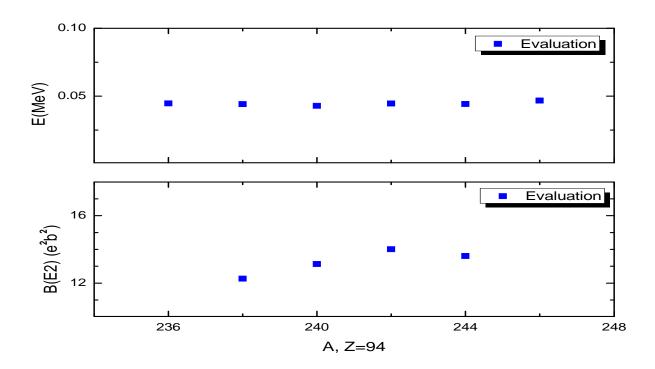


Graph 44. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Ra nuclei.

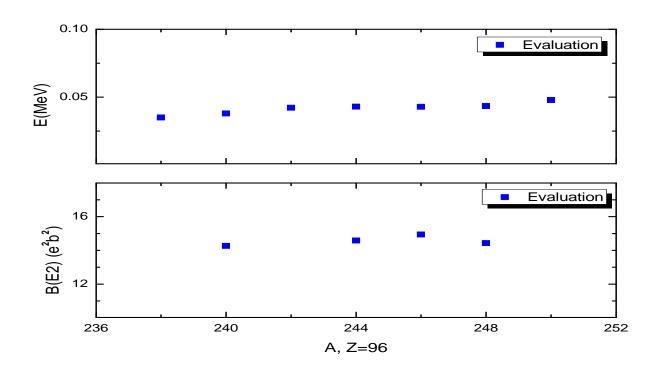


Graph 45. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Th nuclei.

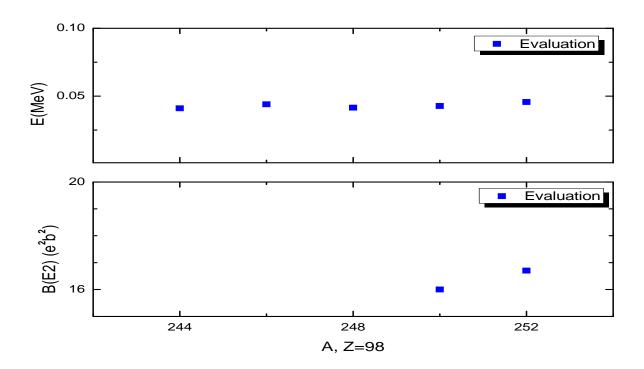




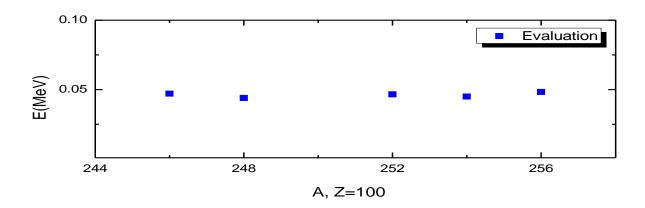
Graph 47. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \to 2_1^+)$ values for Pu nuclei.



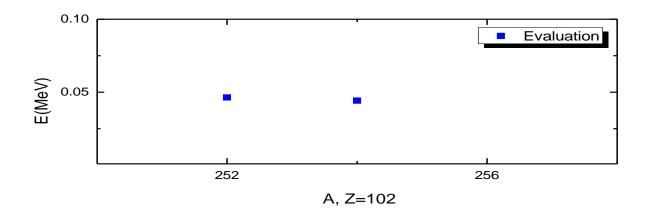
Graph 48. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Cm nuclei.



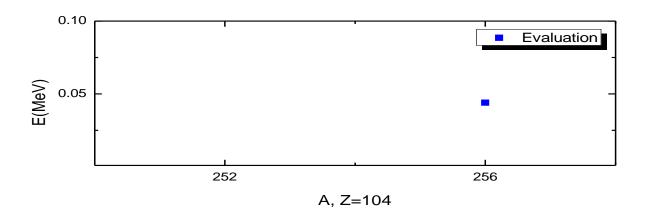
Graph 49. Evaluated energies, $E(2_1^+)$, and $B(E; 0_1^+ \rightarrow 2_1^+)$ values for Cf nuclei.



Graph 50. Evaluated energies, $\mathrm{E}(2_1^+)$ for Fm nuclei.



Graph 51. Evaluated energies, $\mathrm{E}(2_1^+)$ for No nuclei.



Graph 52. Evaluated energies, $\mathrm{E}(2_1^+)$ for Rf nuclei.