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Nuclear Data Sheets for A = 235*

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Abstract: Spectroscopic data and level schemes from radioactive decay and nuclear reaction studies are presented here for all nuclei with mass number A=235.

The highlight of this evaluation consists of the precise and comprehensive Coulomb excitation study (2012Wa35) on ^{235}U, which in addition to the 7/2[743] ground state rotational band, extended the 1/2[631], 5/2[622], 5/2[752], and 3/2[631] rotational bands up to Jπ=53/2+, 49/2+, 41/2–, and 43/2+, respectively.

This evaluation presents a study (2010Hu02) of the ^{237}Np(^{116}Sn,^{118}Snγ) reaction where the ground state rotational band 5/2[642] was observed up to Jπ=(53/2+).

It is worth for historical knowledge to mention the report on the "Discovery of isotopes of the transuranium elements with 93<= Z <=98 " (2013Fr02), where the information for elements Np, Pu, and Am with mass number A= 235 is given. ^{235}Cf has not been observed.

The alpha hindrance factors (HF) presented in this evaluation were calculated using values of the radius parameter (r_0) interpolated from those for even–even adjacent nuclei given by 1998Ak04.

Cutoff Date: All data received by February 2014 have been evaluated.

General Policies and Organization of Material: see http://www.nndc.bnl.gov/nds/NDSPolicies.pdf.

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General Comments: 2012Au07 assign $T_{1/2}$=3 s, Jπ=5/2+ to β$^-$ decaying ^{235}Ra based on systematics. See 2013Fr03 for discovery of some of actinides.

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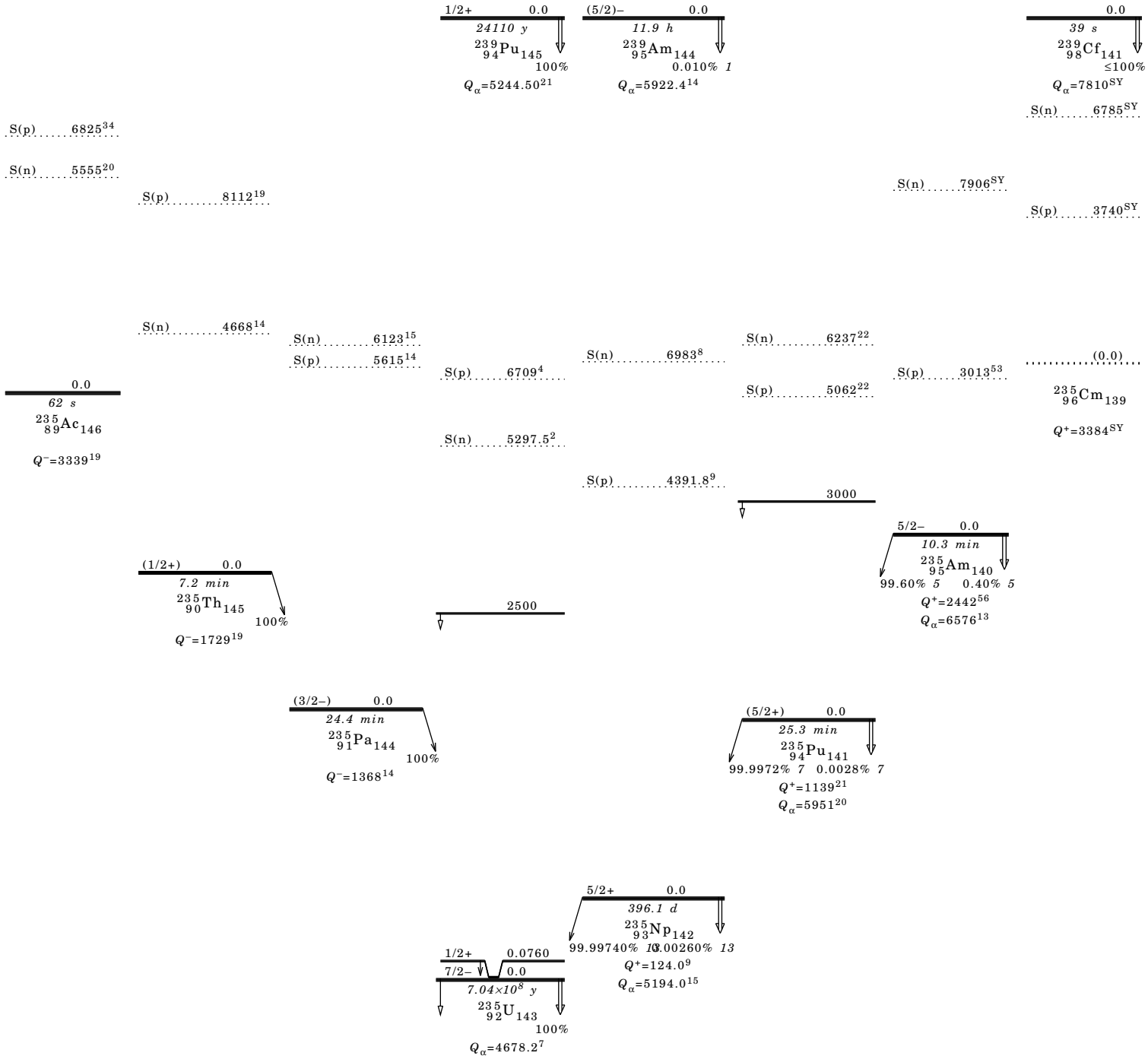
Skeleton Scheme for A=235



Ground–State and Isomeric–Level Properties for A=235

Nuclide	Level	Jπ	$T_{1/2}$	Decay Modes
^{235}Ac	0.0		62 s *4*	
^{235}Th	0.0	(1/2+)	7.2 min *1*	%β^-=100
^{235}Pa	0.0	(3/2−)	24.4 min *2*	%β^-=100
^{235}U	0.0	7/2−	7.04×10^8 y *1*	%α=100; %SF=7×10^{-9} *2*
	0.0760	1/2+	≈26 min	%IT=100
	2500		3.6 ms *18*	%SF=?
^{235}Np	0.0	5/2+	396.1 d *12*	%ε=99.99740 *13*; %α=0.00260 *13*
^{235}Pu	0.0	(5/2+)	25.3 min *5*	%ε+%β^+=99.9972 *7*; %α=0.0028 *7*
	3000		25 ns *5*	%SF≤100
^{235}Am	0.0	5/2−	10.3 min *6*	%ε=99.60 *5*; %α=0.40 *5*
^{235}Cm	0.0			
^{239}Pu	0.0	1/2+	24110 y *30*	%α=100
^{239}Am	0.0	(5/2)−	11.9 h *1*	%α=0.010 *1*; ...
^{239}Cf	0.0		39 s *+37−12*	%α≤100

Adopted Levels

Q(β^-)=3339 *19*; S(n)=5555 *20*; S(p)=6825 *34*; Q(α)=2868 *29* 2012Wa38.
2006Bo41: identified through mass spectrometry of ^{238}U beam fragmentation. Measured lifetime.

^{235}Ac Levels

E(level)	$T_{1/2}$	Comments
0.0	62 s *4*	$T_{1/2}$: from 2012Au07, presumably based on evolution of peak–area as given in 2006Bo41.

Adopted Levels

Q(β^-)=1729 *19*; S(n)=4668 *14*; S(p)=8112 *19*; Q(α)=3376 *17* 2012Wa38.
Q(β^-): This value is inconsistent with Eβ=1440 keV *50* measured by 1989Yu01 (see ^{235}Th β^- decay). The adopted value of 1729 keV *19* is in better agreement with the systematic trend than the 1440–keV value of 1989Yu01.
Discovery of ^{235}Th: 2013Fr03.
Mass measurements: 2012Ch19, 2012Zh46.
Neutron fission cross–section measurements: 2012Pr13, 2011Ch57, 2010Pr07.
Cluster decay half–lives. ^{235}Th (^{16}O, ^{18}O, ^{20}O, ^{22}O, ^{24}Ne, ^{26}Ne): 2012Sa31.
Nuclear Structure: 2005Pa73.

^{235}Th Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	(1/2+)	7.2 min *1*	Jπ: probable Nilsson configuration assignment 1/2[631] is from analogy with ^{237}U (1972El21). $T_{1/2}$: weighted average of 6.9 min *2* by following the decay of β– particles (1969Tr05); 7.3 min *1* by following the decay of 417.0γ (1986Mi10); 6.9 min *3* by following the decay of β– particles, and 7.3 min *3* by following the decay of 417.0γ (1989Yu01). Assignment: ^{234}Th(n,γ), ^{238}U(n,α) chem, parent of ^{235}Pa. %β^-=100.

Adopted Levels, Gammas

Q(β⁻)=1368 *14*; S(n)=6123 *15*; S(p)=5615 *14*; Q(α)=4101 *19* 2012Wa38.
Q(β⁻)=1410 *50*, from 1968Tr07 and adopted decay scheme.
Discovery of ^{235}Th: 2013Fr03.
Mass measurements: 2012Ch19, 2012Zh46.
Neutron fission cross–section measurements: 2012Pr13.
Cluster decay half–lives. ^{235}Pa(^{23}F,^{24}Ne): 2012Sa31.
Calculated Q(α), t, single–particle energies: 2008Do12.
Other reaction: ^{16}O, ^{19}F on ^{232}Th. Measured excitation functions (2000Si04).

^{235}Pa Levels

Cross Reference (XREF) Flags

A ^{235}Th β⁻ Decay
B ^{236}U(t,α)

E(level)	Jπ†	XREF	$T_{1/2}$	Comments
0.0‡	(3/2−)	AB	24.4 min *2*	$T_{1/2}$: weighted average of 24.2 min *3* (1968Tr07), 24.6 min *2* (1986Mi10), 23.7 min *5* (1950Me08), 24.2 min *3* (1968Tr07), and 24.7 min *6* (1989Yu01). Jπ: similarity with ^{231}Pa and ^{233}Pa suggests 3/2− member of 1/2[530] rotational band. Also Jπ=(1/2−) is possible. %β⁻=100.
(10‡ *10*)	(1/2−)	AB		E(level): from analogy with ^{231}Pa (9.20 keV) and ^{233}Pa (6.65 keV). Jπ: similarity with ^{231}Pa and ^{233}Pa suggests 1/2− member of 1/2[530] rotational band. Also Jπ=(3/2−) is possible.
18.51§ *17*	(1/2+)	AB		
51.79# *17*	(3/2+)	A		
55‡ *4*	(7/2−)	B		
65# *6*	(9/2+)	B		
100 *4*		B		
132# *4*	(13/2+)	B		
162 *6*		B		
192 *8*		B		
252 *8*		B		
344.69@ *19*	(3/2+)	AB		
378@ *10*	(5/2+)	B		
468.79 *15*	(1/2,3/2)	A		Jπ: log *ft*≈7.2 from ^{235}Th (Jπ=(1/2+)) β⁻ decay.
484 *12*		B		
525 *12*		B		
570 *12*		B		
630 *12*		B		
649 *12*		B		
682 *12*		B		
727.01 *17*	(1/2,3/2)	A		Jπ: log *ft*≈7.1 from ^{235}Th (Jπ=(1/2+)) β⁻ decay.
747.90 *15*	(1/2,3/2)	A		Jπ: log *ft*≈7.0 from ^{235}Th (Jπ=(1/2+)) β⁻ decay.
751& *8*	(11/2−)	B		
755.75 *24*	(1/2,3/2)	A		Jπ: log *ft*≈7.4 from ^{235}Th (Jπ=(1/2+)) β⁻ decay.
965a *8*	(5/2−)	B		

† From a comparison of σ(exp)/σ(calc) in (t,α), systematics of Nilsson orbitals in other odd–Z nuclei, and in analogy with Jπ assignments in ^{233}Pa (1972El21). Additional arguments are given with some individual levels.
‡ (A): 1/2[530].
§ (B): 1/2[400].
# (C): 3/2[651].
@ (D): 3/2[402].
& (E): 9/2[514]?
a (F): 1/2[541]?

γ(^{235}Pa)

E(level)	Eγ	Iγ
(10)	(≤10)	
344.69	292.9 *1*	100
468.79	417.0 *1*	100

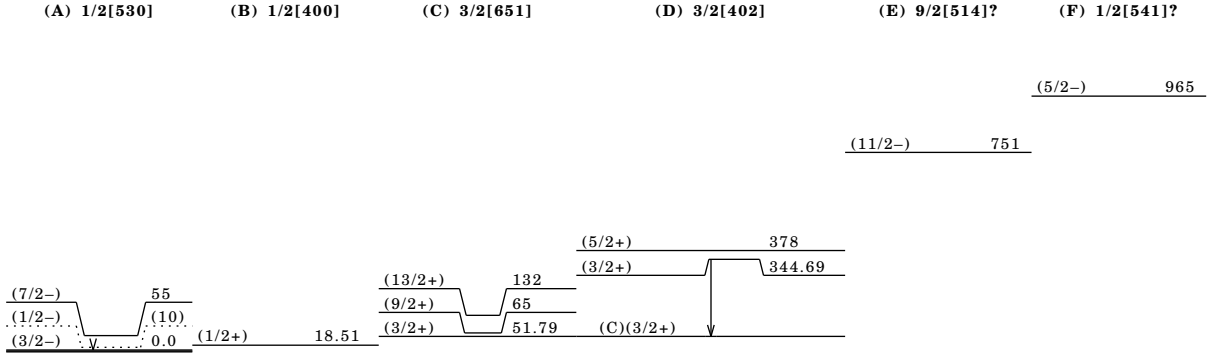
Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{235}Pa) (continued)

E(level)	Eγ	Iγ
468.79	450.4 *2*	15 *4*
	468.7† *2*	24.8 *16*
727.01	708.3 *2*	60 *4*
	727.2† *2*	100 *5*
747.90	696.1 *2*	100 *6*
	729.5 *2*	71 *5*
	747.8† *2*	67 *5*
755.75	704.0 *2*	100 *6*
	737.0 *5*	37 *11*

† Probably a doublet feeding the g.s. and first excited state.



$^{235}_{91}Pa_{144}$

^{235}Th β$^-$ Decay 1986Mi10

Parent ^{235}Th: E=0; Jπ=(1/2+); $T_{1/2}$=7.1 min *2*; Q(g.s.)=1729 *19*; %β$^-$ decay=100.

1986Mi10: Source prepared by irradiating natural U with 30–160 MeV, 14–MeV n; chem, measured γ, β, γ(t); Ge(Li), α(P).

Analogy with ^{233}Th and ^{237}U β$^-$ decays suggests that the main β$^-$ branches feed the (3/2−) g.s. and (1/2−) first excited state in ^{235}Pa. This suggestion has been confirmed by the low experimental absolute γ–ray intensities (Iγ normalization≈0.02 from 1986Mi10 and 1989Yu01). However, the experimental β$^-$ endpoint of 1440 *50* (1989Yu01) together with Q(β$^-$)=1729 *19* (2012Wa38) (mass adjustment) suggests that there is a significant β$^-$ feeding to a level at about 290 keV. This discrepancy has not been resolved.

^{235}Pa Levels

E(level)	Jπ
0.0	(3/2−)
(10.0 *10*)	(1/2−)
18.52 *16*	(1/2+)
51.79 *16*	(3/2+)
344.69 *19*	(3/2+)
468.79 *15*	(1/2,3/2)
727.01 *17*	(1/2,3/2)
747.90 *15*	(1/2,3/2)
755.75 *24*	(1/2,3/2)

^{235}Th β⁻ Decay 1986Mi10 (continued)

β⁻ radiations

Eβ⁻	E(level)	Iβ⁻†‡	Log *ft*	Comments
(973 *19*)	755.75	≈0.7	≈7.1	
(981 *19*)	747.90	≈1.5	≈6.7	
(1002 *19*)	727.01	≈1.4	≈6.8	
(1260 *19*)	468.79	≈2.8	≈6.9	
(1384 *19*)	344.69	≈0.3	≈8.0	
(1677§ *19*)	51.79			
(1710§ *19*)	18.52			
(1719§ *19*)	(10.0)			
(1729§ *19*)	0.0	≈93	≈6	Eβ⁻: Eβ=1440 *50* from 1989Yu01 (abstract and fig. 3; the value 1400 in the text is probably incorrect. The value Q(β⁻)=1470 keV 80, also given in 1989Yu01, assumes that the main β⁻ branch feeds the 1/2[400] rotational band, which is unexpected from systematics). This value of Eβ is inconsistent with Q(β⁻)=1729 keV *19* (2012Wa38). Iβ⁻: from γ–ray transition intensity balance. Iβ≈93% includes possible feedings to the <10 keV (1/2–), 18.6 keV (1/2+), and 51.7 keV (3/2+) levels.

† Intensities are approximate. They have been deduced from γ–ray photon intensity balances without including conversion electrons.
‡ Absolute intensity per 100 decays.
§ Existence of this branch is questionable.

γ(^{235}Pa)

Iγ normalization: from Iγ(417γ)/β⁻=2% *1* (1989Yu01). This value agrees with Iγ(417γ)/β⁻≈2%, which was obtained by 1986Mi10 on the basis of the estimated cross sections for the production of ^{235}Th.

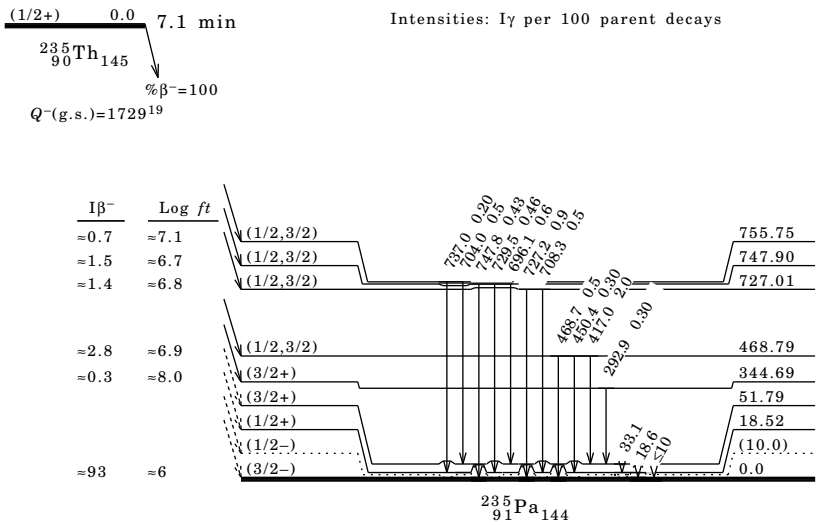
Eγ†	E(level)	Iγ†‡	I(γ+ce)‡	Comments
(≤10)	(10.0)		≈50	Eγ: based on E(level)<10 keV. I(γ+ce): based on analogy with ^{233}Th and ^{237}U β⁻ decays.
(18.6)	18.52			
(33.1)	51.79			
x174.8 *2*		7.6 *11*		
292.9 *1*	344.69	14.8 *2*		
x406.1 *1*		14.9 *14*		
417.0 *1*	468.79	100		
450.4 *2*	468.79	15 *4*		
468.7 *2*	468.79	24.8 *16*		
x484.2 *2*		19 *4*		
x644.9 *2*		28 *3*		
696.1 *2*	747.90	32.1 *18*		
704.0 *2*	755.75	27.1 *17*		
708.3 *2*	727.01	25.8 *17*		
727.2 *2*	727.01	43.3 *20*		
729.5 *2*	747.90	22.8 *17*		
737.0 *5*	755.75	10 *3*		
747.8 *2*	747.90	21.5 *16*		
x837.8 *2*		13.7 *14*		
x932.8 *2*		21.0 *16*		

† From 1986Mi10 Ge(Li). Other: 1970Tr09.
‡ For absolute intensity per 100 decays, multiply by 0.02 *1*.
x γ ray not placed in level scheme.

^{235}Th β⁻ Decay 1986Mi10 (continued)

Decay Scheme

Intensities: Iγ per 100 parent decays



^{236}U(t,α) 1977Th04

E(t)=15 MeV, magnetic spectrograph, σ(60°), FWHM=19 keV, DWBA analysis (1977Th04).

^{235}Pa Levels

E(level)	Jπ†	Comments
0.0‡	3/2	
19§ *3*	1/2	
55‡ *4*	7/2	
65# *6*	(9/2+)	
100 *4*		
132# *4*	13/2+	
162 *6*		
192 *8*		
252 *8*		
345@ *6*	3/2+	
378@ *10*	5/2+	
484 *12*		
525 *12*		
570 *12*		Probable doublet.
630 *12*		
649 *12*		
682 *12*		
751& *8*	(11/2−)	
965a *8*	(5/2−)	

† Based on a comparison of cross sections with theory, and on the analogy with ^{233}Pa level structure.
‡ (A): 1/2[530].
§ (B): 1/2[400].
# (C): 3/2[651].
@ (D): 3/2[402].
& (E): 9/2[514].
a (F): 1/2[541].

Adopted Levels, Gammas

Q(β⁻)=–124.0 *9*; S(n)=5297.5 *2*; S(p)=6709 *4*; Q(α)=4678.2 *7* 2012Wa38.

Other reactions:

^{235}U(n,n'): E<20 MeV (2013He11,2005Ha23); E=0.14–15.2 MeV (2010Ha06); Others: 2009Ch24, 2009Mu14, 2004Du20.

^{235}U(n,n'γ): 2013Ke02, 2012LeZZ, 2008HuZW.

^{235}U(α,α'): 2011Bu11.

^{235}U(p,p): E=1–200 MeV, calculated σ (2008Li05).

^{235}U(SF): 2013Ka26, 2012Fa12, 2012Ha06, 2005Re16. Measured σ using surrogate reaction (2012Hu01); calculated fission barrier and half–life (2012Ro34,2007Ro08).

^{238}U(n,4n): 2012Br11.

^{235}U(n,F) E=400 keV (2012PrZZ); E=2–8 MeV (2011Mu07); E=0.01 – 30 MeV, calculated σ (2009Go05).

^{235}U(^{12}C,^{12}C) E=30–1000 Mev/nucleon; ^{235}U(^{20}C,^{20}C) E=30–1000 Mev/nucleon (2008Li05).

Cluster decay:

^{235}U(^{29}Mg): calculated half–life (2013Ta07).

^{235}U(^{24}Ne), ^{235}U(^{25}Ne): Calculated half–life (2013Zd01,2013Zd02).

^{235}U(^{24}Ne), ^{235}U(^{25}Ne),^{235}U(^{28}Mg): Calculated half–life (2012Ba35,2012Ku29). Others: ^{235}U(^{24}Ne), ^{235}U(^{25}Ne): 2010Ni13, 2004Ba64.

^{235}U(^{20}O), ^{235}U($^{22-26}$Ne), ^{235}U($^{28-30}$Mg) calculated Q(β⁻)value, half–life (2012Sa31).

^{235}U(^{24}Mg): calculated half–life, isotope shift, Q(β⁻)value (2005Bh02).

^{235}U(^{28}Mg): 2010Si12; calculated half–life (2009Ar11). Other: 2009Do16.

^{235}U(^{25}Ne), ^{235}U(^{29}Mg): calculated half–life (2011Sh13).

^{235}U(^{26}Ne), ^{235}U(^{29}Mg): 2005Ku32, 2005Ku04.

^{232}Th(^{16}O,^{13}C), ^{232}Th(^{19}F,^{16}N) (2000Si04): Measured excitation functions.

^{232}Th(α,xnF) (1997Er02): Measured fission fragments.

^{235}U(SF): calculated fission barrier and half–life (2012Ro34,2012Pa40,2011Hu06).

^{235}U isotopic abundance in natural uranium: 2012Qi02, 2011Be53, 2008We01.

Nuclear Structure: Level density parameters: 2006Fr21. Others: 2011Mu06, 2010Ni02, 2010Qu01, 2010To07, 2006Sa35. Quadrupole moment: 2005Ko18.

^{235}U Levels

Cross Reference (XREF) Flags

A ^{235}Pa β⁻ Decay	F ^{234}U(n,γ) E=th	K ^{236}U(d,t)
B ^{235}Np ε Decay	G ^{234}U(d,p)	L ^{236}U(^{3}He,α)
C ^{239}Pu α Decay	H ^{235}U(n,n')	M Muonic Atom
D Coulomb Excitation	I ^{235}U(n,n'γ)	N ^{235}U(γ,γ')
E ^{233}U(t,p)	J ^{235}U(d,d')	

E(level)[§]	Jπ[#]	XREF	$T_{1/2}$	Comments
0.0[&]	7/2–	ABCD FGHIJK MN	7.04×10^{8} y *1*	%α=100; %SF=7×10^{-9} *2*; %^{20}Ne=8×10^{-10} *4*; %^{25}Ne=8×10^{-10}. %^{28}Mg=8×10^{-10}. μ=–0.38 *3* (1983Ni08,2011StZZ). Q=+4.936 *6* (1984Zu02,2011StZZ). μ(^{233}U)/μ(^{235}U)=–1.5604 *14*, consistent with 5/2[633] and 7/2[743] configurations for ^{233}U and ^{235}U ground states, respectively (1990Ga28). Jπ: Measured – see 2013Ma15, 1955Va07, 1956Hu26, 1956Ka53, 1957Bl66, 1958Da21. Parity and configuration assignments are from μ, Q. Charge radius deduced from optical isotope shifts (1990Ga28) Others: 1998El02, 1992An17, 1997Be64. $T_{1/2}$: From 2004Sc03, weighted average (chi**/n–1=1.006) of 6.97×10^{8} y *24* (1939Ni03. Mass spectrometry. Measured Pb/U ratios in uranium ores); 7.11×10^{8} y *14* (1950Kn17. Specific activity method.); 6.77×10^{8} y *21* (1951Sa30, Measured ^{235}U/^{238}U) activity ratios.); 7.12×10^{8} y *16* (1952Fl20. Specific activity method.); 7.64×10^{8} y *43* (1957Cl16. Measured ^{235}U/^{238}U) activity ratios.); 6.95×10^{8} y *16* (1957Wu39. Measured ^{235}U/^{234}U activity ratios.); 7.12×10^{8} y *9* (1965Wh05. Specific activity method); 7.06×10^{8} y *8* (1966Ba58), Mass spectrometry. 7.04×10^{8} y *1* (1971Ja07. Specific activity method); 6.79×10^{8} y *13* (1974De19. Measured ^{235}U/^{238}U α activity ratios); Other value: 7.04×10^{8} y (Value recommended in 2000Ho27.) Others: 1965De06, 1971Ar48, 1974Ja17, 1993Bu10.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{235}U Levels (continued)

E(level)[§]	Jπ[#]	XREF	$T_{1/2}$	Comments
				$T_{1/2}$(SF)=1.0×10^{19} y *3*, value recommended in 2000Ho27 from $T_{1/2}$(SF)=9.8×10^{18} y *28* (1981Vo02); $T_{1/2}$(SF)>1.8×10^{18} y (1974GrZA); $T_{1/2}$(SF)=0.35×10^{18} y *9* (1966Al23); $T_{1/2}$(SF)=0.18×10^{18} y (1952Se67). %^{20}Ne/%α=8×10^{-12} *4* (1989Tr11,1991Bo20). ^{24}Ne emission (1997Ka11). $T_{1/2}$(^{25}Ne)≈9×10^{19} yr. Other: 1997Tr17. $T_{1/2}$(^{28}Mg)=8.8×10^{20} yr (1998Ro11,1997Ro24); other value: >9×10^{20} (1997MiZP). Q(^{233}U)/Q(^{235}U)=0.975 *3* (1990Ga28).
0.0760[†a] *4*	1/2+	A CD F L	≈26 min	%IT=100. $T_{1/2}$: depends on chemical environment (1966Ma20,1968Ne04,1974Ne09,1971Ar48,1972Ne12). $T_{1/2}$=25.7 min *4* in LASER produced plasma (1979Iz02). $T_{1/2}$: $T_{1/2}$=230 min. ^{235m}U placed in a silver matrix. Drastic change in $T_{1/2}$ may be due to a special electromagnetic field resonance (1993Ko32,1989Ko52). Others: 1992Vs01, 1992Vo05. Ultra–violet laser excitation of ^{235}U (1992Bo26). Jπ: favored α decay from 1/2+ ^{239}Pu.
13.0339[†b] *21*	3/2+	A CD FG K	0.50 ns *3*	$T_{1/2}$: from ^{239}Pu α decay (1970Ho02).
46.103[†&] *8*	9/2−	CD F IJ M	≈14 ps	$T_{1/2}$: from B(E2)=6.7, average of B(E2)=4.834 *16* in muonic atom, B(E2)=7.4 *7* in Coulomb excitation (1957Ne07), and B(E2)=8.0 *12* in (d,d'). The approximate value of the half–life is due to the large uncertainty in the E2 γ–ray mixing ratio (δ=0.14 *14*).
51.6968[a] *11*	5/2+	A CD FGH K	191 ps *5*	$T_{1/2}$: from ^{239}Pu α decay (1970Ho02,1970ToZZ).
81.724[b] *4*	7/2+	A CD FG KL		
103.903[†@] *8*	11/2−	CD GH JKLM	33 ps *5*	$T_{1/2}$: from B(E2)=1.18 *16* (1957Ne07) and B(E2)=1.19 *4* in muonic atom (1984Zu02). Other value: B(E2)=2.2 *3*, in (d,d').
129.2995[†c] *10*	5/2+	A CD FG I Kl		Jπ: γ–ray de–excitation (E1 to 7/2−, M1 to 3/2+).
150.356[†a] *16*	9/2+	CD FG Kl		
171.358[†d] *5*	7/2+	CD F		
171.464[†&] *13*	13/2−	CD G J M	21.9 ps *13*	$T_{1/2}$: From B(E2)=2.12 *5* and δ in muonic atom.
197.087[†b] *15*	11/2+	CD G K		
225.382[†c] *7*	9/2+	CD FG IJKl		
250.014[†@] *21*	15/2−	CD G JKl		
259.0 *21*		G		
291.135[†d] *19*	11/2+	CD G JKl		
294.557[†a] *16*	13/2+	CD l		
332.845[†q] *4*	5/2+	C EFG K		
339.976[&] *24*	17/2−	CD JK		
357.22[b] *4*	15/2+	CD JKl		
367.031[†q] *8*	7/2+	C FG J l		
368.9[c] *3*	13/2+	D		
393.218[†e] *5*	3/2+	A C FG IJK		
414.768[†q] *11*	9/2+	C G JKl		
426.741[†f] *3*	5/2+	A C FG JKl		
439.39[@] *3*	19/2−	D		
445.648[†r] *8*	7/2+	C F IJ		Jπ: M1 γ ray to 5/2+, E1 to 7/2−, strong γ ray to 9/2−.
456.84[d] *7*	15/2+	D		
473.826[†e] *11*	7/2+	C F JKL		
482.00[a] *4*	17/2+	D		
510.49[†r] *17*	(9/2+)	C E G JK		Jπ: γ rays to 9/2− and 11/2−.
532.4 *5*	(13/2+)	l		
533.208[†f] *10*	9/2+	C G JKl		
551.17[&] *4*	21/2−	D		
557.2[c] *3*	17/2+	D		
559.34[b] *5*	19/2+	D		
587.8[r] *5*	(11/2+)	C G JK		
608.17[†e] *3*	11/2+	C G JK		
633.092[†i] *15*	(5/2−)	C EF JK		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{235}U Levels (continued)

E(level)[§]	Jπ[#]	XREF	Comments
637.794[†h] *6*	3/2−	A CD FG KL	
658.96[†o] *4*	1/2−	A CD FG I K	
664.531[†g] *12*	(5/2)−	C F J	
666.69[d] *10*	19/2+	D	
670.924[†j] *25*	(7/2)−	C F I K	
671.94[@] *4*	23/2−	D J	
690.2[f] *5*	(13/2+)	D K	
701.101[†h] *17*	(7/2)−	C FG IJK	
703.753[†o] *20*	3/2−	A C F K	
710.02[a] *5*	21/2+	D	
720.22[†i] *3*	(9/2)−	C J	
750.21[†g] *16*	(9/2−)	C J	Jπ: from (d,d').
761.017[‡p] *6*	(1/2)−	C FG K	
769.27[‡s] *6*	1/2+	C F	Jπ: E0 to 1/2+, low α HF.
769.934[‡p] *9*	3/2−	C FG K	
778.36[†j] *19*	(11/2)−	C J L	
779.51[†s] *3*	3/2+	C F	
787.8[c] *3*	21/2+	D	
790.9[e] *8*	15/2+	D	
800.58[b] *6*	23/2+	D	
805.65[&] *6*	25/2−	D G	
805.651[†] *10*	3/2−	C F K	Jπ: E1 γ ray from 1/2+ in (n,γ); E2 γ ray to 7/2−.
806.9[h] *4*	11/2−	D	
811.96[‡p] *3*	(5/2−)	F	
821.23[‡s] *4*	5/2+	C F K	
821.83[k] *7*	(9/2−)	J	Jπ: from (d,d').
843.859[‡t] *10*	(1/2)+	C FG K	Jπ: γ–ray de–excitation (E2 to 5/2+; M1(+E0) to 1/2+).
845.35?[‡s] *2*	(7/2+)	C F	
850.56[i] *3*	13/2−	D	
865.189[‡t] *8*	3/2+	C FG	
879.8[g] *3*	13/2−	D	
885.5[l] *6*	(11/2−)	JK	
891.91[‡t] *3*	5/2+	C FG	
905.262[‡u] *18*	5/2+	F	
916.87[d] *13*	23/2+	D	
921.1[n] *4*	13/2−	D	
924.5[j] *5*	15/2−	D G L	
943 *2*	(7/2−)	G	Jπ: From (d,p).
945.58[@] *5*	27/2−	D	
951.05[‡] *3*	1/2−,3/2−	F	Jπ: E1 γ ray to 1/2+.
953.4[h] *3*	15/2−	D	
960.4[k] *6*	(13/2−)	D G J L	
968.443[‡] *14*	(3/2)+	C FG K	Jπ: E2 to 1/2+.
975.94[a] *7*	25/2+	D	
987.7[n] *4*	13/2−	CD J	
990.229[‡] *8*	1/2−,3/2−	Fg	Jπ: E1 from 1/2+ in (n,γ).
992.64[‡] *3*	(5/2+)	C Fg K	Jπ: γ–ray de–excitation; not detected in average res. neutron capture. Detected in thermal neutron capture.
1002.28[‡] *20*	1/2−,3/2−	FG JK	Jπ: E1 from 1/2+ in (n,γ).
1020.6[e] *7*	19/2+	D	
1023.79[i] *7*	17/2−	D	
1038.231[‡] *10*	5/2+	Fg k	Jπ: M1 γ ray to 7/2+; detected in (n,γ).
1047.1[l] *4*	15/2−	D	
1054.2[g] *3*	17/2−	D	
1057.4[c] *3*	25/2+	D	
1057.42[†] *11*		C F I	
1066.5[m] *5*	15/2−	D	
1072.82[‡] *17*	(1/2,3/2)	FG K	Jπ: detected in thermal neutron (n,γ).
1078.03[b] *7*	27/2+	D	
1099.02[‡] *11*	(3/2−)	F	Jπ: E1 γ ray from 1/2+; γ–ray de–excitation in (n,γ).
1100.98[&] *6*	29/2−	D	
1108 *4*	(9/2−)	g J	
1109.0[j] *3*	19/2−	D	

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Adopted Levels, Gammas (continued)

^{235}U Levels (continued)

E(level)[§]	Jπ[#]	XREF	Comments
1116.21[‡] *4*	(5/2−)	C EFg I	Jπ: γ−ray de−excitation (E1 to 5/2+, γ's to 7/2+, 3/2+); Conversely, 1972Ri08 suggested Jπ=5/2+, possible configuration 5/2[633]×0+.
1141.3[k] *3*	17/2−	D	
1142.6[h] *3*	19/2−	D	
1142.633[‡] *8*	(3/2)−	F K	Jπ: γ−ray de−excitation (M1+E2 to 3/2−. M1 to (5/2)−. γ ray to 1/2+).
1156.2[n] *3*	17/2−	D	
1204.16[d] *15*	27/2+	D	
1235.5[i] *5*	21/2−	D	
1240.9[l] *3*	19/2−	D	
1258.08[@] *6*	31/2−	D	
1261.2[m] *3*	19/2−	D	
1275.2[g] *3*	21/2−	D	
1276.84[a] *8*	29/2+	D	
1292.2[e] *3*	23/2+	D	
1333.6[j] *3*	23/2−	D	
1349.93[k] *24*	21/2−	D	
1362.5[c] *3*	29/2+	D	
1374.5[h] *3*	23/2−	D	
1389.22[b] *9*	31/2+	D	
1434.30[&] *6*	33/2−	D	
1467.17[l] *24*	23/2−	D	
1485.59[i] *9*	25/2−	D	
1504.8[m] *4*	23/2−	D	
1525.15[d] *17*	31/2+	D	
1542.4[g] *4*	25/2−	D	
1595.4[k] *3*	25/2−	D	
1599.7[j] *3*	27/2−	D	
1600.7[e] *6*	27/2+	D	
1606.32[@] *6*	35/2−	D	
1610.04[a] *10*	33/2+	D	
1646.8[h] *3*	27/2−	D	
1656.4 *7*		N	
1700.1[c] *3*	33/2+	D	
1731.65[b] *10*	35/2+	D	
1731.8[l] *3*	27/2−	D	
1733.54 *19*		N	
1769.3 *4*		N	
1773.49[i] *10*	29/2−	D	
1802.23[&] *6*	37/2−	D	
1815.25 *18*		N	
1827.67 *19*		N	
1851.6[g] *5*	29/2−	D	
1862.41 *10*		N	
1877.55[d] *20*	35/2+	D	
1879.12[k] *9*	29/2−	D	
1906.1[j] *3*	31/2−	D	
1943.43[e] *10*	31/2+	D	
1958.9[h] *4*	31/2−	D	
1973.09[a] *12*	37/2+	D	
1973.8 *3*		N	
1986.91[@] *6*	39/2−	D	
2003.36 *17*		N	
2005.9 *4*		N	
2010.6 *3*		N	
2033.4[l] *3*	31/2−	D	
2067.1 *4*		N	
2067.4[c] *3*	37/2+	D	
2074.2 *3*		N	
2086.7 *6*		N	
2097.2[i] *5*	33/2−	D	
2103.36[b] *13*	39/2+	D	

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Adopted Levels, Gammas (continued)

^{235}U Levels (continued)

E(level)[§]	Jπ[#]	XREF	$T_{1/2}$	Comments
2110.2 *3*		N		
2193.0[k] *5*	33/2−	D		
2201.00[&] *7*	41/2−	D		
2216.1 *3*		N		
2249.6[j] *3*	35/2−	D		
2258.69[d] *24*	39/2+	D		
2314.5[e] *7*	35/2+	D		
2363.80[a] *18*	41/2+	D		
2368.6[l] *4*	35/2−	D		
2395.90[@] *8*	43/2−	D		
2416.1 *3*		N		
2454.7[i] *12*	37/2−	D		
2462.7[c] *3*	41/2+	D		
2500 *300*		F	3.6 ms *18*	E(level),$T_{1/2}$: Fission isomer (2007Ob02). %SF=? From 2007Ob02. From ^{234}U(n,F), σ(SF)=10 μb *8*. Produced with neutrons of E(n)=0.95 and 1.27 MeV. Separated with the isomer spectrometer neptune at the Van de Graaff laboratory of the irmm, Geel, Belgium.
2502.5[b] *9*	43/2+	D		
2555.6 *6*		N		
2626.2[j] *3*	39/2−	D		
2626.81[&] *9*	45/2−	D		
2666.2[d] *7*	43/2+	D		
2709.4[e] *8*	39/2+	D		
2754.7 *4*		N		
2780.2[a] *3*	45/2+	D		
2829.97[@] *12*	47/2−	D		
2843.4[i] *15*	41/2−	D		
2883.7[c] *4*	45/2+	D		
2927.9[b] *9*	47/2+	D		
3075.98[&] *17*	49/2−	D		
3098.3[d] *7*	47/2+	D		
3124.1[e] *10*	43/2+	D		
3220.6[a] *3*	49/2+	D		
3286.77[@] *17*	51/2−	D		
3328.6[c] *4*	49/2+	D		
3547.6[&] *8*	53/2−	D		
3683.5[a] *3*	53/2+	D		
3764.3[@] *6*	55/2−	D		
4040.7[&] *13*	57/2−	D		

[†] From ^{239}Pu α decay.
[‡] From ^{234}U(n,γ).
[§] Deduced by evaluators from least–squares fit to γ–ray energies.
[#] Spin/parity and configuration assignments are based on γ–ray multipolarities, B(E2) values from Coulomb Excitation, alpha hindrance factors from ^{239}Pu α decay, and on rotational structure.
[@] (A): 7/2[743], α=+1/2.
[&] (B): 7/2[743], α=−1/2.
[a] (C): 1/2[631], α=+1/2.
[b] (D): 1/2[631], α=−1/2.
[c] (E): 5/2[622], α=+1/2.
[d] (F): 5/2[622], α=−1/2.
[e] (G): 3/2[631], α=+1/2.
[f] (H): 3/2[631], α=−1/2.
[g] (I): K=3/2 γ–vibrational band, α=+1/2.
[h] (J): K=3/2 γ–vibrational band. α=−1/2.
[i] (K): 5/2[752], α=+1/2.
[j] (L): 5/2[752], α=−1/2.
[k] (M): 9/2[734], α=+1/2.
[l] (N): 9/2[734], α=−1/2.
[m] (O): K=11/2 γ–vibrational band, α=+1/2.

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Adopted Levels, Gammas (continued)

^{235}U Levels (continued)

[n] (P): K=11/2 γ–vibrational band, α=–1/2.
[o] (Q): 1/2[501] + 1/2[770].
[p] (R): 1/2[631]×0–.
[q] (S): 5/2[633].
[r] (T): 7/2[624].
[s] (U): 1/2[631]×0+ β vibration.
[t] (V): 5/2[622]–2+.
[u] (W): 5/2[622]×0+ β vibration.

γ(^{235}U)

E(level)	Eγ[†]	Iγ[†]	Mult.	δ[‡]	α	Comments
0.0760	0.0765 *4*	100	E3		>1×10^{10}	Eγ: weighted average of 0.0768 keV *5* (1979Zh05) and 0.07616 keV *53* (1996PaZY). Others: 1995Pa45. B(E3)(W.u.)=1.57×10^{19}/(1+α).
13.0339	12.975 *10*	100	(M1+E2)	0.02	497	B(E2)(W.u.)≈28.7, B(M1)(W.u.)=0.041.
46.103	46.21 *5*	100	M1+E2	0.14 *14*	50 *30*	B(E2)(W.u.)= 839, B(M1)(W.u.)=0.31 18.
51.6968	38.661 *2*	38.0 *8*	M1+E2	0.48 *3*	298 *24*	B(E2)(W.u.)=65 *7*, B(M1)(W.u.)=0.00141 *7*.
	51.624 *1*	100 *2*	E2		310	B(E2)(W.u.)=215 *10*.
81.724	30.04 *2*	60.3 *17*	(M1)		156.7	
	68.696 *6*	100 *28*	E2		78.5	
103.903	57.828 *3*	100 *1*	M1+E2	0.23 *2*	32.6 *16*	B(M1)(W.u.)=0.086 *14*, B(E2)(W.u.)≈420.
	103.06 *3*	18.7 *5*	E2		11.58	B(E2)(W.u.)≈204.
129.2995	47.60 *3*	0.99 *4*	(M1)		40.4	
	77.592 *14*	6.02 *8*	M1(+E2)	0.5 *5*	17 *11*	
	116.26 *2*	8.99 *17*	M1(+E2)	0.56 *56*	14 *3*	
	129.296 *1*	100.0 *6*	E1		0.275	
150.356	68.74 *CA*	9 *4*	(M1+E2)	0.5 *SY*	30 *10*	
	98.78 *2*	100 *5*	E2		14.11	
171.358	41.93 *5*	100 *10*	M1+E2	0.14 *10*	70 *30*	
	89.64 *3*	18.5 *14*	(M1+E2)		14 *8*	
	119.70 *3*	13 *6*	(M1+E2)		10 *4*	
	125.21 *10*	38.6 *10*	(E1)		0.296	
	158.1 *3*	0.68 *7*	(E2)		1.86	
	171.393 *6*	75.3 *14*	(E1)		0.1414	
171.464	67.674 *12*	100 *2*	M1+E2	0.194 *3*	16.43 *25*	B(M1)(W.u.)=0.12 *9*, B(E2)(W.u.)=303 *24*.
	124.51 *3*	45 *2*	E2		5.01	B(E2)(W.u.)=517 *37*.
197.087	115.31 *14*	100	E2		6.87	
225.382	54.039 *8*	100 *2*	M1(+E2)	0.1 *1*	30 *7*	
	96.14 *3*	19.5 *9*	[E2]		16.02	
	143.35 *20*	8.7 *5*	(M1+E2)		5 *3*	
	173.70 *5*	1.5 *4*	(E2)		1.280	
	179.220 *12*	34.0 *4*	(E1)		0.1273	
	225.42 *4*	7.6 *3*	(E1)		0.0747	
250.014	78.78 *3*	100 *12*	M1(+E2)	0.5 *5*	16 *10*	
	146.25 *3*	99 *19*	E2		2.56	
291.135	65.708 *30*	100 *7*	M1(+E2)	0.23 *20*	20 *9*	
	119.0 *10*	≈18	[E2]		6.15 *25*	
	188.23 *10*	21 *3*	[E1]		0.1135	
	244.92 *5*	10 *1*	[E1]		0.0618	
294.557	97.6 *3*	28 *CA*	M1+E2	0.5 *3*	7.0 *19*	
	144.201 *3*	100 *2*	E2		2.70	
332.845	161.450 *15*	21.1 *4*	M1		5.67	
	203.550 *5*	100 *2*	M1		2.95	
	281.2 *2*	0.37 *5*	M1+E2		0.7 *5*	
	319.68 *10*	0.85 *9*	M1+E2		0.5 *4*	
	332.845 *5*	86.8 *5*	E1		0.0313	
339.976	90.17 *3*	71 *6*	[M1]		6.24	
	168.13 *3*	100 *8*	[E2]		1.456	
357.22	62.6 *10*	3.9 *10*				
	160.08 *4*	100 *20*				
367.031	141.657 *20*	29.8 *7*	[M1]		8.22	
	195.679 *8*	100 *2*	M1		3.30	

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Adopted Levels, Gammas (continued)

γ(^{235}U) (continued)

E(level)	Eγ†	Iγ†	Mult.	δ‡	α
367.031	237.77 *10*	13.7 *6*	[M1]		1.91
	285.3 *2*	1.7 *4*	(M1+E2)		0.7 *5*
	320.862 *20*	50.4 *10*	[E1]		0.0339
	354.0 *5*	0.6 *2*	[E2]		0.1155
	367.063 *25*	83.3 *20*	[E1]		0.0254
368.9	78.7 *10*	40 *16*			
	143.7 *10*	100 *50*			
393.218	263.95 *3*	7.6 *3*	M1		1.428
	341.506 *10*	18.2 *6*	M1		0.701
	380.191 *6*	87.4 *18*	M1		0.523
	393.14 *3*	100 *10*	M1		0.477
414.768	123.62 *5*	26.9 *10*	[M1]		12.08
	189.360 *10*	94.3 *11*	[M1+E2]		2.3 *14*
	218.0 *5*	1.4 *12*			
	243.38 *3*	28.7 *5*	[M1+E2]		1.1 *7*
	311.78 *4*	29.3 *8*	[E1]		0.0361
	368.554 *20*	100 *2*	[E1]		0.0252
426.741	255.384 *15*	5.2 *2*	[M1]		1.565
	297.46 *3*	3.2 *2*	[M1]		1.025
	345.013 *4*	35 *2*	M1		0.682
	375.054 *3*	100 *2*	M1		0.543
	413.713 *5*	94 *2*	M1		0.415
	426.68 *3*	1.51 *4*	(E2)		0.0699
439.39	98.92 *3*	41 *8*			
	189.56 *3*	100 *4*			
445.648	274.370§ *10*	8 *4*	M1		1.282
	316.41 *3*	100 *3*	M1		0.865
	399.536 *3*	46 *3*	[E1]		0.0213
	445.72 *3*	67 *5*	E1		0.01698
456.84	88.0 *10*	49 *16*			
	165.70 *6*	100 *23*			
473.826	248.95 *5*	3.5 *4*	[M1]		1.680
	302.87 *5*	2.4 *2*	[M1]		0.976
	323.84 *3*	26.2 *4*	M1		0.811
	341.014 *30*	<24	[M1]		0.704
	392.53 *3*	100 *10*	M1		0.479
	422.598 *19*	59.5 *10*	M1		0.392
	428.4 *3*	0.50 *5*	[E1]		0.0184
	461.25 *5*	1.11 *2*	[E2]		0.0575
	473.9 *5*	0.026 *13*	[E1]		0.01501
482.00	125.2 *10*	1.7 *7*			
	187.48 *4*	100 *13*			
510.49	406.8 *2*	100 *20*			
	463.9 *3*	11.2 *12*			
533.208	242.08 *3*	2.8 *2*	[M1]		1.82
	307.85 *5*	2.1 *2*	[M1]		0.933
	336.113 *12*	43.2 *8*	M1		0.733
	361.89 *5*	4.7 *3*	[M1]		0.598
	382.75 *5*	100 *2*	(M1)		0.513
	430.08 *10*	1.67 *5*	[E1]		0.0183
	451.481 *10*	73.1 *6*	M1(+E2)	1.0 *10*	0.19 *14*
	481.66 *12*	1.8 *1*	[E2]		0.0517
	487.06 *10*	0.10 *1*	[E1]		0.01421
551.17	111.67 *3*	34 *5*			
	211.67 *4*	100 *3*			
557.2	100.0 *10*	35 *8*			
	188.30 *13*	100 *19*			
559.34	76.6 *10*	2.7 *5*			
	202.08 *4*	100 *10*			
608.17	411.15 *3*	100 *50*	[M1]		0.422
	457.61 *5*	21.9 *4*	[M1]		0.316
	526.4 *4*	0.84 *30*	[E2]		0.0419
633.092	633.15 *6*	100	M1(+E2)	<0.5	0.122 *11*

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{235}U) (continued)

E(level)	Eγ†	Iγ†	Mult.	δ‡	α	Comments
637.794	211.056 *7*	0.7 *4*				
	244.583 *8*	1.7 *9*				
	586.3 *3*	8.0 *8*				
	624.78 *5*	18 *1*	(E1)			
	637.7		(E1)			
	637.8	100 *10*	E2		0.0273	
658.96	265.7 *3*	11 *2*	[E1]		0.0514	
	645.94 *4*	100 *3*	E1			
	658.86 *6*	66.8 *13*	E1			
664.531	493.0& *3*	43 *2*	[E1]		0.01387	B(E1)(W.u.)=4.1×10^{-6} *25*.
	582.89 *10*	30 *2*	[E1]		0.01001	B(E1)(W.u.)=1.7×10^{-6} *10*.
	612.83 *3*	47 *2*	E1			B(E1)(W.u.)=2.3×10^{-6} *14*.
	618.28 *6*	100 *3*	(E2)		0.0292	B(E2)(W.u.)=0.46 *28*.
	664.58 *5*	81.3 *16*	E2		0.0251	B(E2)(W.u.)=0.26 *16*.
666.69	110.0 *10*	23 *4*				
	209.84 *8*	100 *13*				
670.924	624.78 *3*	100 *5*	M1		0.1369	
	670.99 *4*	2	M1+E2		0.096 *18*	
671.94	120.93 *3*	25.4 *18*				
	232.40 *3*	100 *5*	[E2]		0.435	
701.101	550.5 *2*	19 *2*	[E1]		0.01117	B(E1)(W.u.)≈4×10^{-6}.
	597.99 *5*	74 *3*	[E2]		0.0314	B(E2)(W.u.)≈1.4.
	619.21 *6*	54 *4*	[E1]			B(E1)(W.u.)≈9×10^{-6}.
	649.32 *6*	32 *2*	[E1]			B(E1)(W.u.)≈4×10^{-6}.
	654.88 *8*	100 *2*	(E2)		0.0258	B(E2)(W.u.)≈1.5.
	701.01 *2*	22.7 *6*	[M1+E2]		0.06 *4*	B(E2)(W.u.)≈0.2.
703.753	652.05 *2*	100 *2*	E1			
	690.81 *8*	14 *4*	E1			
	703.6 *5*	59.0 *12*	E1			
710.02	152.0 *10*	1.2 *5*				
	228.06 *4*	100 *8*				
720.22	617.10 *10*	100 *5*	M1		0.1415	
	674.05 *3*	38 *2*	M1		0.1118	
750.21	579.4 *3*	43 *9*				
	599.6 *2*	100 *10*				
	668.2 *5*	20 *7*				
761.017	123.228§ *5*	2.0 *4*	[M1]		12.19	
	747.970§ *10*	100 *8*	E1			
	760.98§ *4*	8.0 *16*	[E1]			
769.27	639.99 *10*	100 *2*	[E2]		0.0271	
	756.4 *2*	32 *6*	[M1+E2]		0.05 *4*	
	769.15 *8*	59 *11*	E0+M1			
769.934	718.231§ *10*	41 *3*	E1			
	756.87§ *6*	10 *3*	[E1]			
	769.870§ *16*	100 *18*	E1			
778.36	606.9 *2*	23.3 *23*	M1(+E2)	<1	0.12 *3*	
	674.4 *5*	100 *3*	(M1)		0.1116	
779.51	697.8& *5*	54 *12*	[E2]		0.0226	
	727.9 *2*	86 *5*	M1(+E2)	<0.8	0.077 *14*	
	766.47 *3*	90 *5*	E0+M1+E2		0.05 *3*	
	779.4	100 *6*	M1(+E2)	<1	0.061 *15*	
787.8	121.4 *10*	27 *5*				
	230.64 *10*	100 *17*				
790.9	434.1 *10*	100				
800.58	90.65 *6*	1.8 *6*				
	241.19 *4*	100 *7*				
805.65	134.2 *2*	28 *2*				
	254.5 *2*	100 *5*	[E2]		0.319	
805.651	172.560# *11*	9# *3*	[M1]		4.7	
	378.83# *16*	29# *15*	[E1]		0.0238	
	412.31# *12*	69# *23*	[E1]			
	792.58# *5*	77# *9*	(E1)			
	805.65# *1*	101# *10*	E2		0.01688	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{235}U) (continued)

E(level)	Eγ†	Iγ†	Mult.	δ‡	α
806.9	557.0 *5*	100 *25*			
	635.3 *5*	100 *100*			
811.96	760.26§ *5*	45 *9*	[E1]		
	798.92§ *3*	100 *10*	(E1)		
821.23	428.03& *4*				
	596.0 *5*	32 *16*	[E2]		0.0318
	670.8& *5*	7	[E2]		0.0246
	769.59# *14*	<42#	E0+(M1)		
	808.19# *4*	92# *17*	M1		0.0690
	821.16§ *CA*		[E2]		
	821.3# *2*	100# *25*	[E1]		
843.859	714.70§ *10*	65 *7*	E2		0.0215
	843.780§ *10*	100 *5*	M1(+E0)		
845.35?	763.61§& *2*	100	E0(+M1)		
850.56	600.47 *6*	100 *15*			
	679.22 *3*	75 *17*			
865.189	693.810# *10*	44# *5*	E2		0.0229
	735.910# *15*	69# *7*	M1+E2	1.2 *2*	0.048 *7*
	783.40# *5*	8.7# *18*	[E2]		0.0179
	813.510# *17*	100# *10*	M1		0.0678
879.8	629.7 *5*	100 *12*			
	708.4 *5*	42 *12*			
885.5	63.5 *5*				
	108.7 *5*				
	165.8 *5*				
	215.6 *5*				
	297.9 *5*				
	715.3 *5*				
	734.4 *3*				
	782.8 *3*				
	839.5 *5*				
891.91	720.55# *3*	27# *7*	[M1+E2]		0.06 *4*
	762.6# *2*	13# *6*	[M1+E2]		0.05 *3*
	840.25§ *9*	64 *7*	M1+E0		
	879.2 *3*	48 *5*	[M1+E2]		0.035 *21*
	891.0 *3*	100 *10*	[E2]		0.01385
905.262	679.83§ *6*	100 *13*	E2		0.0239
	733.93§ *4*	67 *15*	M1		0.0891
	775.96# *2*	47# *15*	E0+M1		
916.87	129.0 *10*	13.0 *25*			
	250.17 *8*	100 *9*			
921.1	671.1				
924.5	584.5 *5*	100			
945.58	140.13 *4*	18.9 *10*			
	273.63 *3*	100 *4*			
951.05	171.548# *8*	2.8# *14*	[E1]		0.1411
	950.94§ *15*	100 *10*	E1		
953.4	595.8 *5*	38 *4*			
	614.2 *5*	100 *10*			
	702.9 *5*	24.0 *20*			
960.4	74.88 *7*				
	138.3 *5*				
	183.5 *5*				
	240.3 *5*				
	372.5 *3*				
	601.1 *4*				
	622.3 *6*				
	763.3 *5*				
	790.3 *5*				
	858.8 *4*				
968.443	916.78# *8*	16# *5*	[M1+E2]		0.031 *19*
	955.40# *2*	100# *11*	M1+E2	0.6 *2*	0.036 *5*
	968.37# *2*	89# *9*	M1+E2	0.6 *3*	0.035 *6*

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

$\gamma(^{235}U)$ (continued)

E(level)	Eγ†	Iγ†	Mult.	δ‡	α
975.94	174.6 *10*	1.6 *8*			
	265.93 *4*	100 *6*			
987.7	737.2 *5*	100 *40*			
	816.7 *5*	70 *40*			
990.229	125.040# *2*	9# *3*	[E1]		0.297
	229.24# *2*	8# *5*	[M1]		2.12
	990.13# *4*	100# *10*	[E1]		
992.64	978.9# *7*	35# *10*			
	992.64# *3*	100# *10*			
1002.28	1002.2§ *2*	100			
1020.6	230.0 *10*	30 *30*			
	461.2 *10*	100 *50*			
1023.79	583.90 *12*	100 *5*			
	683.99 *7*	87 *6*			
1038.231	564.070# *17*	80# *20*	M1		0.180
	611.630# *11*	100# *20*	(E2)		0.0299
	1024.7# *6*	60# *20*			
1047.1	85.15 *12*				
	122.1 *2*				
	124.4 *5*				
	160.1 *2*				
	195.5 *5*				
	268.2 *4*				
	606.7 *5*				
	706.5 *5*				
	796.4 *4*				
	874.7 *2*				
1054.2	174.3 *5*	22 *9*			
	614.6 *5*	100 *40*			
	714.6 *8*	39 *8*			
1057.4	141.0 *10*	8.4 *22*			
	269.60 *9*	100 *9*			
1057.42	832.5 *2*	66 *5*			
	886.0# *5*	11# *5*			
	927.8# *2*	70# *20*			
	1005.7 *3*	40 *7*			
	1057.3 *2*	100 *16*			
1066.5	816.5 *5*	100.0			
1072.82	1060.1# *3*	34# *11*			
	1072.6# *2*	100# *20*			
1078.03	102.9 *10*	0.5 *5*			
	277.44 *4*	100 *6*			
1099.02	1047.40# *13*	100# *23*	[E1]		
	1085.8# *2*	50# *12*	[E1]		
	1099.0# *3*	38# *13*	[E2]		
1100.98	155.74 *4*	19.7 *10*			
	295.21 *3*	100 *5*			
1109.0	557.6 *5*	70 *100*			
	669.3 *5*	100 *100*			
	769.6 *5*	80 *100*			
1116.21	944.9# *4*	34# *11*	[E1]		
	986.92# *4*	100# *10*	E1		
	1102.9# *7*	9# *6*	[E1]		
	1115.6# *3*	20# *6*			
1141.3	802.0 *5*	100 *14*			
	890.9 *5*	100 *20*			
1142.6	583.1 *5*	84 *10*			
	592.0 *5*	97 *20*			
	702.9 *5*	100 *20*			
1142.633	478.100# *10*	62# *7*	M1		0.281
	504.840# *6*	66# *7*	M1+E2	1.2 *2*	0.127 *18*
	1090.9# *2*	24# *6*	[E1]		
	1142.2# *2*	100# *20*	[E1]		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

γ(^{235}U) (continued)

E(level)	Eγ†	Iγ†
1156.2	716.1 *5*	50 *17*
	816.7 *5*	50 *17*
	906.3 *5*	100 *40*
1204.16	146.5 *10*	9 *3*
	287.28 *8*	100 *10*
1235.5	431.4 *10*	100 *10*
	563.5 *10*	100 *17*
	684.1 *10*	100 *17*
	795.2 *10*	39 *13*
1240.9	801.6 *5*	100 *40*
	901.4 *5*	100 *40*
	991.0 *5*	100 *40*
1258.08	157.31 *4*	16.0 *10*
	312.43 *3*	100 *4*
1261.2	822.0 *5*	100 *40*
	921.8 *5*	100 *40*
	1010.4 *5*	100 *40*
1275.2	221.0 *6*	17 *9*
	603.3 *5*	100 *17*
	724.1 *4*	90 *40*
1276.84	300.90 *4*	100
1292.2	272.0 *10*	16 *20*
	491.6 *3*	100 *24*
1333.6	224.5 *5*	20 *130*
	527.8 *5*	1.×10^{2} *3*
	661.8 *5*	100 *50*
1349.93	209.0 *5*	10 *6*
	798.3 *5*	60 *8*
	910.1 *5*	100 *6*
	1010.5 *5*	60 *6*
1362.5	159.0 *10*	12 *4*
	305.08 *9*	100 *10*
1374.5	568.7 *5*	100 *30*
	573.4 *5*	27 *3*
	703.1 *5*	86 *15*
1389.22	311.20 *5*	100
1434.30	176.45 *4*	17.4 *10*
	333.26 *3*	100 *4*
1467.17	227.0 *5*	33 *17*
	795.3 *5*	100 *40*
	916.2 *5*	100 *40*
	1027.8 *5*	100 *40*
1485.59	250.4 *10*	64 *22*
	539.80 *10*	100 *30*
	680.10 *9*	90 *40*
	813.6 *10*	43 *22*
1504.8	833.3 *5*	100 *40*
	953.2 *5*	70 *40*
1525.15	162.0 *10*	13 *3*
	320.97 *8*	100 *10*
1542.4	267.1 *7*	80 *30*
	596.9 *5*	100 *30*
	736.7 *6*	100 *40*
1595.4	245.5 *5*	17 *10*
	789.7 *5*	67 *17*
	923.9 *5*	100 *40*
1599.7	266.1 *5*	100 *200*
	498.5 *5*	100 *200*
	654.2 *5*	100 *200*
1600.7	308.0 *10*	50 *30*
	522.9 *10*	100 *30*
1606.32	172.28 *5*	13.0 *11*
	348.18 *3*	100 *4*
1610.04	333.20 *6*	100
1646.8	545.8 *5*	100 *10*
	568.2 *5*	61 *10*
	701.8 *5*	48 *7*
1656.4	1656.4 *7*	100
1700.1	175.0 *10*	6 *3*
	337.66 *9*	100 *13*
1731.65	342.42 *5*	100
1731.8	264.6 *5*	70 *40*
	785.9 *5*	100 *40*
	926.5 *5*	100 *40*
1733.54	1687.0 *5*	60 *20*
	1733.6 *2*	100
1769.3	1769.3[a] *4*	100[a]
1773.49	287.7 *10*	80 *20*
	515.40 *8*	62 *20*
	672.7 *3*	100 *40*
	827.8 *10*	60 *20*
1802.23	196.18 *6*	15.2 *15*
	367.89 *3*	100 *5*
1815.25	1769.3[a] *4*	62[a] *4*
	1815.2 *2*	100
1827.67	1782.1[@] *6*	45[@] *18*
	1827.6 *2*	100
1851.6	309.1 *10*	59 *21*
	593.5 *6*	100 *40*
	750.7 *10*	90 *40*
1862.41	1862.4 *1*	100
1877.55	178.0 *10*	11 *4*
	352.37 *11*	100 *10*
1879.12	284.0 *5*	38 *15*
	778.2 *5*	50 *15*
	933.53 *7*	100 *25*
	1073.3 *5*	25 *15*
1906.1	306.4 *5*	100 *150*
	472.0 *5*	30 *150*
	647.8 *5*	50 *150*
1943.43	342.6 *10*	79 *4*
	554.21 *5*	100 *4*
1958.9	524.5 *5*	100 *16*
	701.0 *5*	89 *16*
1973.09	363.05 *7*	100
1973.8	1973.8 *3*	100
1986.91	184.81 *5*	11.6 *15*
	380.55 *3*	100 *5*
2003.36	1957.4 *2*	62 *13*
	2003.0 *3*	100
2005.9	2005.9 *4*	100
2010.6	2010.6 *3*	100
2033.4	301.7 *5*	50 *25*
	774.8 *5*	50 *25*
	932.8 *5*	100 *50*
2067.1	2067.1 *4*	100
2067.4	189.0 *10*	9 *5*
	367.37 *15*	100 *17*
2074.2	2074.2 *3*	100
2086.7	2086.7 *6*	100
2097.2	323.8 *10*	100 *40*
	490.6 *10*	63 *20*
	663.2 *10*	80 *30*
	839.1 *10*	60 *30*
2103.36	371.71 *8*	100

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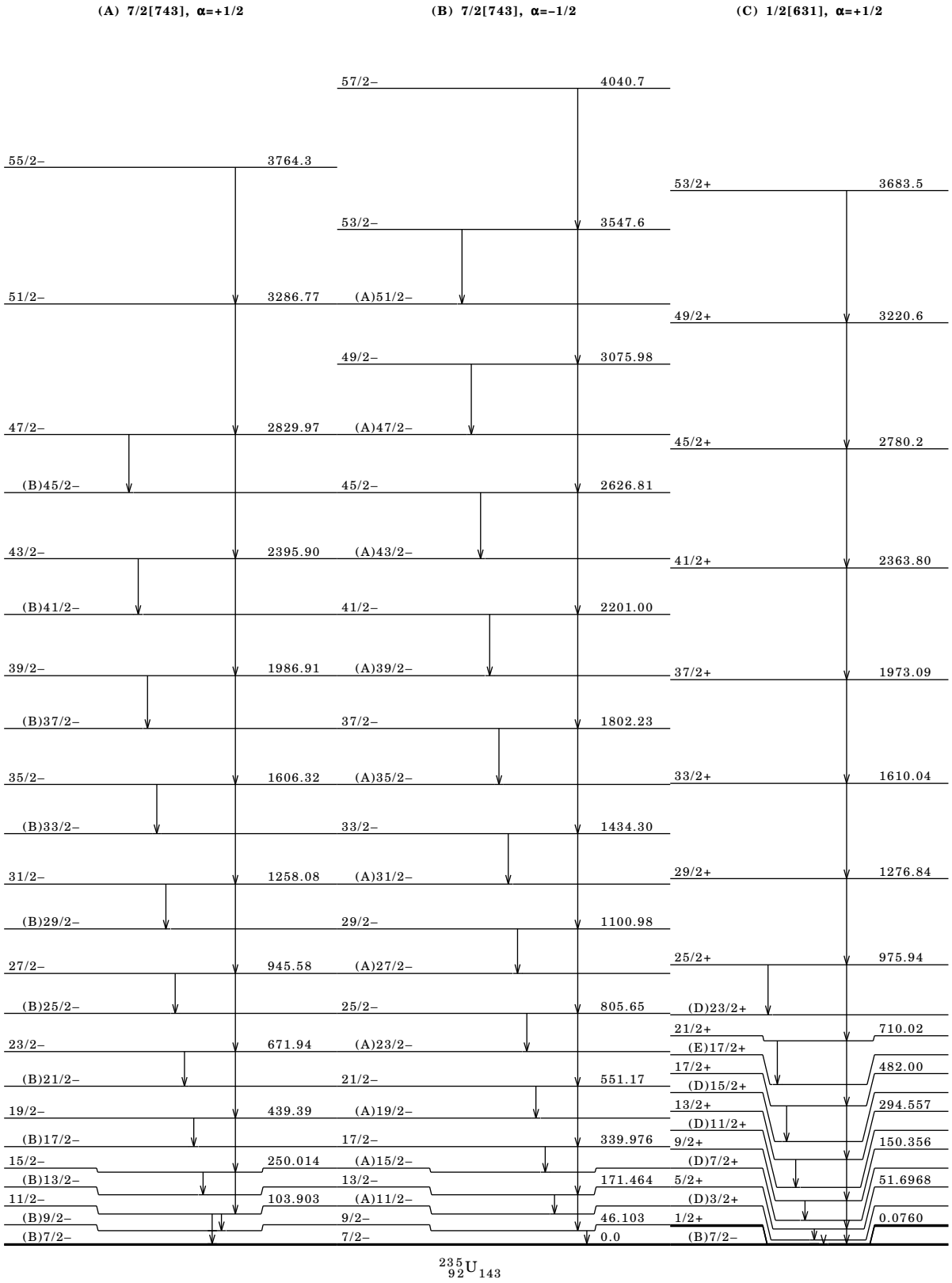
Adopted Levels, Gammas (continued)

γ(^{235}U) (continued)

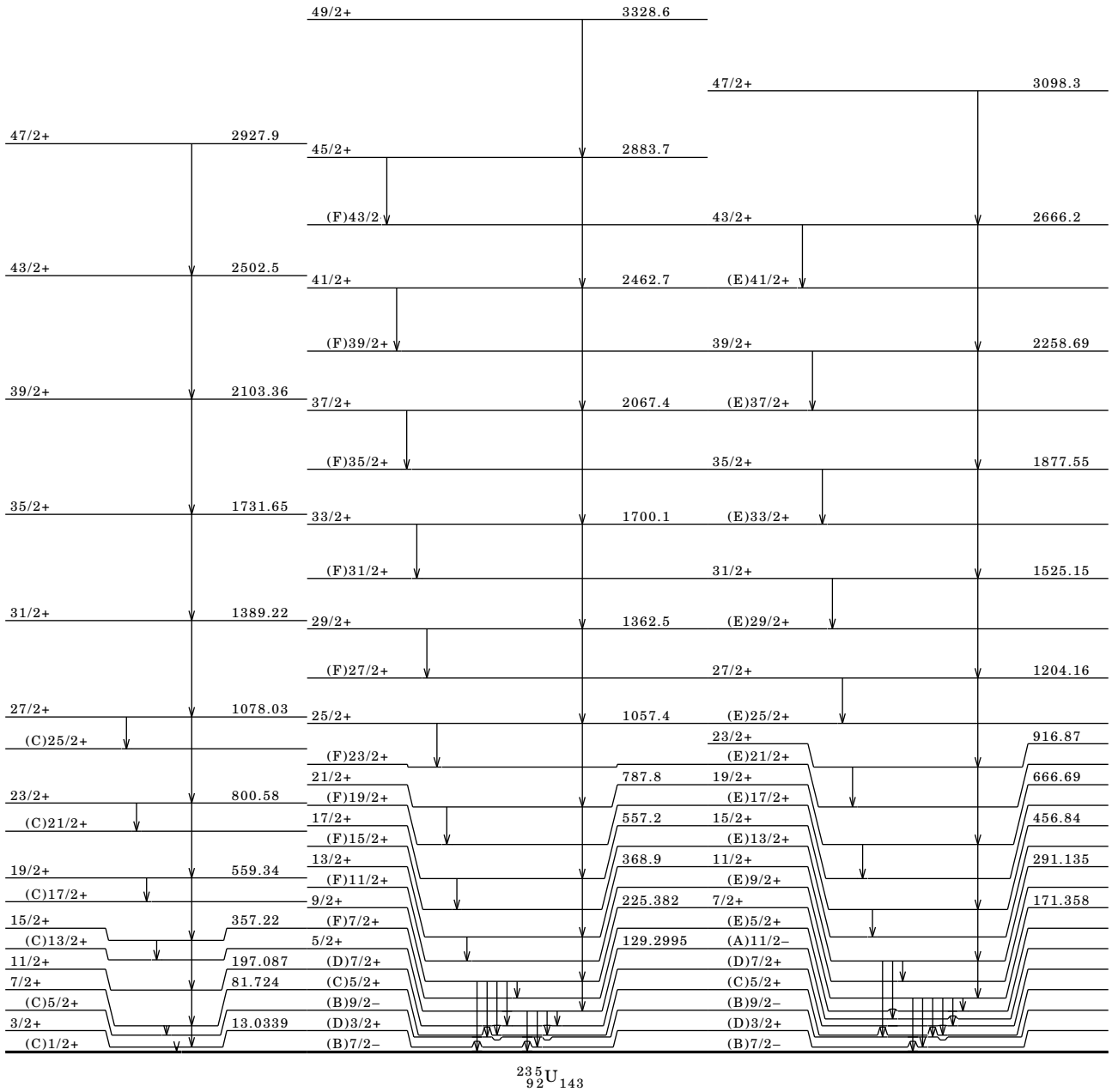
E(level)	Eγ†	Iγ†
2110.2	2063.3 *6*	51 *13*
	2110.4 *3*	100
2193.0	934.9 *5*	100
2201.00	214.10 *3*	19 *3*
	398.76 *4*	100 *6*
2216.1	2216.1 *3*	100
2249.6	343.4 *5*	100 *120*
	447.3 *5*	20 *120*
	643.0 *5*	40 *120*
2258.69	192.0 *10*	9 *5*
	381.10 *15*	100 *13*
2314.5	371.1 *10*	79 *4*
	583.3 *10*	100 *3*
2363.80	390.71 *13*	100
2368.6	762.6 *5*	100 *50*
	934.0 *5*	100 *50*
2395.90	195.21 *20*	13 *3*
	409.00 *5*	100 *7*
2416.1	2416.1 *3*	100
2454.7	357.5 *10*	100
2462.7	203.0 *10*	25 *7*
	395.27 *7*	100 *9*
2502.5	398.9 *10*	100
2555.6	2555.6 *6*	100
2626.2	376.2 *5*	≈100
	425.6 *5*	≈100
	639.4 *5*	≈100
2626.81	231.04 *18*	15 *6*
	425.77 *6*	100 *8*
2666.2	203.6 *10*	30 *19*
	407.6 *10*	100 *30*
2709.4	395.5 *10*	100 *5*
	605.7 *10*	50 *4*
2754.7	2754.7 *4*	100
2780.2	416.37 *20*	100
2829.97	202.90 *18*	17 *5*
	434.14 *10*	100 *10*
2843.4	388.7 *10*	100
2883.7	217.8 *10*	21 *12*
	420.96 *7*	100 *12*
2927.9	425.40 *5*	100
3075.98	245.6 *5*	29 *11*
	449.20 *15*	100 *12*
3098.3	432.1 *1*	100
3124.1	415.0 *10*	32 *23*
	621.3 *10*	100 *20*
3220.6	440.44 *8*	100
3286.77	456.80 *13*	100
3328.6	444.96 *10*	100
3547.6	261.0 *10*	≈20
	471.4 *10*	≈100
3683.5	462.91 *10*	100
3764.3	477.5 *5*	100
4040.7	493.1 *10*	100

† From Coulomb Excitation or ^{239}Pu α decay, unless otherwise specified.
‡ From ^{239}Pu α decay.
§ From ^{234}U(n,γ).
# From ^{234}U(n,γ).
@ Unresolved from a 1782γ in ^{238}U.
& Placement of transition in the level scheme is uncertain.
a Multiply placed; undivided intensity given.

Adopted Levels, Gammas (continued)

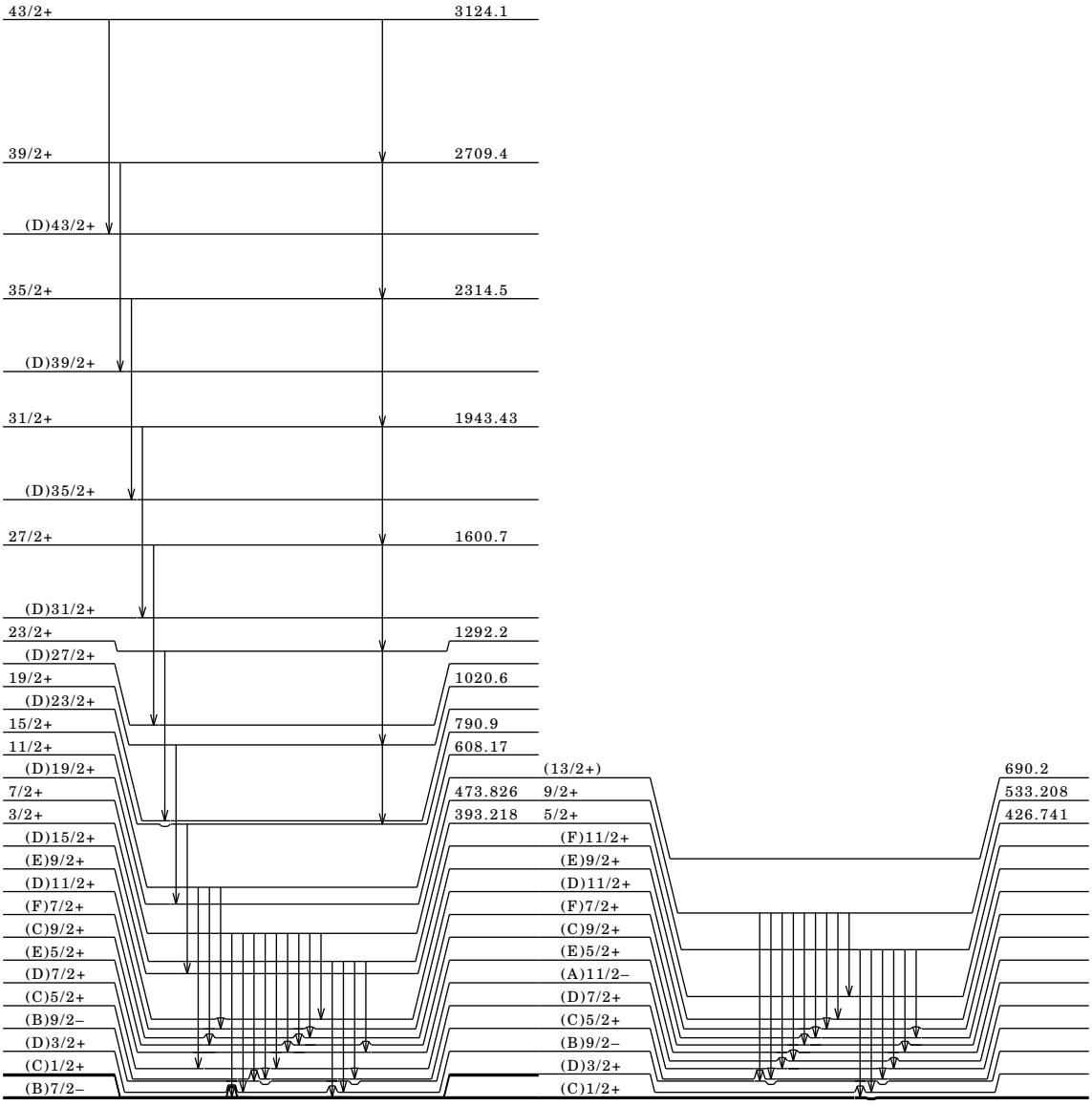


Adopted Levels, Gammas (continued)



Adopted Levels, Gammas (continued)

(G) 3/2[631], α=+1/2 **(H) 3/2[631], α=–1/2**

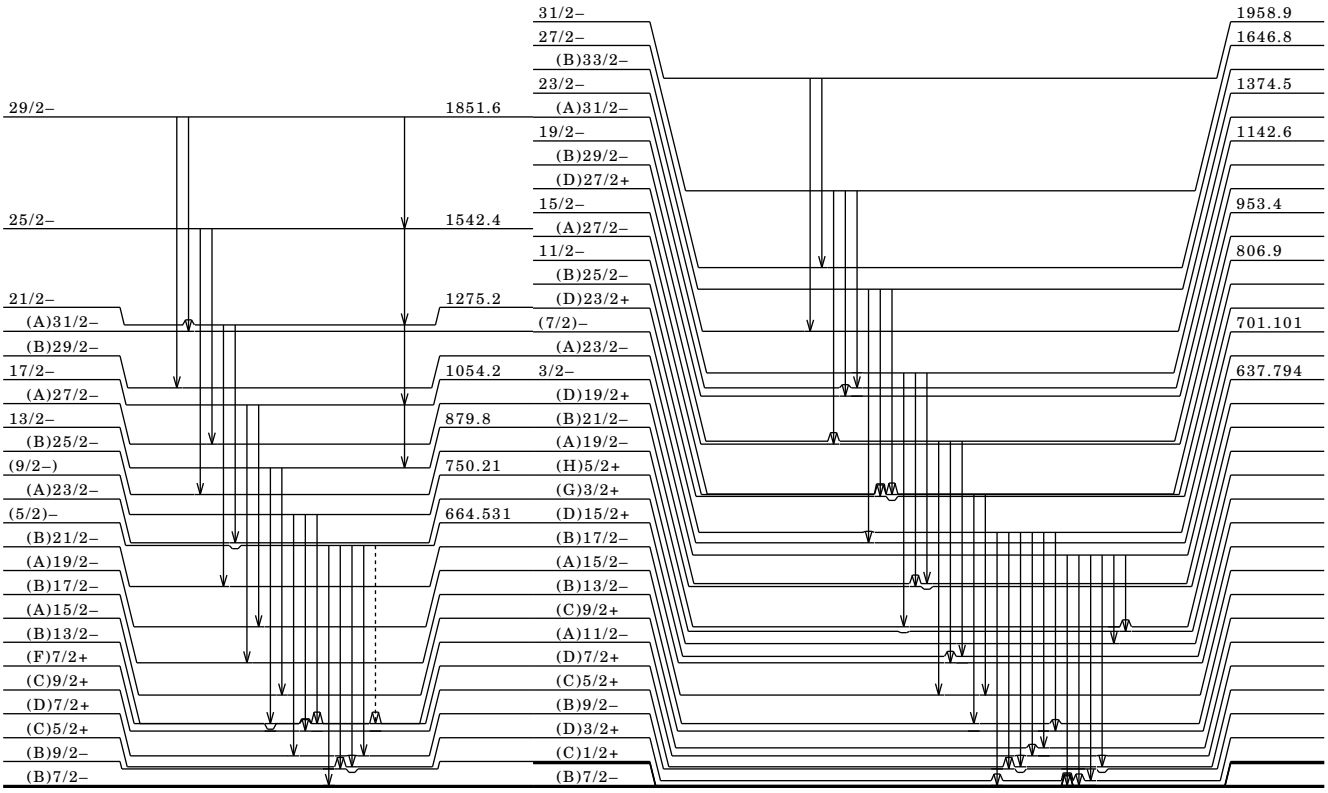


$^{235}_{92}U_{143}$

Adopted Levels, Gammas (continued)

(I) K=3/2 γ–vibrational band, α=+1/2

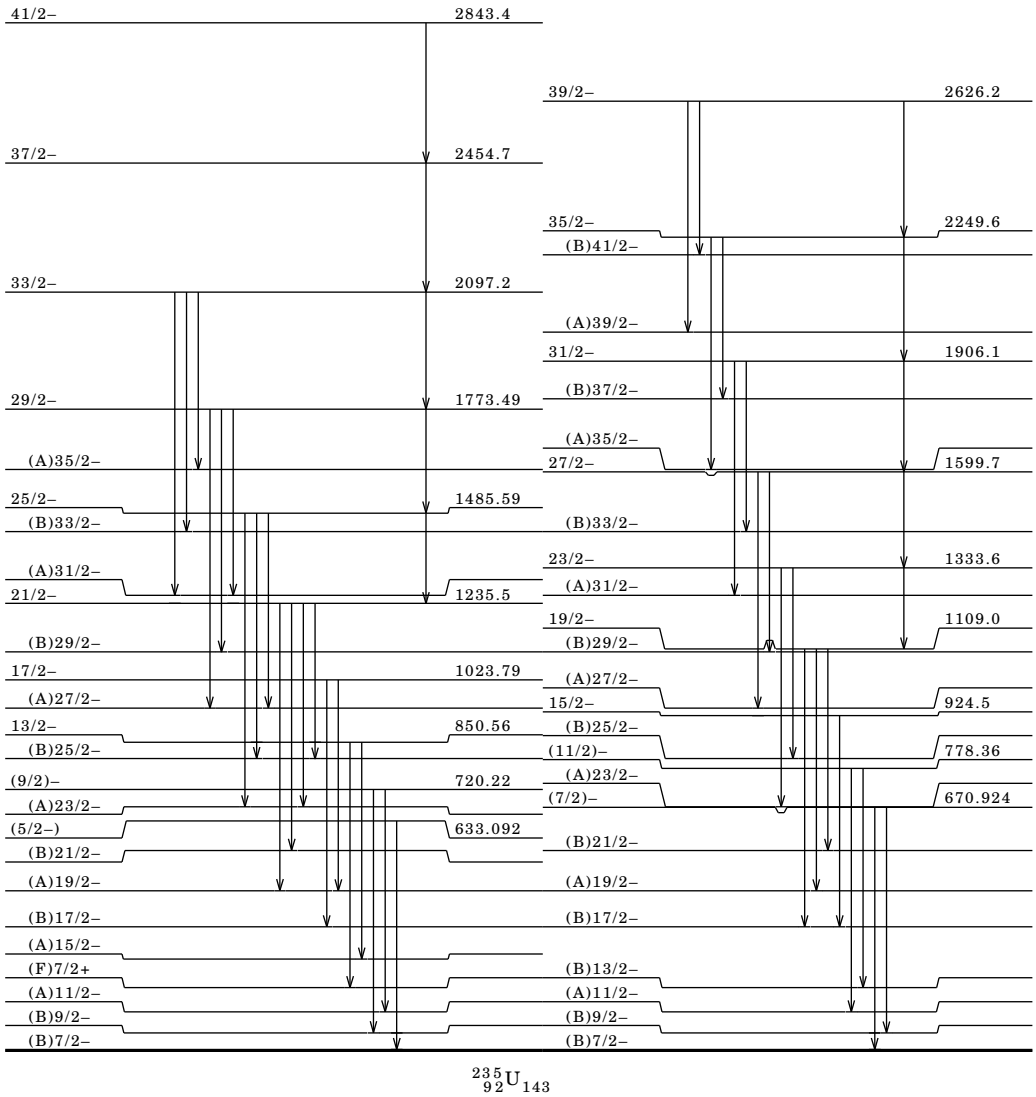
(J) K=3/2 γ–vibrational band. α=–1/2



$^{235}_{92}U_{143}$

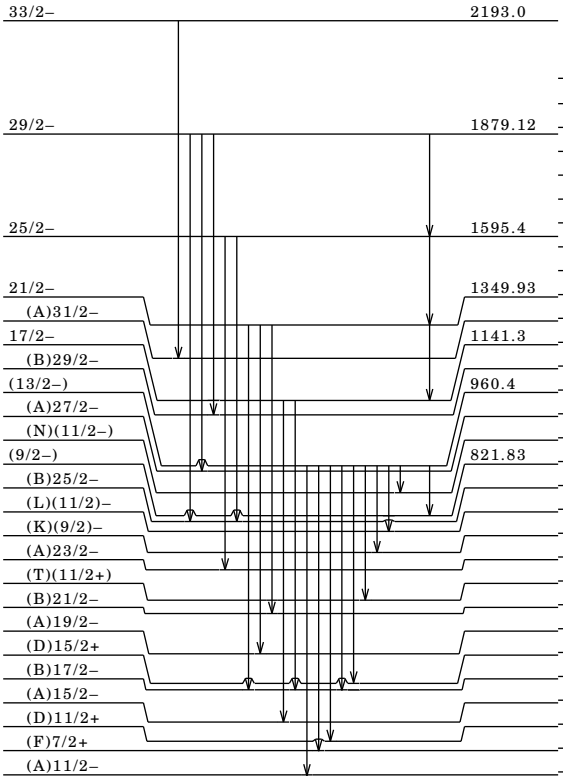
Adopted Levels, Gammas (continued)

(K) 5/2[752], α=+1/2 **(L) 5/2[752], α=–1/2**

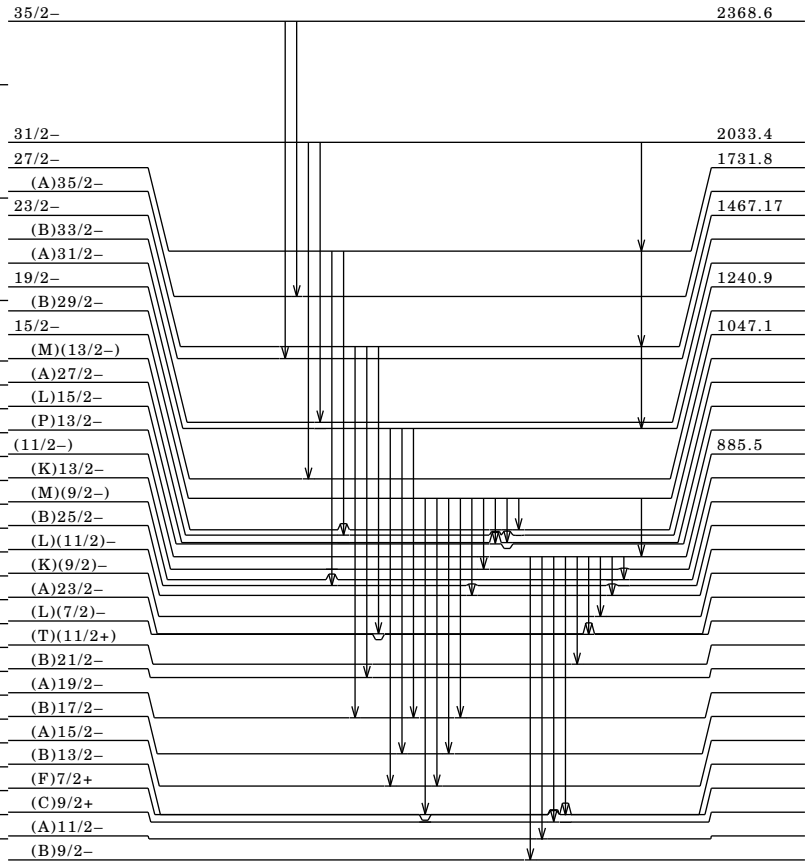


Adopted Levels, Gammas (continued)

(M) 9/2[734], α=+1/2



(N) 9/2[734], α=–1/2



$^{235}_{92}U_{143}$

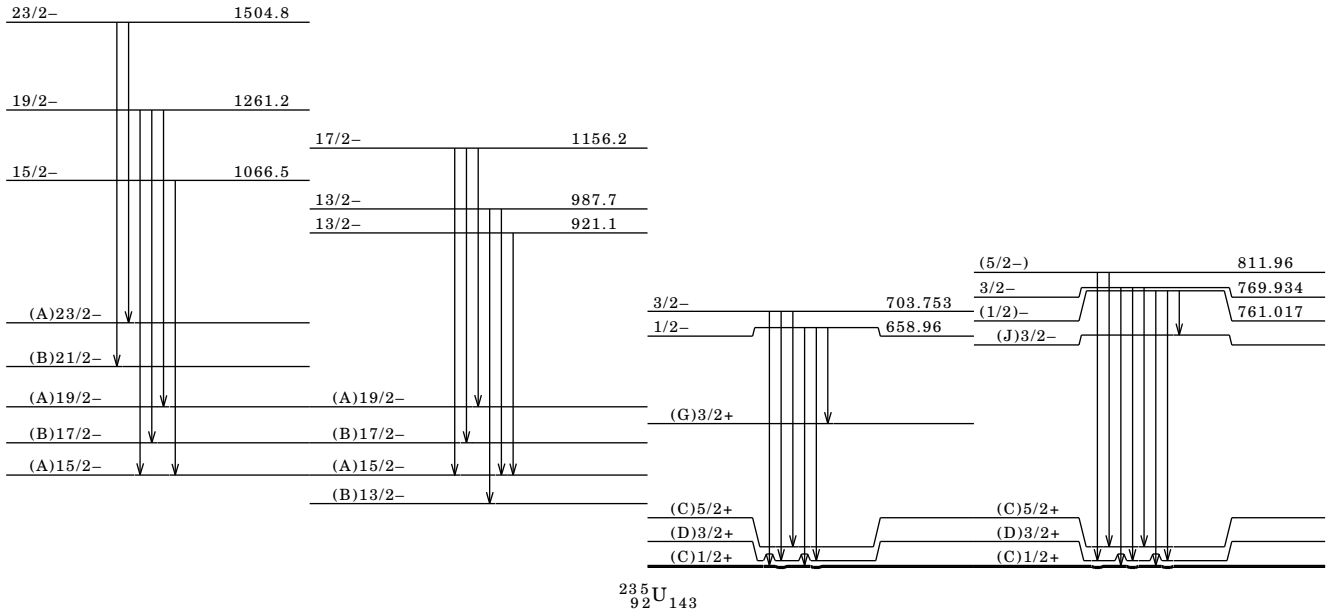
Adopted Levels, Gammas (continued)

(O) K=11/2 γ–vibrational band, α=+1/2

(P) K=11/2 γ–vibrational band, α=–1/2

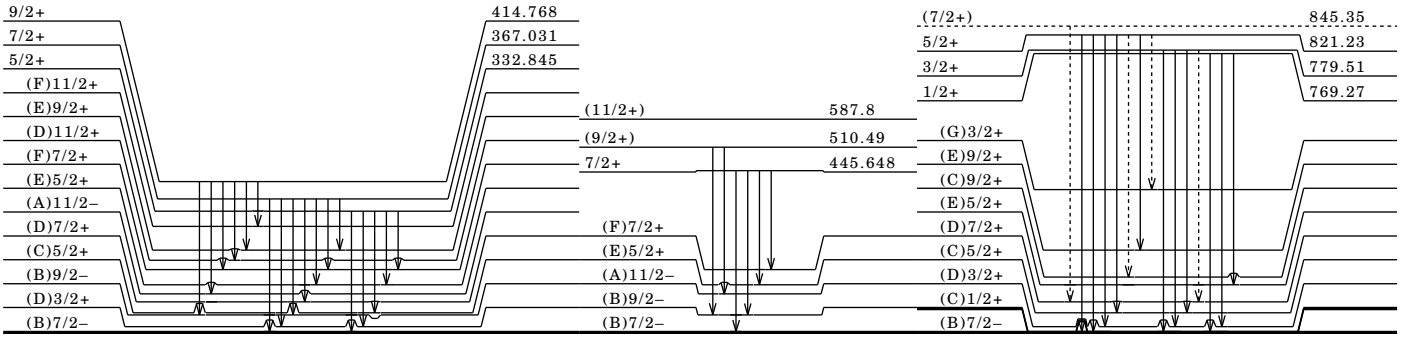
(Q) 1/2[501] + 1/2[770]

(R) 1/2[631]×0–



Adopted Levels, Gammas (continued)

(S) 5/2[633] **(T) 7/2[624]** **(U) 1/2[631]×0+ β vibration**

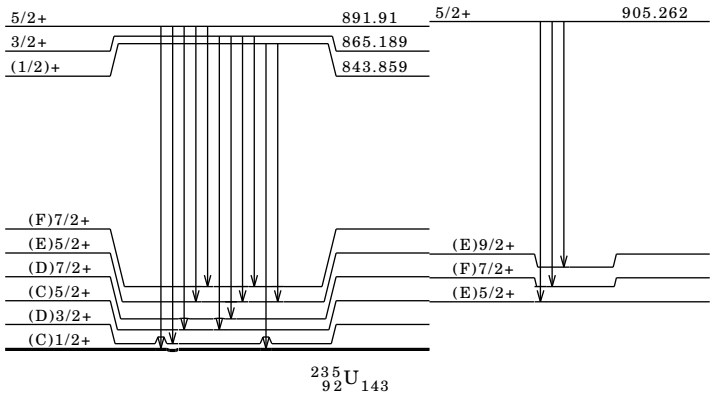


$^{235}_{92}U_{143}$

Adopted Levels, Gammas (continued)

(V) 5/2[622]–2+

(W) 5/2[622]×0+
β vibration



^{235}Pa β⁻ Decay 1969KaZX,1986Mi10

Parent ^{235}Pa: E=0; Jπ=(3/2−); $T_{1/2}$=24.4 min *2*; Q(g.s.)=1368 *14*; %β⁻ decay=100.

The decay scheme is based mainly on the data of 1969KaZX and 1986Mi10, and on the levels of ^{235}U known from other sources. Based on the absolute intensities of γ rays with energies higher than about 300 keV, it has been concluded that the β⁻ decay of ^{235}Pa feeds almost exclusively (99.99%) levels below 50 keV. Other: 1992He12.

^{235}U Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	7/2−	7.04×10^8 y *10*	$T_{1/2}$: From Adopted Levels.
0.1 *10*	1/2+	≈26 min	$T_{1/2}$: From Adopted Levels.
13.1 *12*	3/2+		
51.7 *13*	5/2+		
81.7 *14*	7/2+		
129.3	5/2+		
393.9 *13*	3/2+		
426.7 *14*	5/2+		
637.8 *10*	3/2−		
659.1 *13*	1/2−		
703.7 *16*	3/2−		

β⁻ radiations

Eβ⁻	E(level)	Iβ⁻†	Log *ft*	Comments
(664‡ *14*)	703.7	<0.01	>9	
(709‡ *14*)	659.1			
(730‡ *14*)	637.8			
(941‡ *14*)	426.7	≤0.01	≥9	
(974‡ *14*)	393.9	<0.01	>9.5	Log *ft*: compares with 7.3 in ^{233}Pa β⁻ decay.
(1239‡ *14*)	129.3			
1410 *50*	13.1	≈99.99	≈6.04	Eβ⁻: from 1968Tr07. Iβ⁻: sum of Iβ to the 1/2+, 3/2+ and 5/2+ members of the 1/2[631] band, based on 1986Mi10. Most of the intensity, however, feeds the 3/2+ level at 13 keV. Log *ft*: compares with log *ft*=6.7 to 3/2+ and 7.1 to 1/2+ in ^{233}Pa β⁻ decay.

† Absolute intensity per 100 decays.
‡ Existence of this branch is questionable.

γ(^{235}U)

Iγ≈3% (1968Tr07), ≤3% (1969KaZX) for the full γ–ray emission. 1986Mi10 (in disagreement) estimated an upper limit of 0.01% for the most intense γ rays (at 374.9 and 413.6 keV) in ^{235}Pa β⁻ decay.

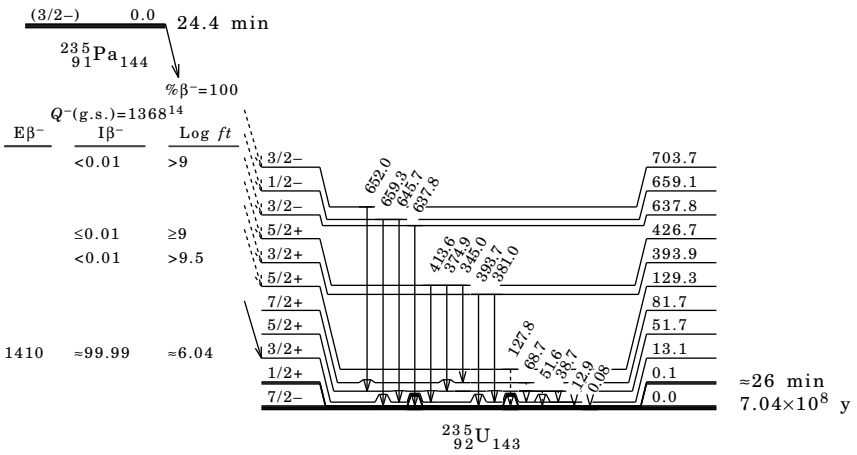
U K x ray detected (1969KaZX,1968Tr07). U L x ray not analyzed. Most of the β⁻ decay (≈99.99%) feeds the low–lying 3/2+ level at 13 keV (1986Mi10).

Eγ†	E(level)	Eγ†	E(level)	Eγ†	E(level)
(0.08)	0.1	x131.8		637.8	637.8
(12.9)	13.1	345.0	426.7	645.7	659.1
(38.7)	51.7	374.9	426.7	652.0	703.7
(51.6)	51.7	381.0	393.9	659.3	659.1
(68.7)	81.7	393.7	393.9		
127.8‡	129.3	413.6	426.7		

† From 1969KaZX. 1986Mi10 detected only the 375– and 414–keV γ rays.
‡ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

^{235}Pa β⁻ Decay 1969KaZX,1986Mi10 (continued)

Decay Scheme



Muonic Atom 1984Zu02

$T_{1/2}$=50.3 ns *10* fission fragments followed (1980Wi06). $T_{1/2}$=52.3 ns *13* electrons followed (1977Jo09). $T_{1/2}$=49.6 ns *6* fission fragments followed (1980Ah02). $T_{1/2}$=50.05 ns *14* fission fragments followed (1990Ha03).

Muonic x–rays measured with Ge(Li). Muons stopped in 97.64% enriched ^{235}U target. From the analysis of L, M, N x–rays 1984Zu02 deduced B(E2) values and deformation parameters for a deformed–Fermi charge distribution. Good agreement with the rigid rotor model was found; a small Coriolis admixture improved the agreement between theory and experiment (1984Zu02).

^{235}U Levels

E(level)†	Jπ	Comments
0.0	7/2–	β(2)=0.2485 *13*; β(4)=0.091 *4*. The quoted uncertainties are statistical only. 1984Zu02 estimated additional 0.5% and 2.0% model uncertainties for β(2) and β(4), respectively.
46.20 *5*	9/2–	B(E2)(7/2– to 9/2–)=4.834 *16*.
103.35 *6*	11/2–	B(E2)(7/2– to 11/2–)=1.19 *4*, B(E2)(9/2– to 11/2–)=4.65 *7*.
170.71 *6*	13/2–	B(E2)(9/2– to 13/2–)=2.12 *5*, B(E2)(11/2– to 13/2–)=3.78 *10*.

† From adopted levels, B(E2)'s from 1984Zu02.

^{235}Np ε Decay 1958Gi05

Parent ^{235}Np: E=0; Jπ=5/2+; $T_{1/2}$=396.2 d *12*; Q(g.s.)=124.0 *9*; %ε decay=99.9974 *1*.

No γ rays were observed. Based on (L xray)(L xray) coincidences, an upper limit of 2% was deduced for ε populations to levels above 13 keV, and from the 26–min activity in equilibrium with ^{235}Np, a total ε feeding of 0.1% to the 1/2[631] rotational band.

K x ray, L x ray studied by 1956Ho46, 1958Gi05, 1972Ha21, 1972Mc25, 1983Ah02. L x ray/K x ray=18.5 *10* measured by 1983Ah02. L x ray=34.0% *4*, $K\alpha_2$ x ray=0.59% *14*, $K\alpha_1$ x ray=0.95% *23*, Kβ x ray=0.46% *11*, calculated by evaluator using the computer program RADLST.

^{235}U Levels

E(level)	Jπ†	$T_{1/2}$†
0.0	7/2–	7.04×10⁸ y *1*
0.07	1/2+	≈26 min
13	3/2+	
46	9/2–	
52	5/2+	

Continued on next page (footnotes at end of table)

^{235}Np ε Decay 1958Gi05 (continued)

^{235}U Levels (continued)

E(level)	Jπ†
82	7/2+

† From Adopted Levels.

β+,ε Data

ε(L1)/ε(K)=29 *4*, ε(L)/ε(K)=32 *4*, ε(M)/ε(L)=0.46 *3* (1972Mc25).

Eε	E(level)	Iε†	Log *ft*
(42.0 *9*)	82	<0.1	>8.5
(72.0 *9*)	52	<0.1	>9.2
(78.0 *9*)	46	<2	>8.0
(111.0 *9*)	13	<0.1	>9.7
(123.9 *9*)	0.07	<0.1	>9.8
(124.0 *9*)	0.0	>97.9	<6.8

† For intensity per 100 decays, multiply by 0.999974 *1*.

^{239}Pu α Decay 1993Sc22

Parent ^{239}Pu: E=0; Jπ=1/2+; $T_{1/2}$=24110 y *30*; Q(g.s.)=5244.50 *21*; %α decay=100.
The decay scheme is given as presented in 1993Sc22.
For coincidence measurements information see 1971Ar47.

^{235}U Levels

E(level)†	Jπ	$T_{1/2}$	Comments
0.0	7/2−	7.04×10^8 y *1*	
0.0765 *4*	1/2+	≈26 min	E(level): from Adopted Levels. 1971CuZU reported E=0.572 *33* (calorimetry); This result does not agree with the value adopted here.
13.0401 *21*	3/2+	0.50 ns *3*	$T_{1/2}$: from 1970Ho02.
46.207 *10*	9/2−		
51.7008 *11*	5/2+	191 ps *5*	$T_{1/2}$: from 1970ToZZ. Other: 200 ps *20* (1970Ho02).
81.741 *4*	7/2+		
103.036 *10*	11/2−		
129.2961 *10*	5/2+		
150.467 *15*	9/2+		
170.708 *14*	13/2−		
171.388 *5*	7/2+		
197.119 *14*	11/2+		
225.422 *8*	9/2+		
249.130 *12*	15/2−		
291.144 *19*	11/2+		
294.668 *15*	13/2+		
332.845 *4*	5/2+		
338.52 *6*	17/2−		
357.30? *6*	15/2+		
367.069 *8*	7/2+		
393.225 *6*	3/2+		
414.779 *11*	9/2+		
426.755 *3*	5/2+		
445.716 *20*	7/2+		
474.297 *13*	7/2+		
509.92 *17*	(9/2+)		
533.228 *10*	9/2+		
608.09 *5*	11/2+		
633.17 *6*	(5/2)−		
637.82 *5*	3/2−		

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^{239}Pu α Decay 1993Sc22 (continued)

^{235}U Levels (continued)

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
658.97 *4*	1/2−	769.27 *6*	1/2+	865.35 *18*	3/2+
664.541 *23*	(5/2)−	769.5 *3*	3/2−	891.89 *15*	5/2+
670.99 *4*	(7/2)−	777.59 *19*	(11/2)−	968.451 *20*	3/2+
701.02 *3*	(7/2)−	779.51 *3*	3/2+	970.52? *22*	(5/2,7/2)
703.758 *19*	3/2−	805.73 *6*	3/2−	986.65 *17*	(13/2−)
720.25 *3*	(9/2)−	821.25 *4*	5/2+	992.72 *22*	(5/2+)
750.07 *16*	(9/2−)	843.859 *10*	(1/2)+	1057.58 *13*	(7/2)
761.05 *5*	(1/2)−	845.3? *10*	(7/2+)	1116.20? *20*	(5/2−)

† From a least−squares fit to γ−ray energies from ^{239}Pu α decay.

α radiations

Others: 2013Fe03, 2012Ni16,1996Vi07, 1996Ra09, 1996Pa22, 1996Ga19, 1996Co28, 1996Bu50, 1996Bo19, 1995Bo32, 1994Ra27, 1994Sa63, 1993Ya17, 1993Ha30, 1992Ma04, 1992Ga25.

Eα‡	E(level)	Iα@&	HF†	Comments
(4059)	1116.20?	21×10^{-9} *4*	41	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4117)	1057.58	93×10^{-9} *8*	31	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4181)	992.72	56×10^{-9} *7*	190	Iα: deduced by evaluator from γ−ray transition intensity balance. Iα does not include possible contribution from 767and 821 γ rays.
(4187)	986.65	7.6×10^{-8} *7*	158	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4202)	970.52?	4.0×10^{-8} *5*	412	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4204.5)	968.451	61×10^{-9} *4*	281	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4280)	891.89	19×10^{-8} *1*	398	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4306)	865.35	10×10^{-8} *1*	1250	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4326)	845.3?	4.18×10^{-8} *3*	4379	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4327)	843.859	23×10^{-8} *1*	818	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4349)	821.25	3.0×10^{-7} *4*	960	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4364.5)	805.73	83×10^{-9} *6*	4620	Iα: deduced by evaluator from γ−ray transition intensity balance.
≈4380	769.27	25×10^{-6} *8*	30	Iα: from 1963Bj03. Iα: 27×10^{-6}% *4*, deduced by evaluator from γ−ray transition intensity balance.
(4390)	779.51	1.0×10^{-6} *1*	622	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4392)	777.59	7.07×10^{-7} *23*	912	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4400.3)	769.5	10.3×10^{-6} *13*	73	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4408)	761.05	10×10^{-8} *2*	8700	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4419)	750.07	33×10^{-8} *3*	3230	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4448.5)	720.25	2.13×10^{-6} *9*	859	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4464.7)	703.758	115×10^{-7} *4*	214	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4467.4)	701.02	6.9×10^{-6} *1*	375	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4497)	670.99	$\leq3\times10^{-8}$	147000	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4503)	664.541	5.37×10^{-6} *9*	921	Iα: deduced by evaluator from γ−ray transition intensity balance.
4510 *20*	658.97	0.00008 *3*	68	Iα: 0.0000266% *5*, deduced by evaluator from γ−ray transition intensity balance.
(4529.6)	637.82	3.19×10^{-6} *3*	2483	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4534)	633.17	2.82×10^{-6} *5*	3047	Iα: deduced by evaluator from γ−ray transition intensity balance.
(4559)	608.09	12×10^{-6} *5*	1110	Iα: deduced by evaluator from γ−ray transition intensity balance.
4632 *3*	533.228	0.0007 *2*	69	Iα: from 1966Ah02. Iα: 0.00087% *3*, deduced by evaluator from γ−ray transition intensity balance.
(4655)	509.92	2.8×10^{-6} *6*	25400	Iα: deduced by evaluator from γ−ray transition intensity balance.
4691 *3*	474.297	0.0005 *2*	260	Iα: from 1966Ah02. Iα: 0.00060% *3*, deduced by evaluator from γ−ray transition intensity balance.
(4718.5)	445.716	40×10^{-6} *1*	5180	Iα: deduced by evaluator from γ−ray transition intensity balance.
4736 *3*	426.755	0.0051# *8*	55	Iα: other value: 0.0045% *10* (1976BaZZ,1971Ar47). Iα: 0.00587% *5*, deduced by evaluator from γ−ray transition intensity balance.
4749 *5*	414.779	≈0.0006	573	Iα: 0.00075% *12*, deduced by evaluator from γ−ray transition intensity balance.

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^{239}Pu α Decay 1993Sc22 (continued)

α radiations (continued)

Eα[‡]	E(level)	Iα[@&]	HF[†]	Comments
4769 *5*	393.225	0.0015[#] *6*	330	Iα: other value: 0.0008% *3* (1976BaZZ,1971Ar47). Iα: 0.00115% *5*, deduced by evaluator from γ–ray transition intensity balance.
4795 *4*	367.069	0.0012[#] *6*	620	Iα: other value: 0.0007% *2* (1976BaZZ,1971Ar47). Iα: 0.00095% *1*, deduced by evaluator from γ–ray transition intensity balance.
(4824)	338.52	22×10^{-6} *2*	53400	Iα: deduced by evaluator from γ–ray transition intensity balance.
4828 *3*	332.845	0.0024[#] *7*	540	Iα: other value: 0.0025% *6* (1971Ar47). Iα: 0.00359% *4*, deduced by evaluator from γ–ray transition intensity balance.
4866[a] *5*	294.668	0.0019[#] *7*	1240	Iα: other value: 0.02% *2* (1976BaZZ,1971Ar47). Iα: 0.0017% *5*, deduced by evaluator from γ–ray transition intensity balance.
4871 *5*	291.144	0.0007 *3*	3500	Iα: 0.0008% *5*, deduced by evaluator from γ–ray transition intensity balance.
4912 *5*	249.130	0.0024[#] *9*	1990	Iα: other value: 0.0005% *3* (1976BaZZ,1971Ar47). Iα: 0.0030% *16*, deduced by evaluator from γ–ray transition intensity balance.
4934 *3*	225.422	0.0060[#] *10*	1150	Iα: other value: 0.0040% *10* (1976BaZZ,1971Ar47). Iα: 0.005% *2*, deduced by evaluator from γ–ray transition intensity balance.
4960 *5*	197.119	0.007[#] *1*	1520	Iα: other value: 0.006% *3* (1976BaZZ,1971Ar47). Iα: 0.0048% *7*, deduced by evaluator from γ–ray transition intensity balance.
4987 *3*	171.388	0.013[#] *2*	1210	Iα: other value: 0.007% *2* (1976BaZZ,1971Ar47). Iα: Iα(170.7 + 171.4) (1966Ah02). Iα: 0.004% *5*, deduced by evaluator from γ–ray transition intensity balance.
5006 *5*	150.467	0.017[#] *2*	1260	Iα: other value: 0.013% *5* (1976BaZZ,1971Ar47). Iα: 0.023% *2*, deduced by evaluator from γ–ray transition intensity balance.
5028 *3*	129.2961	0.009[#] *3*	3300	Iα: other value: 0.005% *1* (1976BaZZ,1971Ar47). Iα: 0.012% *7*, deduced by evaluator from γ–ray transition intensity balance.
5054 *5*	103.036	0.047[#] *13*	930	Iα: other value: 0.025% *5* (1976BaZZ,1971Ar47). Iα: 0.038% *2*, deduced by evaluator from γ–ray transition intensity balance.
5076 *5*	81.741	0.078[#] *8*	765	Iα: other values: 0.03% *1* (1992Bl13); 0.036% *3* (1976BaZZ,1971Ar47). Iα: 0.051% *9*, deduced by evaluator from γ–ray transition intensity balance.
5105.5[§] *8*	51.7008	11.94[#] *7*	7.76	Iα: other values: 11.80% *19* (1992Bl13); 11.5% *8* (1991Ry01). Iα: 11.5% *3*, deduced by evaluator from γ–ray transition intensity balance.
5111[a]	46.207	<0.02	5010	Iα: deduced by evaluator from γ–ray transition intensity balance.
5144.3[§] *8*	13.0401	17.11[#] *14*	9.49	Iα: other values: 17.56% *28* (1992Bl13); 11.5% *8* (1991Ry01). Iα: 15.2% *4*, deduced by evaluator from γ–ray transition intensity balance.
5156.59[§] *14*	0.0765	70.77[#] *14*	2.76	Eα: other value: 5155.36 keV *19*, time–of–flight method (1992Fr04). Iα: other values: 70.73% *46* (1992Bl13); 73.3% *8* (1991Ry01). Iα: 73.0% *4*, deduced by evaluator from γ–ray transition intensity balance.
(5156.7)	0.0	0.03 *SY*	6500 *SY*	HF: alpha particles to g.s. were not detected. HF=6500 is based on analogy with ^{241}Cm α decay. Iα: based on HF=6500 from ^{241}Cm α decay.

[†] Using $r_0(^{235}U)$=1.5122, average of $r_0(^{234}U)$=1.5075 and $r_0(^{236}U)$=1.5168 (1998Ak04).
[‡] From 1968Ba25, 1971Ar47, 1981AhZV, unless otherwise specified (Eα values in parentheses have been calculated from Q(α) and level energies). Other: 1999Sa15.
[§] Evaluated alpha–particle energies from 1991Ry01.
[#] From 1993Ga28: values are combined results from measurements at CIEMAT (Spain) and IRMN (Belgium).
[@] From 1976BaZZ and 1971Ar47, unless otherwise specified.
[&] Absolute intensity per 100 decays.
[a] Existence of this branch is questionable.

^{239}Pu α Decay 1993Sc22 (continued)

γ(^{235}U)

$K\alpha_2$ x ray=0.00417% *4*, $K\alpha_1$ x ray=0.00652% *9*, $K\beta_1'$ x ray=0.002387% *17*, $K\beta_2'$ x ray=0.000216% *15*, L_l x ray=0.0996% *11*, L_α x ray=1.649% *18*, L_η x ray=0.0566% *10*, L_β x ray=2.30% *2*, L_γ x ray=0.568% *6*, L x ray=4.67% *5* (1992Bl07,1994Mo36).
L_l x ray=0.1016% *17*, L_α x ray=1.648% *36*, L_η x ray=0.0544% *9*, L_β x ray=2.28% *5*, L_γ x ray=0.579% *14*, L x ray=4.66% *6* (1994Le37).
$K\alpha_2$ x ray=0.00422% *1*, $K\alpha_1$ x ray=0.00676% *2* (1976GuZN); L x ray=6.7% *10* (1966Ah02).
γ rays at 313.5 and 1057.3 keV were reported in 1971GuZY but not in 1976GuZN.
Iγ normalization: Based on measurements in 1994Mo36.

Eγ[†‡]	E(level)	Iγ[§g]	Mult.[@]	δ[@]	α	Comments
0.0765 *4*	0.0765		E3		≈1×10^{10}	I(γ+ce)[g]: 99.9×10^6. I(γ+ce): from γ–ray transition intensity balance. Eγ: from Adopted Gammas.
12.975 *10*	13.0401	34100 *900*	M1+E2[a]	0.02	497	I(γ+ce)[g]: 18.4×10^6 *3*. Iγ: absolute intensity measurement (1994Mo36,1992Bl07). α: deduced by evaluator from γ–ray transition intensity balance at 13.0–keV level and Iγ=0.0341% *9* (1992Bl07,1994Mo36). Mult.,δ: deduced by evaluator from α(exp)=538.6, using α(exp)(Theory, M1)=513.7 and α(exp)(Theory, E2)=76830 from 1978Ro22.
[x]14.22[e] *3*		5.5×10^{3}[d] *4*				Reported only in 1994Mo36.
30.04 *2*	81.741	217 *6*	(M1)[a]		156.7	Other value: Eγ=30.03 keV *10*, Iγ=280 *80* (1994Mo36).
38.661 *2*	51.7008	10440[d] *130*	M1+E2[a]	0.48 *3*	298 *24*	Iγ: other value: Iγ=10460 *150* (1992Bl07).
[x]40.41[f] *5*		162 *16*				Reported only in 1976GuZN.
41.93[e] *5*	171.388	146[d] *15*	M1+E2[a]	0.14 *10*	70 *30*	Other value: Eγ=42.06 keV *3*, Iγ=165 *5* (1976GuZN).
46.21 *5*	46.207	72.1[d] *11*	M1(+E2)[a]	0.14 *14*	50 *30*	Iγ: other value: Iγ=737 *14* (1976GuZN).
46.68[e] *3*	197.119	46.5[d] *25*	(M1)[a]		42.7	Other value: Eγ=46.69 keV, Iγ=58 *4* (1976GuZN). Mult.: for pure M1 Iγ<100 from γ–ray transition intensity balance.
(47.60[e] *3*)	129.2961	62.5[d] *25*	(M1)[a]		40.4	
51.624 *1*	51.7008	27220[d] *220*	E2		310	Iγ: other value: Iγ=27360 *38* (1992Bl07).
54.039 *8*	225.422	194.4[d] *25*	M1(+E2)[a]	0.1 *1*	30 *7*	Iγ: other value: Iγ=197 *3* (1976GuZN).
56.828 *3*	103.036	1152[d] *13*	M1+E2	0.23 *2*	32.6 *16*	Iγ: other value: Iγ=1130 *25* (1976GuZN). δ: from muonic ^{235}U atom.
65.708 *30*	291.144	52.0[d] *34*	M1(+E2)[a]	0.23 *20*	20 *9*	
67.674 *12*	170.708	151.7[d] *23*	M1+E2	0.194 *3*	16.93 *25*	Iγ: other value: 164 *3* (1976GuZN). δ: from muonic ^{235}U atom.
68.696[h] *6*	81.741	360[dh] *100*	E2		78.6	
68.74[h] *CA*	150.467	130[dh] *60*	(M1+E2)	0.5 *SY*	30	Iγ: comparison with (n,γ) suggests that most of the intensity de–excites the 81.8 level. Iγ=485 *6* for doublet (1994Mo36). Other value: Iγ=410 *5* (1976GuZN).
[x]74.96[f] *10*		38 *6*				From 1971GuZY. A 74.88 *7* γ ray was reported in Coul. ex. deexciting the 608.1 *11*/2+ state; however, no strong α intensity from ^{239}Pu decay to this level was detected.
77.592 *14*	129.2961	380[d] *5*	M1(+E2)	0.5 *5*	17 *11*	Iγ: other value: Iγ=410 *20* (1976GuZN).
78.43 *2*	249.130	154.2[d] *22*	M1(+E2)	0.5 *5*	16 *10*	Iγ: other value: Iγ=141 *6* (1976GuZN).
89.64[eh] *3*	171.388	27[dh] *2*	(M1+E2)		14 *8*	Other value: Eγ=89.73 keV *4*, Iγ=30 *6* (1976GuZN).
≈89.7[h]	338.52	2[h] *SY*	[M1]		6.33	
96.14[e] *3*	225.422	37.9[dd] *18*	[E2]		16.02	Other value: Eγ=96.13 keV *5*, Iγ=22.3 *40* (1976GuZN).

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^{239}Pu α Decay 1993Sc22 (continued)

γ(^{235}U) (continued)

Eγ[†‡]	E(level)	Iγ[§g]	Mult.[@]	δ[@]	α	Comments
97.6 *3*	294.668		M1+E2	0.5 *3*	7.0 *19*	I(γ+ce)[g]: 700 *500*. Seen in ce only (1965Tr03).
98.780 *20*	150.467	1465[d] *68*	E2		14.11	Iγ: other value: 1220 *40* (1976GuZN).
103.060 *30*	103.036	215.6[d] *54*	E2		11.58	Iγ: other value: Iγ=230 *12* (1976GuZN).
115.38 *5*	197.119	462 *50*	E2		6.87	Iγ: from 1976GuZN and corrected for x–ray component.
116.26 *2*	129.2961	567[d] *11*	M1(+E2)	0.56 *56*	14 *3*	Iγ: other value: Iγ=597 *9* (1976GuZN).
119.70[eh] *3*	171.388	21[dh] *10*	(M1+E2)		10 *4*	Other value; Eγ=119.72 keV *3*, Iγ=22 *10* (1976GuZN).
≈119.7[hi]	291.144	≈9.5[h]	[E2]		6.00	Iγ: Iγ=30.2 *18* for the doublet (1994Mo36). Intensity split based on (n,γ). Other value: Iγ=32 *2* (1976GuZN).
122.35[i] *12*	225.422	0.95[d] *12*	[E1]		0.312	Iγ: other value: Iγ=3 *2* (1976GuZN). From 1968Cl02.
(123.228 *5*)	761.05	0.0016 *4*	[M1]		12.19	Iγ: from (n,γ).
123.62 *5*	414.779	23.7[d] *9*	[M1]		12.08	Iγ: other value: Iγ=19.7 *12* (1976GuZN).
124.51 *3*	170.708	68.1[d] *18*	E2		5.06	Iγ: other values: 61.3 *25* (1976GuZN).
125.21 *10*	171.388	56.3[d] *15*	[E1]		0.296	Iγ: other values: 71.1 *20* (1976GuZN).
129.296 *1*	129.2961	6310[d] *40*	E1		0.275	Iγ: other value: Iγ=6310 *60* (1986LoZT).
141.657 *20*	367.069	32.0 *7*	[M1]		8.22	
143.35 *20*	225.422	17.3 *7*	[M1+E2]		5 *3*	
144.201 *3*	294.668	283 *6*	E2		2.71	
146.094 *6*	249.130	119[#] *3*	E2		2.57	
158.1 *3*	171.388	1.0 *1*	[E2]		1.86	
160.19[i] *5*	357.30?	6.2 *12*	[E2]		1.766	Eγ: from Coul. ex. Eγ=161.9 *5* deexciting the 359.0 *15*/2+ level.
161.450 *15*	332.845	123[#] *2*	(M1)		5.67	
167.81 *5*	338.52	2.9 *7*	[E2]		1.467	
171.393 *6*	171.388	110[#] *2*	[E1]		0.1414	
(172.560 *8*)	805.73	0.003 *CA*	M1		4.70	Eγ: from (n,γ). From (n,γ).
173.70 *5*	225.422	3.1 *8*	[E2]		1.280	
179.220 *12*	225.422	66[#] *1*	[E1]		0.1273	
[x]184.55 *5*		2.1 *7*	[M1]		3.89	
188.23 *10*	291.144	10.9 *11*	[E1]		0.1135	
189.360 *10*	414.779	83[#] *1*	[M1+E2]		2.3 *14*	
[x]193.13 *12*		8.9 *9*				
195.679 *8*	367.069	107[#] *1*	M1[&]		3.30	
[x]196.87 *5*		3.7 *4*				
203.550 *5*	332.845	569[#] *3*	M1		2.95	
218.0[i] *5*	414.779	1.2 *10*				Eγ,Iγ: from 1965Tr03, 1981UmZZ.
225.42 *4*	225.422	15.1 *5*	[E1]		0.0747	
237.77 *10*	367.069	14.4 *6*	[M1]		1.91	Eγ: from 1971GuZY, 1979Al03.
242.08 *3*	533.228	7.3 *5*	[M1]		1.82	
243.38 *3*	414.779	25.3 *5*	[M1+E2]		1.1 *7*	
244.92 *5*	291.144	5.1 *5*	[E1]		0.0618	
248.95 *5*	474.297	7.2 *7*	[M1]		1.680	
255.384 *15*	426.755	80[#] *1*	[M1]		1.565	
263.95 *3*	393.225	26.5 *10*	M1[&]		1.428	
265.7 *3*	658.97	1.6 *3*	[E1]		0.0514	
281.2 *2*	332.845	2.1 *3*	[M1+E2]		0.7 *5*	
285.3 *2*	367.069	1.9 *4*	[M1+E2]		0.7 *5*	
297.46 *3*	426.755	49.8[#] *8*	[M1]		1.025	
302.87 *5*	474.297	5.1 *4*	[M1]		0.976	
307.85 *5*	533.228	5.5 *4*	[M1]		0.933	
311.78 *4*	414.779	25.8[#] *7*	[E1]		0.0361	
316.41 *3*	445.716	13.2 *4*	M1[&]		0.865	
319.68 *10*	332.845	4.8 *5*	[M1+E2]		0.5 *4*	
320.862 *20*	367.069	54.2 *7*	[E1]		0.0339	
323.84 *3*	474.297	53.9 *7*	M1[&]		0.811	
332.845 *5*	332.845	494[#] *3*	E1		0.0313	
336.113 *12*	533.228	112 *2*	M1		0.733	

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^{239}Pu α Decay 1993Sc22 (continued)

γ(^{235}U) (continued)

Eγ[†‡]	E(level)	Iγ[§g]	Mult.[@]	δ[@]	α	Comments
341.506 *10*	393.225	66.2 *14*	M1		0.701	
345.013 *4*	426.755	556[#] *5*	M1[&]		0.682	
345.014[i] *30*	474.297	<50	(M1)		0.682	
[x]350.8 *3*		1.8 *4*				
354.0 *5*	367.069	0.73 *30*	[E2]		0.1155	
361.89 *5*	533.228	12.2 *6*	[M1]		0.598	
367.073 *25*	367.069	89 *2*	[E1]		0.0254	
368.554 *20*	414.779	88 *2*	[E1]		0.0252	
375.054 *3*	426.755	1554[#] *9*	M1[&]		0.543	
380.191 *6*	393.225	305[#] *6*	M1[&]		0.523	
382.75 *5*	533.228	259[#] *5*	M1		0.513	
392.53 *3*	474.297	205 *20*	M1[&]		0.479	
393.14 *3*	393.225	348 *30*	M1[&]		0.477	Iγ: from I(392γ+393γ)=552.7 *11* (1976GuZN) and I(392γ)/I(393γ)=0.59 from (n,γ) of 1979Al03.
399.53 *6*	445.716	5.9 *3*	[E1]		0.0213	
406.8 *2*	509.92	2.5 *5*	[E1]		0.0205	Eγ: not reported by 1971GuZY, not detected in Coul. ex.
411.2 *3*	608.09	6.8 *34*	[M1]		0.422	
(412.3 *CA*)	805.73	0.018	[E1]		0.02006	
413.713 *5*	426.755	1466[#] *11*	M1[&]		0.415	
422.598 *19*	474.297	122[#] *2*	M1[&]		0.392	
426.68 *3*	426.755	23.3 *6*	[E2]		0.0699	
428.4 *3*	474.297	1.00 *10*	[E1]		0.0184	
430.08 *10*	533.228	4.30 *13*	[E1]		0.0183	
445.72 *3*	445.716	8.8[#] *6*	E1[&]		0.01698	
[x]446.82 *20*		0.84 *20*				
451.481 *10*	533.228	189.4[#] *16*	M1(+E2)	1.0 *10*	0.19 *14*	
457.61 *5*	608.09	1.49 *2*	[M1]		0.316	
461.25 *5*	474.297	2.27 *2*	[E2]		0.0575	
463.9 *3*	509.92	0.28 *3*	[E1]		0.01566	
473.9 *5*	474.297	0.054 *27*	[E1]		0.01501	
481.66 *12*	533.228	4.6[#] *2*	[E2]		0.0517	
487.06 *10*	533.228	0.265 *21*	[E1]		0.01421	
493.08[i] *5*	664.541	0.87 *3*				
[x]497.0 *5*		0.046 *23*				
526.4 *4*	608.09	0.057 *19*	[E2]		0.0419	
[x]538.8 *2*		0.30 *2*				
550.5 *2*	701.02	0.42 *3*	[E1]		0.01117	
[x]557.3 *5*		0.038 *19*				
579.4 *3*	750.07	0.086 *17*	[E2]		0.0337	
582.89 *10*	664.541	0.615 *18*	[E1]		0.01001	
586.3 *3*	637.82	0.153 *15*	[E1]			
596.0 *5*	821.25	0.039 *20*	[E2]		0.0317	
597.99 *5*	701.02	1.67 *5*	[E2]		0.0314	
599.6 *2*	750.07	0.20 *2*	[E1]			
606.9 *2*	777.59	0.120 *12*	M1(+E2)[b]	<1	0.12 *3*	
[x]608.9 *2*		0.116 *12*				
612.83 *3*	664.541	0.95 *5*	E1[&]			
617.10 *10*	720.25	1.34 *7*	[M1]		0.1415	
618.28 *6*	664.541	2.04 *6*	(E2)[&]		0.0292	
619.21 *6*	701.02	1.21 *8*	[E1]			
624.78[j] *5*	637.82	0.437[j] *20*	[E1]			Doublet.
624.78[ij] *3*	670.99	0.437[j] *20*	(M1)		0.1369	Doublet.
633.15 *6*	633.17	2.53 *3*	M1(+E2)[&]	<0.5	0.122 *11*	
637.7[j]	637.82	2.56[j] *3*	[E1]			Doublet.
637.8[j]	637.82	2.56[j] *3*	E2[&]		0.0273	Doublet.
639.99 *10*	769.27	8.7[#] *2*	[E2]		0.0271	
645.94 *4*	658.97	15.2 *3*	E1[&]			
649.32 *6*	701.02	0.71 *5*	[E1]			
[x]650.529 *60*		0.27 *4*				
652.05 *2*	703.758	6.6[#] *2*	E1[&]			
654.88 *8*	701.02	2.25 *3*	(E2)[b]		0.0258	

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^{239}Pu α Decay 1993Sc22 (continued)

γ(^{235}U) (continued)

Eγ[†‡]	E(level)	Iγ[§g]	Mult.[@]	δ[@]	α	Comments
658.86 *6*	658.97	9.7 *2*	E1[&]			
664.58 *5*	664.541	1.66 *3*	E2[&]		0.0251	
668.2 *5*	750.07	0.039 *13*	[E1]			
670.8[cij] *5*	821.25	0.009[j]				Doublet.
670.99[cij] *4*	670.99	0.009[j]	[M1+E2]		0.07 *5*	Doublet.
674.05 *3*	720.25	0.515 *16*	[M1]		0.1118	Doublet.
674.4 *5*	777.59	0.515 *16*	(M1)		0.1116	Doublet.
[x]685.97 *11*		0.87 *3*	E1[&]			
[x]688.1 *3*		0.111 *11*				
690.81 *8*	703.758	0.90 *25*	E1[&]			Iγ: from 1981UmZZ.
[x]693.2[h] *5*		0.03[h] *1*				
693.2[h] *5*	865.35	0.02[h] *CA*	(E2)		0.0229	Iγ: from (n,γ).
697.8 *5*	779.51	0.074 *15*				
[x]699.6 *5*		0.079 *16*				
701.1 *2*	701.02	0.512 *16*	[M1+E2]		0.06 *4*	
703.68 *5*	703.758	3.95 *2*	E1[&]			
[x]712.96 *5*		0.052 *6*				
714.71 *14*	843.859	0.079 *8*	E2[&]		0.0215	
718.0 *5*	769.5	2.8[#] *2*	E1[&]			
720.3[h] *5*	720.25	0.0285[h] *CA*				Iγ: from 1976GuZN Iγ(720.3)=0.0485 and using Branching for 891 level in (n,γ).
720.3[h] *CA*	891.89	0.020[h] *CA*				Iγ: from (n,γ).
727.9 *2*	779.51	0.124 *6*	M1[&]		0.0911	
736.5 *5*	865.35	0.030 *10*	M1+E2[&]	1.2 *2*	0.048 *7*	
[x]742.7 *5*		0.038 *13*				
747.4 *5*	761.05	0.081 *16*	E1			
756.4[h] *2*	769.27	2.8[h] *5*	[M1+E2]		0.05 *4*	The Iγ has been split based on the (n,γ) decay scheme. The measured intensity of the doublet is 3.47 with 0.4% uncertainty.
756.4[h] *4*	769.5	0.67[h] *20*	[E1]			
762.6 *CA*	891.89	0.010 *CA*				Iγ: from (n,γ).
763.6 *CA*	845.3?	0.022 *CA*	E0(+M1)[&]		>0.9	Iγ: from 1976GuZN Iγ(763.7)=0.032 and from Branching from 892 level in (n,γ).
766.47 *3*	779.51	0.13 *2*	E0+M1[&]		4.0 *4*	Doublet. Iγ: from (n,γ). Iγ(doublet)=0.275 in ^{239}Pu α decay.
767.29[hi] *4*	992.72	≈0.14[h]				Doublet. Iγ: from (n,γ). Iγ(doublet)=0.275 in ^{239}Pu α decay.
769.15 *8*	769.27	5.1 *10*	M1+E0		2.0 *2*	E and α are from (n,γ). Iγ(769.37)=11.9 *2* is from ^{239}Pu α decay(1986LoZT) and γ–ray branchings in (n,γ).
769.37 *50*	769.5	6.8 *12*	E1[&]			The intensities are split based on the (n,γ) level scheme; Iγ of doublet is 11.9 *2* (1986LoZT).
(769.54 *4*)	821.25		(E0)[&]			I(γ+ce)[g]: 0.08 *2*.
[x]777.1 *3*		0.028 *7*				
779.4	779.51	0.136 *8*	M1[&]		0.0760	Eγ: from (n,γ). Reported as 779.61 by 1976GuZN.
[x]786.9 *2*		0.086 *9*	E2[&]		0.01771	
[x]788.5 *3*		0.035 *7*				
792.9 *3*	805.73	0.020 *4*	(E1)[&]			
[x]796.9 *3*		0.015 *3*				
[x]803.2 *2*		0.064 *5*				
805.9 *3*	805.73	0.027 *4*	E2[&]		0.01688	
808.4 *2*	821.25	0.121 *6*	M1[&]		0.0689	
813.7 *2*	865.35	0.045 *5*	M1[&]		0.0677	
816.0 *2*	986.65	0.024 *4*	[M1+E2]		0.04 *3*	
821.3[h] *2*	821.25	0.050[h] *11*				Possible doublet.

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^{239}Pu α Decay 1993Sc22 (continued)

γ(^{235}U) (continued)

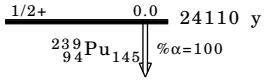
Eγ[†‡]	E(level)	Iγ[§g]	Mult.[@]	δ[@]	α	Comments
821.3[hi] *2*	992.72	<0.01[h]				Possible doublet.
[x]826.8 *3*		0.018 *6*				
[x]828.9 *2*		0.133 *8*				
832.5 *2*	1057.58	0.0296 *23*				
[x]837.3 *2*		0.019 *4*				
840.4 *2*	891.89	0.048 *5*	M1(+E0)[&]		0.14 *2*	
843.780 *10*	843.859	0.134 *7*	M1(+E0)[&]		0.09 *1*	Eγ: from (n,γ). Reported as 844.0 by 1976GuZN.
879.2 *3*	891.89	0.036 *4*	[M1+E2]		0.035 *21*	
891.0 *3*	891.89	0.075 *8*	[E2]		0.01385	
[x]895.4 *3*		0.0075 *25*				
[x]898.1 *3*		0.018 *4*				
[x]905.5 *3*		0.0075 *25*				
[x]911.7 *3*		0.014 *4*				
918.7 *3*	970.52?	0.0084 *30*				
[x]931.9 *3*		0.013 *4*				
940.3 *3*	986.65	0.050 *5*	[E2]		0.01248	
955.6 *2*	968.451	0.031 *3*	M1+E2[&]	0.6 *2*	0.036 *5*	
957.6 *3*	970.52?	0.032 *3*				
(968.37 *2*)	968.451	0.028 *CA*	M1+E2[&]	0.6 *3*	0.035 *6*	
979.7 *3*	992.72	0.028 *5*	[M1+E2]		0.026 *15*	
[x]982.7 *3*		0.011 *3*				
986.9 *2*	1116.20?	0.021 *4*	E1[&]			
992.7 *3*	992.72	0.027 *4*				
1005.7 *3*	1057.58	0.018 *3*				
[x]1009.4 *3*		0.014 *3*				
1057.3 *2*	1057.58	0.045 *7*				

[†] Eγ from (n,γ) (1979Al03) above 600 keV are ≈0.1 keV systematically higher than Eγ from 1976GuZN. Some ΔE of multiply placed γ rays have been estimated by evaluators on the basis of (n,γ) results.
[‡] From 1968Cl02, 1971GuZY, 1976GuZN, 1982He02, 1992Bl07.
[§] From 1976GuZN, unless otherwise specified. Other measurements: 1966Ah02, 1966Ho09, 1968Cl02, 1971GuZY, 1981UmZZ, 1982He02, 1984Iw02, 1992Ba08, 1997Bu23, 1992Co10, 1997Ko52.
[#] From 1986LoZT.
[@] From ce data in 1965Tr03 and adopted Iγ, unless otherwise specified. Some δ were deduced from γ–ray intensity balances using experimental α–particle intensities.
[&] From (n,γ) results in 1979Al03.
[a] From intensity balance.
[b] From Coul. ex.
[c] γ placed more than once in the decay scheme.
[d] Absolute γ–ray intensity measurement (1994Mo36).
[e] From (1994Mo36).
[f] Assignment to ^{239}Pu α decay is uncertain.
[g] For absolute intensity per 100 decays, multiply by 1.00×10^{-6}.
[h] Multiply placed; intensity suitably divided.
[i] Placement of transition in the level scheme is uncertain.
[j] Multiply placed; undivided intensity given.
[x] γ ray not placed in level scheme.

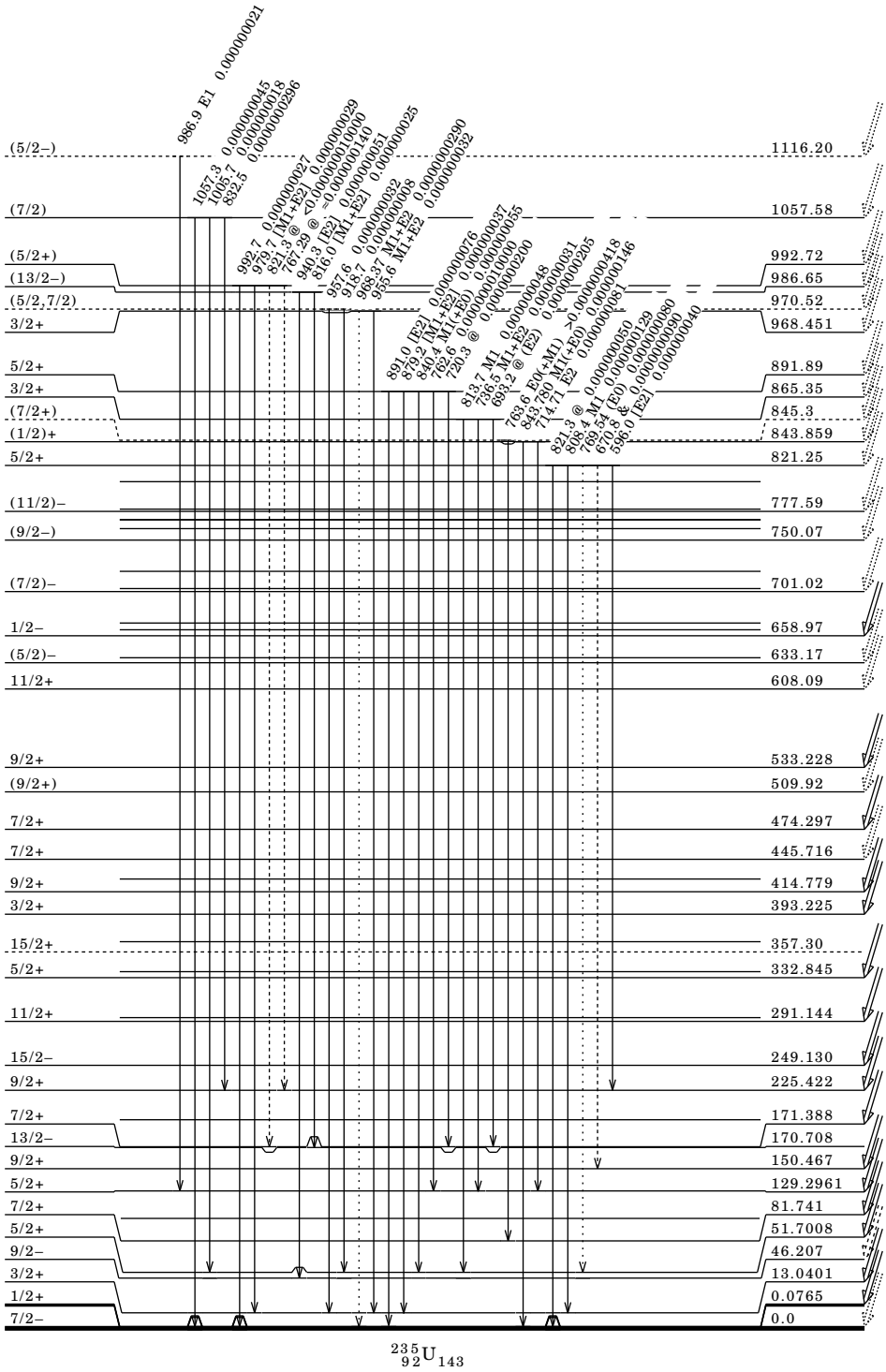
^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



Q_α(g.s.)=5244.50[21]



Eα	Iα	HF
	21×10^{-9}	41
	93×10^{-9}	31
	56×10^{-9}	190
	7.6×10^{-8}	158
	4.0×10^{-8}	412
	61×10^{-9}	281
	19×10^{-8}	398
	10×10^{-8}	1250
	4.18×10^{-8}	4379
	23×10^{-8}	818
	3.0×10^{-7}	960
	7.07×10^{-7}	912
	33×10^{-8}	3230
	6.9×10^{-6}	375
4510	0.00008	68
	2.82×10^{-6}	3047
	12×10^{-6}	1110
4632	0.0007	69
	2.8×10^{-6}	25400
4691	0.0005	260
	40×10^{-6}	5180
4749	≈0.0006	573
4769	0.0015	330
4828	0.0024	540
4871	0.0007	3500
4912	0.0024	1990
4934	0.0060	1150
4987	0.013	1210
5006	0.017	1260
5028	0.009	3300
5076	0.078	765
5105.5	11.94	7.76
	<0.02	5010
5144.3	17.11	9.49
5156.59	70.77	2.76
	0.03	6500

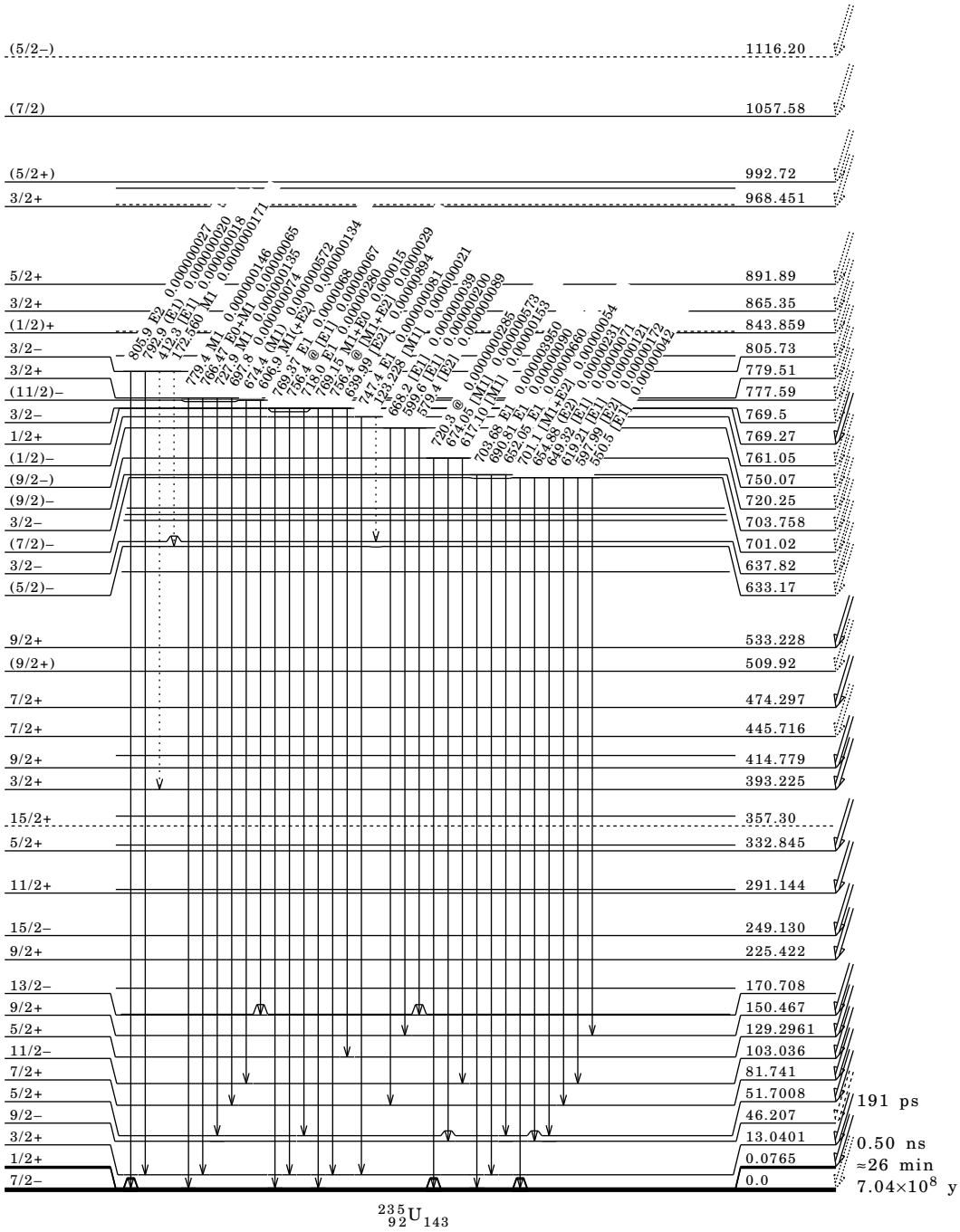
^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given

1/2+ 0.0 24110 y
$^{239}_{94}Pu_{145}$ %α=100

Q_α(g.s.)=5244.50[21]

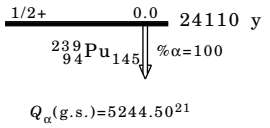


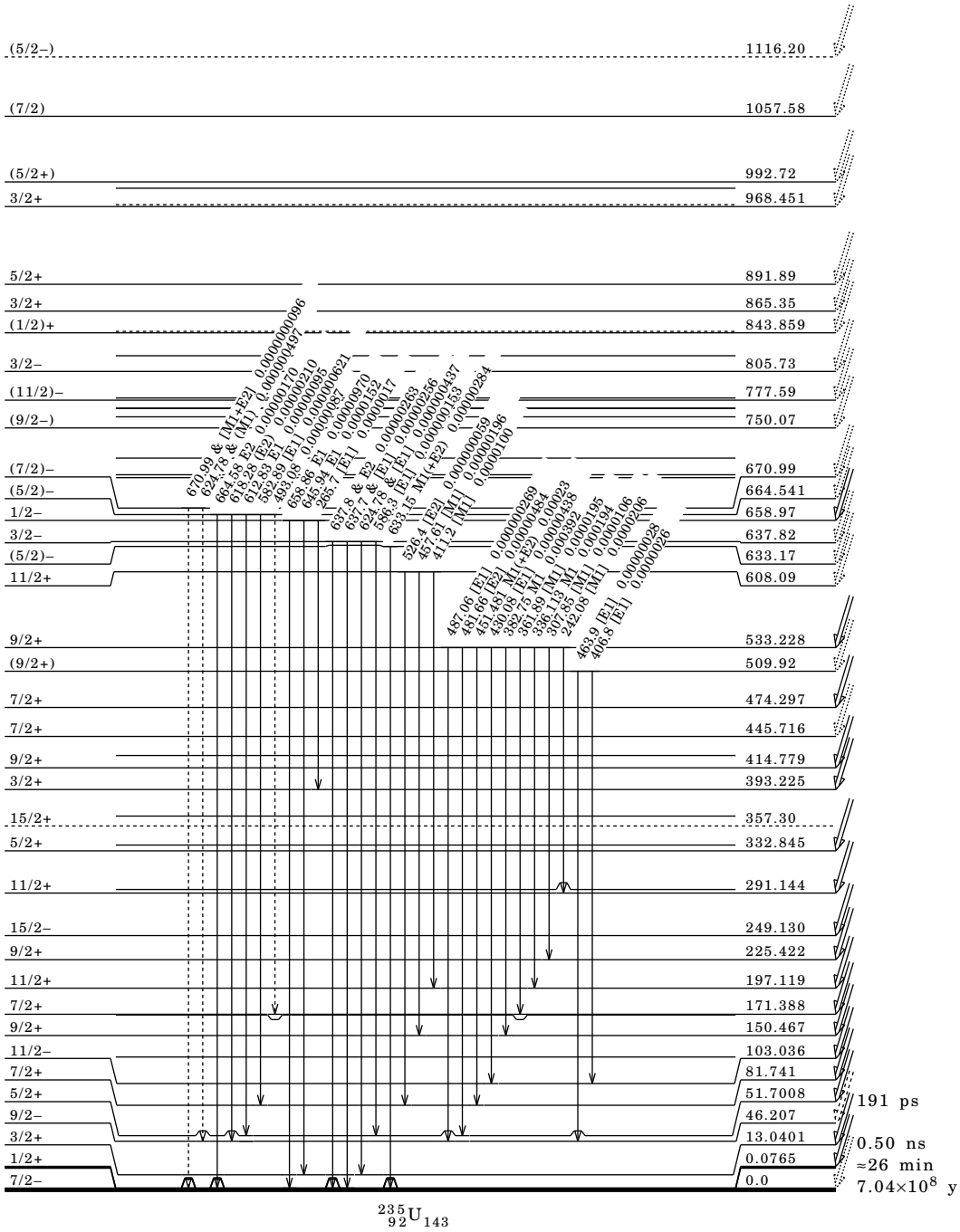
	Eα	Iα	HF
1116.20		21×10^{-9}	41
1057.58		93×10^{-9}	31
992.72		56×10^{-9}	190
968.451		61×10^{-9}	281
891.89		19×10^{-8}	398
865.35		10×10^{-8}	1250
843.859		23×10^{-8}	818
805.73		83×10^{-9}	4620
779.51		1.0×10^{-6}	622
777.59		7.07×10^{-7}	912
769.5		10.3×10^{-6}	73
769.27	≈4380	25×10^{-6}	30
761.05		10×10^{-8}	8700
750.07		33×10^{-8}	3230
720.25		2.13×10^{-6}	859
703.758		115×10^{-7}	214
701.02		6.9×10^{-6}	375
637.82		3.19×10^{-6}	2483
633.17		2.82×10^{-6}	3047
533.228	4632	0.0007	69
509.92		2.8×10^{-6}	25400
474.297	4691	0.0005	260
445.716		40×10^{-6}	5180
414.779	4749	≈0.0006	573
393.225	4769	0.0015	330
357.30			
332.845	4828	0.0024	540
291.144	4871	0.0007	3500
249.130	4912	0.0024	1990
225.422	4934	0.0060	1150
170.708			
150.467	5006	0.017	1260
129.2961	5028	0.009	3300
103.036	5054	0.047	930
81.741	5076	0.078	765
51.7008	5105.5	11.94	7.76
46.207		<0.02	5010
13.0401	5144.3	17.11	9.49
0.0765	5156.59	70.77	2.76
0.0		0.03	6500

^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given





Eα	Iα	HF
	21×10^{-9}	41
	93×10^{-9}	31
	56×10^{-9}	190
	61×10^{-9}	281
	19×10^{-8}	398
	10×10^{-8}	1250
	23×10^{-8}	818
	83×10^{-9}	4620
	7.07×10^{-7}	912
	33×10^{-8}	3230
	≤3×10^{-8}	147000
	5.37×10^{-6}	921
4510	0.00008	68
	3.19×10^{-6}	2483
	2.82×10^{-6}	3047
	12×10^{-6}	1110
4632	0.0007	69
	2.8×10^{-6}	25400
4691	0.0005	260
	40×10^{-6}	5180
4749	≈0.0006	573
4769	0.0015	330
4828	0.0024	540
4871	0.0007	3500
4912	0.0024	1990
4934	0.0060	1150
4960	0.007	1520
4987	0.013	1210
5006	0.017	1260
5054	0.047	930
5076	0.078	765
5105.5	11.94	7.76
	<0.02	5010
5144.3	17.11	9.49
5156.59	70.77	2.76
	0.03	6500

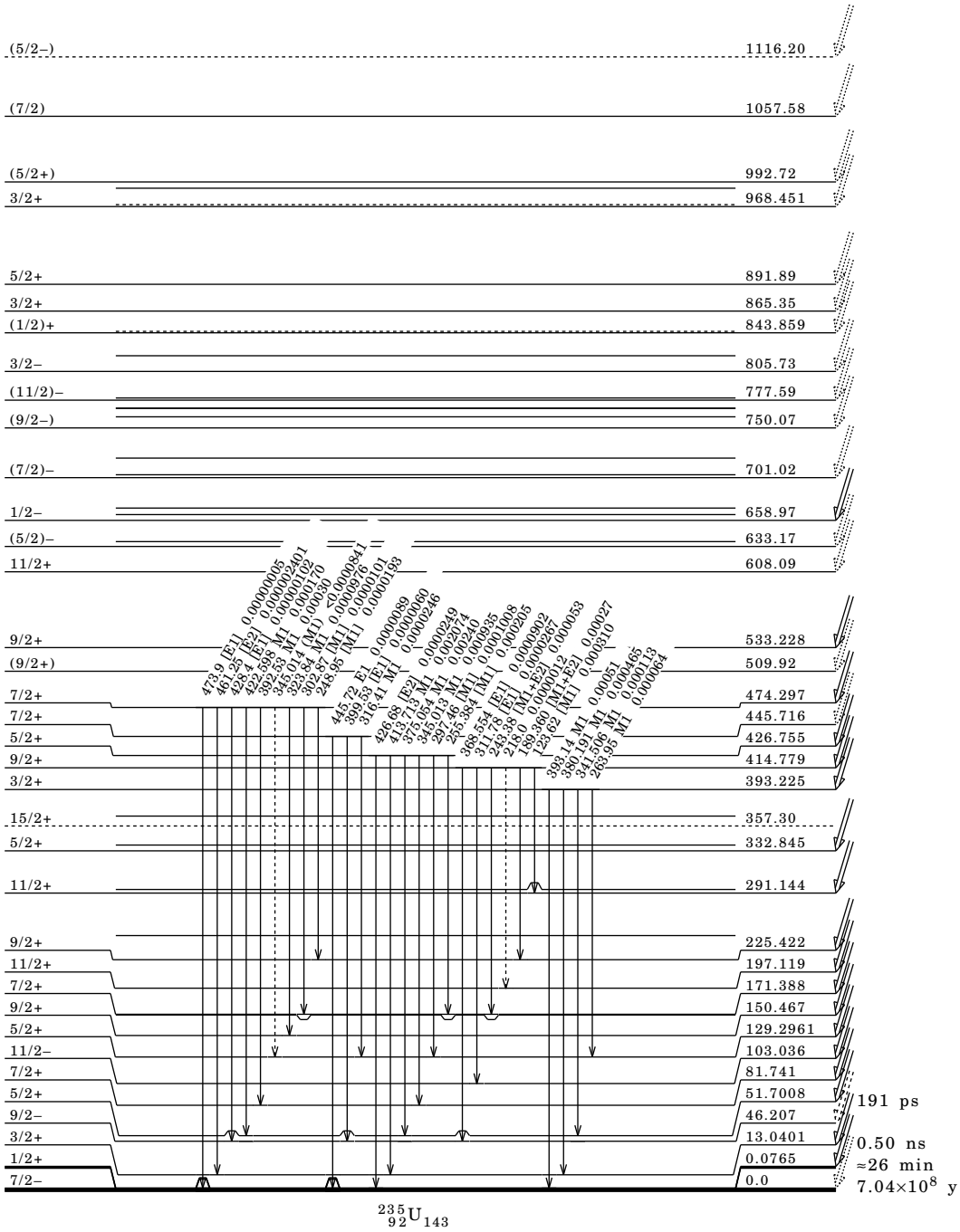
^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given

1/2+ 0.0 24110 y
$^{239}_{94}Pu_{145}$ %α=100

Q_α(g.s.)=5244.50[21]

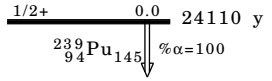


	Eα	Iα	HF
1116.20		21×10^{-9}	41
1057.58		93×10^{-9}	31
992.72		56×10^{-9}	190
968.451		61×10^{-9}	281
891.89		19×10^{-8}	398
865.35		10×10^{-8}	1250
843.859		23×10^{-8}	818
805.73		83×10^{-9}	4620
777.59		7.07×10^{-7}	912
750.07		33×10^{-8}	3230
701.02		6.9×10^{-6}	375
658.97	4510	0.00008	68
633.17		2.82×10^{-6}	3047
608.09		12×10^{-6}	1110
533.228	4632	0.0007	69
509.92		2.8×10^{-6}	25400
474.297	4691	0.0005	260
445.716		40×10^{-6}	5180
426.755	4736	0.0051	55
414.779	4749	≈0.0006	573
393.225	4769	0.0015	330
332.845	4828	0.0024	540
291.144	4871	0.0007	3500
225.422	4934	0.0060	1150
197.119	4960	0.007	1520
171.388	4987	0.013	1210
150.467	5006	0.017	1260
129.2961	5028	0.009	3300
103.036	5054	0.047	930
81.741	5076	0.078	765
51.7008	5105.5	11.94	7.76
46.207		<0.02	5010
13.0401	5144.3	17.11	9.49
0.0765	5156.59	70.77	2.76
0.0		0.03	6500

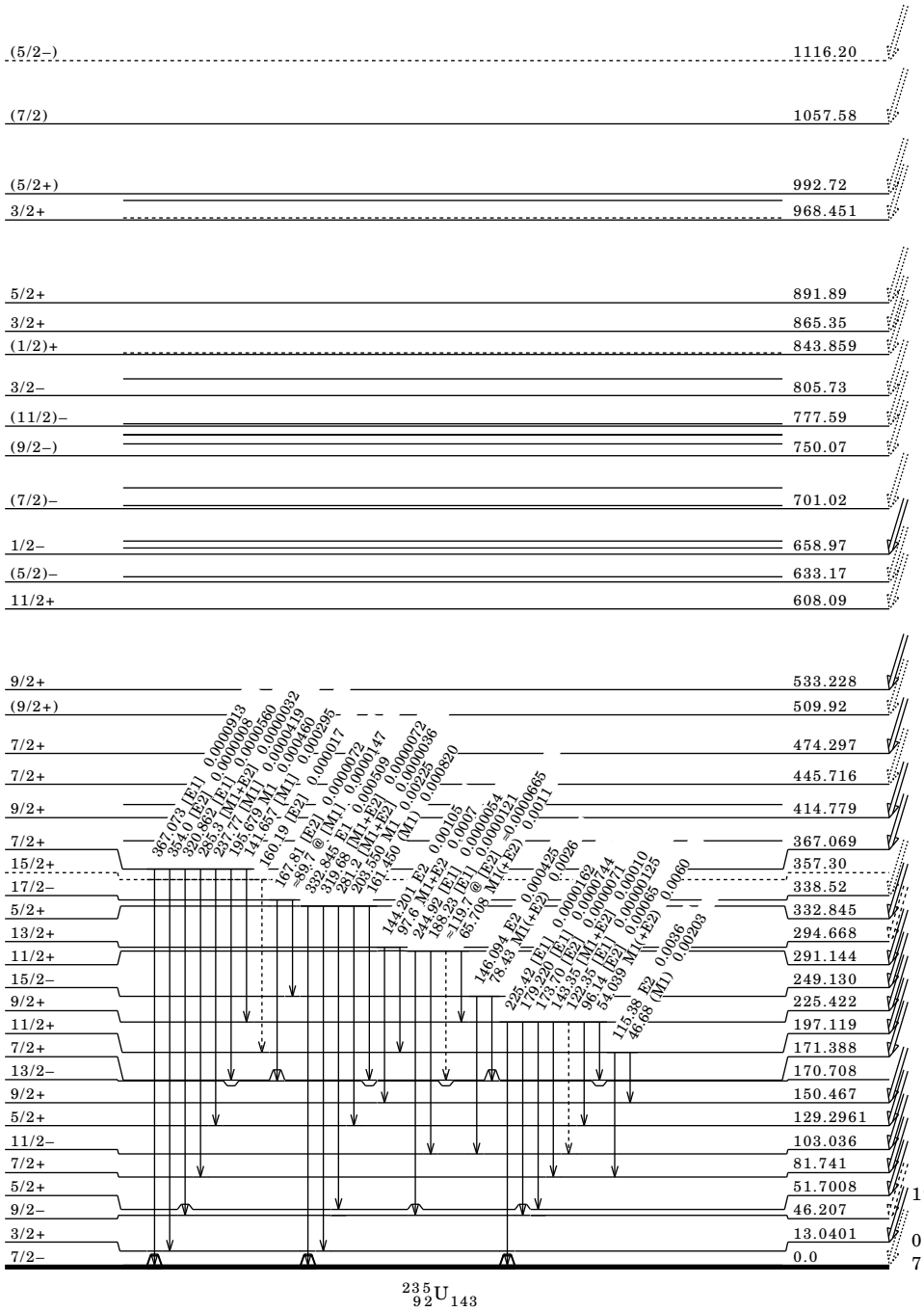
^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



Q_α(g.s.)=5244.50[21]

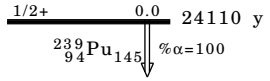


	Eα	Iα	HF
(5/2−) 1116.20		21×10^{-9}	41
(7/2) 1057.58		93×10^{-9}	31
(5/2+) 992.72		56×10^{-9}	190
3/2+ 968.451		61×10^{-9}	281
5/2+ 891.89		19×10^{-8}	398
3/2+ 865.35		10×10^{-8}	1250
(1/2)+ 843.859		23×10^{-8}	818
3/2− 805.73		83×10^{-9}	4620
(11/2)− 777.59		7.07×10^{-7}	912
(9/2−) 750.07		33×10^{-8}	3230
(7/2)− 701.02		6.9×10^{-6}	375
1/2− 658.97	4510	0.00008	68
(5/2)− 633.17		2.82×10^{-6}	3047
11/2+ 608.09		12×10^{-6}	1110
9/2+ 533.228	4632	0.0007	69
(9/2+) 509.92		2.8×10^{-6}	25400
7/2+ 474.297	4691	0.0005	260
7/2+ 445.716		40×10^{-6}	5180
9/2+ 414.779	4749	≈0.0006	573
7/2+ 367.069	4795	0.0012	620
15/2+ 357.30			
17/2− 338.52		22×10^{-6}	53400
5/2+ 332.845	4828	0.0024	540
13/2+ 294.668		0.0019	1240
11/2+ 291.144	4871	0.0007	3500
15/2− 249.130	4912	0.0024	1990
9/2+ 225.422	4934	0.0060	1150
11/2+ 197.119	4960	0.007	1520
7/2+ 171.388	4987	0.013	1210
13/2− 170.708			
9/2+ 150.467	5006	0.017	1260
5/2+ 129.2961	5028	0.009	3300
11/2− 103.036	5054	0.047	930
7/2+ 81.741	5076	0.078	765
5/2+ 51.7008	5105.5	11.94	7.76
9/2− 46.207		<0.02	5010
3/2+ 13.0401	5144.3	17.11	9.49
7/2− 0.0		0.03	6500

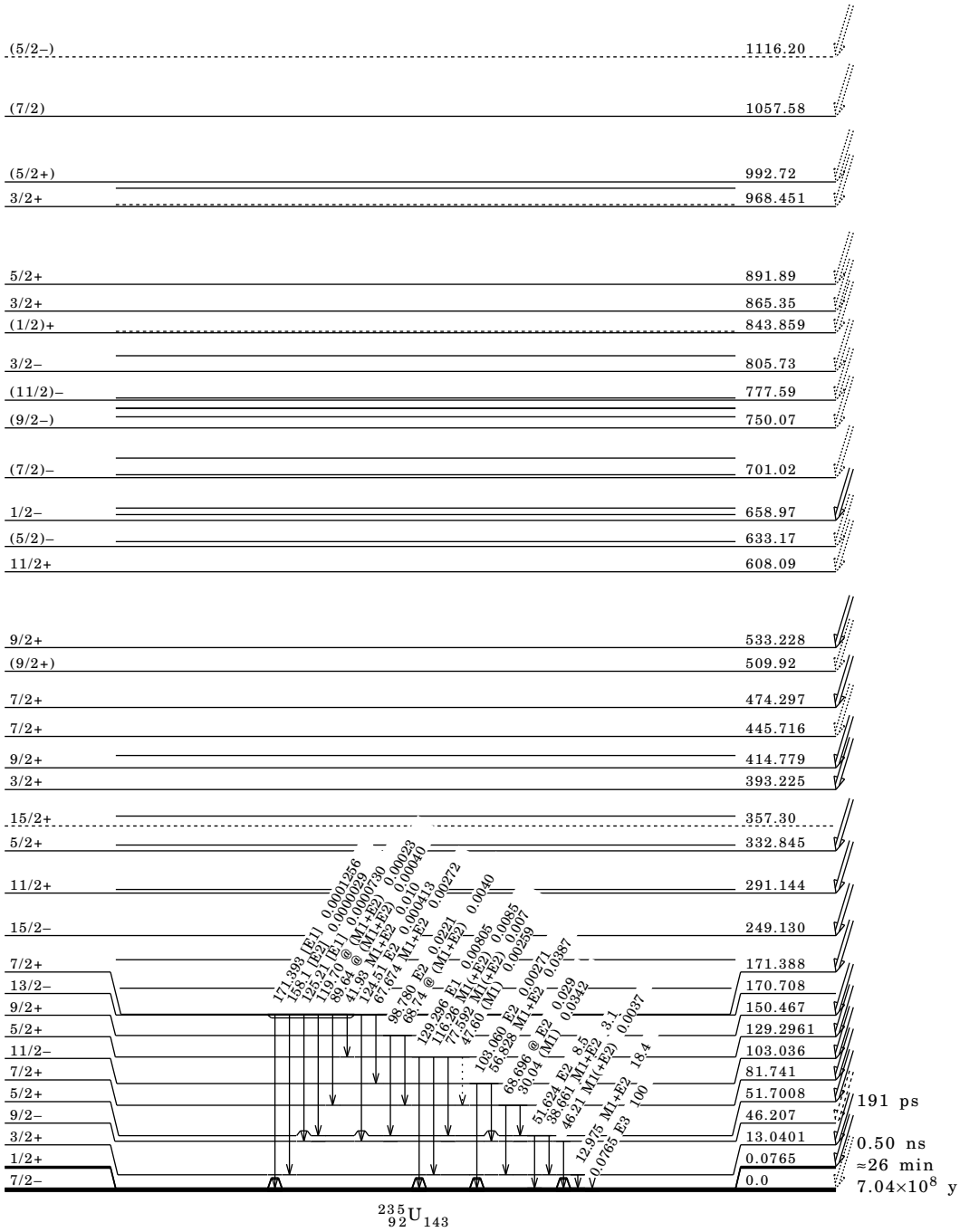
^{239}Pu α Decay 1993Sc22 (continued)

Decay Scheme (continued)

Intensities: I(γ+ce) per 100 parent decays
@ Multiply placed; intensity suitably divided
& Multiply placed; undivided intensity given



Q_α(g.s.)=5244.50[21]



	Eα	Iα	HF
(5/2−) 1116.20		21×10^{-9}	41
(7/2) 1057.58		93×10^{-9}	31
(5/2+) 992.72		56×10^{-9}	190
3/2+ 968.451		61×10^{-9}	281
5/2+ 891.89		19×10^{-8}	398
3/2+ 865.35		10×10^{-8}	1250
(1/2)+ 843.859		23×10^{-8}	818
3/2− 805.73		83×10^{-9}	4620
(11/2)− 777.59		7.07×10^{-7}	912
(9/2−) 750.07		33×10^{-8}	3230
(7/2)− 701.02		6.9×10^{-6}	375
1/2− 658.97	4510	0.00008	68
(5/2)− 633.17		2.82×10^{-6}	3047
11/2+ 608.09		12×10^{-6}	1110
9/2+ 533.228	4632	0.0007	69
(9/2+) 509.92		2.8×10^{-6}	25400
7/2+ 474.297	4691	0.0005	260
7/2+ 445.716		40×10^{-6}	5180
9/2+ 414.779	4749	≈0.0006	573
3/2+ 393.225	4769	0.0015	330
15/2+ 357.30			
5/2+ 332.845	4828	0.0024	540
11/2+ 291.144	4871	0.0007	3500
15/2− 249.130	4912	0.0024	1990
7/2+ 171.388	4987	0.013	1210
13/2− 170.708			
9/2+ 150.467	5006	0.017	1260
5/2+ 129.2961	5028	0.009	3300
11/2− 103.036	5054	0.047	930
7/2+ 81.741	5076	0.078	765
5/2+ 51.7008	5105.5	11.94	7.76
9/2− 46.207		<0.02	5010
3/2+ 13.0401	5144.3	17.11	9.49
1/2+ 0.0765	5156.59	70.77	2.76
7/2− 0.0		0.03	6500

^{233}U(t,p) 1972Ri08

E(t)=20 MeV, measured angular distribution at three angles (1972Ri08).

^{235}U Levels

E(level)
331 *31*
511 *40*
636 *30*
1115 *32*

^{234}U(n,γ) E=th 1972Ri08,1979Al03

1979Al03: 99.1% enriched ^{234}U, 5.5×10^{14} thermal n/cm^2 s. γ rays bent crystal, internal conversion electrons, with a magnetic spectrometer (1979Al03).

1972Ri08: 99.7% enriched ^{234}U. Low energy γ's measured with Ge(Li) with Na(I) annulus detector, high–energy γ's measured with Ge(Li) detector.

^{234}U(n,γ). Compiled and analyzed σ(n,γ): 2012Pr13, 2011Go05, 2011Wo04, 2010Pr07, 2006BeZU, 2006RuZZ.

Calculated σ(n,F) E(n)=0 – 30 MeV (2011Go05).

Measured σ(n,γ) E(n)=0–5.3 MeV (2011Gu21). Others: 2006BrZX, 2006DrZX.

Measured σ(n,γ) E(n)=0.001 – 1 MeV (2010Co02). σ(n,γ) E(n)=Thermal (2008Br08,2008BrZW,2008BrZW).

^{235}U Levels

E(level)	Jπ‡
0.0	7/2−†
0.0768 *10*	1/2+†
13.0410 *24*	3/2+
46.205 *7*	9/2−
51.7027 *20*	5/2+
81.739 *4*	7/2+
129.3009 *16*	5/2+†
150.449 *6*	9/2+
171.390 *3*	7/2+
225.418 *5*	9/2+
332.8413 *19*	5/2+†
367.074 *5*	7/2+
393.2138 *22*	3/2+†
426.742 *4*	5/2+
445.747 *5*	7/2+
474.301 *4*	7/2+
633.089 *6*	5/2−†
637.791 *5*	3/2−
658.938 *4*	1/2−†
664.539 *5*	5/2−
670.983 *23*	7/2−
701.006 *22*	7/2−
703.757 *5*	3/2−
761.018 *6*	1/2−,3/2−
769.25 *4*	1/2+†
769.937 *9*	3/2−
779.509 *14*	3/2+
805.649 *8*	3/2−
811.96 *3*	5/2−
821.24 *4*	5/2+
835.0 *6*	1/2,3/2
843.865 *8*	1/2+
845.351? *21*	7/2+
865.207 *7*	3/2+
891.94 *3*	5/2+
905.272 *18*	5/2+
951.055 *15*	(1/2−,3/2−)
958.7 *10*	1/2,3/2
968.447 *14*	3/2+
977.7 *10*	1/2,3/2
990.247 *8*	(1/2−,3/2−)
992.71 *3*	(1/2+)
1002.35 *17*	1/2−,3/2−
1007.5 *7*	1/2−,3/2−
1010.7 *19*	1/2−,3/2−
1034.9 *3*	1/2−,3/2−
1038.372 *10*	5/2+
1045.1 *15*	1/2,3/2
1057.24 *14*	7/2+
1072.91 *16*	1/2+†
1082.9 *7*	1/2,3/2
1099.11 *13*	(3/2−)
1106.0 *7*	1/2,3/2
1116.21 *4*	(5/2−)
1129.3 *3*	1/2−,3/2−
1142.632 *7*	3/2−
1157.64 *21*	7/2+
1185.6 *4*	1/2−,3/2−
1194.35 *17*	1/2−†
1202.7 *3*	3/2−
1225.9 *7*	1/2−,3/2−
1242.9 *3*	3/2−†
1251.8 *7*	1/2+,3/2+
1265.8 *3*	1/2−,3/2−
1272.5 *3*	1/2−
1288.196 *24*	5/2−
1296.91 *16*	3/2+
1302.4 *4*	1/2−,3/2−
1316.5 *4*	1/2−,3/2−
1321.401 *14*	5/2+
1330.7 *3*	1/2−,3/2−
1358.6 *3*	1/2−,3/2−
1368.7 *8*	1/2−,3/2−
1382.54 *16*	1/2−†
1388.3 *4*	1/2−,3/2−
1396.4 *3*	3/2−
1404.5 *5*	(1/2+,3/2+)
1412.91 *11*	3/2+†
1413.11 *22*	3/2−
1438.63 *24*	5/2+
1439.2 *4*	3/2−,1/2−
1448.9 *3*	1/2−,3/2−
1463.4 *5*	1/2−,3/2−
1483.60 *22*	7/2+
1483.9 *9*	(1/2,3/2)
1488.1 *9*	(1/2,3/2)
1496.0 *9*	(1/2+,3/2+)
1534.3 *7*	1/2−,3/2−
1553.8 *10*	1/2,3/2
1572.4 *5*	1/2−,3/2−
1614.0 *7*	1/2−,3/2−
1622.6 *13*	1/2−,3/2−
1689.6 *5*	1/2−,3/2−
1707.4 *7*	1/2−,3/2−
1744.5 *7*	1/2,3/2
1773.0 *10*	1/2−,3/2−
1801.9 *12*	1/2−,3/2−
1890.4 *4*	1/2−,3/2−
1905.7 *5*	1/2−,3/2−
1911.1 *7*	1/2−,3/2−
1931.7 *9*	1/2−,3/2−
2003.6 *13*	1/2−,3/2−
2013.6 *15*	1/2−,3/2−
2023.3 *12*	1/2−,3/2−
2073.3 *20*	1/2−,3/2−
2139.0 *8*	1/2−,3/2−
2206.7 *3*	1/2−,3/2−

Continued on next page (footnotes at end of table)

^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

^{235}U Levels (continued)

E(level)	Jπ‡	$T_{1/2}$	Comments
2500 *300*		3.6 ms *18*	E(level),$T_{1/2}$: Fission isomer (2007Ob02). From ^{234}U(n,F), σ(SF)=10 μb 8. Produced with neutrons of E(n)=0.95 and 1.27 MeV. Separated with the isomer spectrometer neptune at the Van de Graaff laboratory of the irmm, Geel, Belgium.
5297.65 *7*	1/2+		

† Same assignment in 1972Ri08.
‡ From 1979Al03.

γ(^{235}U)

Intensities of primary γ rays are from thermal neutron capture (1972Ri08). Intensities of secondary γ rays are from 1979Al03.

Partial radiation widths Γ(γ)=Iγ/Eγ^3 (Eγ is the γ–ray energy in units of fractions of the n–binding energy in thermal n capture (1979Al03), Iγ is an average of γ–ray intensities (in units of 1×10^{-3} eV) from resonances at 5.2, 31, and 49 eV, and from thermal neutron capture). Total Γ=25×10^{-3} eV *6* (1977Ko15).

Eγ†	E(level)	Iγ#	Mult.‡§	α	Comments
(0.077 *1*)	0.0768		E3		
12.975 *10*	13.0410				Eγ: From adopted levels, gammas.
x23.45 *5*		0.040 *15*			
29.86 *5*	81.739	0.02 *1*			
x30.90 *10*		0.010 *5*			
38.72 *6*	51.7027	0.010 *5*			
42.14 *5*	171.390	0.03 *1*			
46.16 *5*	46.205	0.020 *5*			
47.60 *5*	129.3009	0.03 *1*			
51.628 *4*	51.7027	0.03 *1*	[E2]	310	
x53.51 *15*		0.010 *5*			
54.026 *5*	225.418	0.010 *5*	[M1]	27.8	
68.697 *3*	81.739	0.08 *2*	[E2]	78.6	
(68.70)	150.449				
77.599 *2*	129.3009	0.16 *4*	[M1+E2]	≈16.52	
x89.90 *5*		0.02 *1*			
(98.78 *2*)	150.449		[E2]	14.11	Eγ: from ^{239}Pu α decay.
116.262 *3*	129.3009	0.19 *3*	[M1+E2]	4.99	
≈119.38	171.390	0.010 *5*			
x121.95 *6*		0.03 *1*			
123.228 *5*	761.018	0.025 *5*			
125.040 *2*	990.247	0.06 *2*	[E1]	0.297	
125.21 *10*	171.390	0.01 *CA*	[E1]	0.296	E,Iγ based on ^{239}Pu α decay.
129.302 *2*	129.3009	3.23 *30*	[E1]	0.275	
x132.187 *4*		0.02 *1*			
141.655 *6*	367.074	0.020 *7*	[M1]	8.22	
x142.18 *8*		0.02 *7*			
x146.65 *7*		0.020 *5*			
x148.14 *13*		0.010 *5*			
x158.960 *4*		0.04 *2*			
161.449 *3*	332.8413	0.15 *3*	M1	5.67	α(L1)exp=1.0 *3*.
x167.13 *9*		0.03 *1*			
171.370 *11*	171.390	0.02 *1*	[E1]	0.1415	
171.548 *8*	951.055	0.02 *1*	[E1]	0.1411	
172.560 *11*	805.649	0.03 *1*	[M1]	4.70	
x181.870 *19*		0.02 *1*			
x182.849 *5*		0.08 *3*			
x195.220 *12*		0.02 *1*			
195.70 *2*	367.074	0.08 *2*	M1	3.30	α(L1)exp=0.62 *20*.
x196.872 *7*		0.05 *2*			
203.553 *7*	332.8413	0.51 *5*	M1	2.95	α(L1)exp=0.55 *10*.
211.056 *7*	637.791	0.02 *1*	[E1]	0.0869	
x212.42 *11*		0.04 *2*			
229.24 *2*	990.247	0.05 *3*	[M1]	2.12	

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#	Mult.‡§	δ	α	Comments
237.774 *6*	367.074	0.03 *1*	[M1]		1.91	
244.583 *8*	637.791	0.04 *2*	[E1]		0.0620	
263.916 *4*	393.2138	0.16 *2*	M1		1.428	α(K)exp=0.96 *20*; α(L1)exp=0.22 *4*.
274.370 *10*	445.747	0.02 *1*	M1		1.282	
297.42 *3*	426.742	0.03 *1*	[M1]		1.026	α(K)exp=0.74 *10*; α(L1)exp=0.15 *2*.
316.444 *6*	445.747	0.26 *3*	M1		0.865	
320.51 *17*	367.074	0.03 *1*				
323.853 *4*	474.301	0.10 *2*	M1		0.811	
332.841 *2*	332.8413	0.45 *5*	E1		0.0313	
341.510 *2*	393.2138	0.37 *4*	M1		0.701	α(K)exp=0.62 *9*.
345.003@ *4*	426.742	0.35@ *4*	M1		0.682	α(K)exp=0.55 *8*.
	474.301	≤0.1@	M1		0.682	α(K)exp=0.50 *15*.
367.15 *17*	367.074	0.11 *4*				
x371.330 *12*		0.07 *2*	(M1)		0.558	α(K)exp=0.51 *15*.
x373.74 *16*		0.07 *4*				
375.043 *7*	426.742	1.0 *1*	M1		0.543	α(K)exp=0.48 *6*.
x376.094 *5*		0.14 *2*	M1		0.539	
378.83 *16*	805.649	0.10 *5*				
380.173 *3*	393.2138	1.92 *20*	M1		0.523	α(K)exp=0.44 *6*.
392.552 *6*	474.301	0.31 *4*	M1		0.479	
393.138 *6*	393.2138	2.11 *21*	M1		0.477	α(K)exp=0.41 *5*.
399.530 *12*	445.747	0.15 *3*	[E1]		0.0213	
412.31 *12*	805.649	0.24 *8*				
413.710 *13*	426.742	0.91 *10*	M1		0.415	
422.596 *8*	474.301	0.18 *2*	M1		0.392	
445.740 *17*	445.747	0.20 *2*	E1		0.01698	
x454.56 *20*		0.09 *4*				
478.100 *19*	1142.632	0.36 *4*	M1		0.281	
x491.130 *13*		0.41 *5*	M1+E2	0.54 *20*	0.21 *3*	α(K)exp=0.16 *2*; α(L1)exp=0.29 *4*.
x495.92 *30*		0.05 *2*				
504.840 *6*	1142.632	0.38 *4*	M1+E2	1.2 *2*	0.127 *18*	α(K)exp=0.129 *15*.
x517.0 *3*		0.06 *2*				
x558.3 *1*		0.12 *3*				
564.070 *17*	1038.372	0.08 *2*	M1		0.180	α(K)exp=0.15 *4*.
582.75 *8*	664.539	0.12 *3*				
x586.940 *14*		0.05 *2*				
x595.440 *15*		0.10 *2*				
x599.244 *5*		0.41 *4*	M1		0.1530	α(K)exp=0.13 *2*.
x602.370 *15*		0.20 *4*				
x608.4 *2*		0.13 *3*				
611.630 *11*	1038.372	0.10 *2*	E1,E2			
612.838 *6*	664.539	0.39 *4*	E1			
x615.800 *11*		0.21 *3*	M1+E2	0.9 *3*	0.092 *21*	α(K)exp=0.076 *15*.
617.212 *7*	1288.196	0.50 *5*	E2		0.0293	Mult.: E1 or E2. Level scheme requires E2.
618.335 *6*	664.539	0.70 *7*	(E2)		0.0292	Mult.: E2 or E1. Level scheme requires E2.
x621.900 *15*		0.20 *4*				
624.750 *10*	637.791	0.61 *10*	(E1)			
624.777 *22*	670.983	0.3 *1*	(M1)		0.1369	Eγ: from ce(K) (1979Al03). Iγ: from 1979Al03 and ^{239}Pu α decay.
x627.4 *11*		0.02 *2*				
633.088 *6*	633.089	2.0 *2*	M1		0.1321	α(K)exp=0.096 *15*.
637.770 *10*	637.791	3.5 *4*	E2		0.0273	α(K)exp=0.016 *2*. Doublet.
640.4 *2*	769.25	0.23 *6*				
x642.6 *5*		0.07 *3*				
645.894 *5*	658.938	1.34 *15*	E1			
x649.5 *3*		0.20 *5*				
652.052 *5*	703.757	1.31	E1			
654.80 *2*	701.006	0.09 *2*				
x658.163 *7*		0.46 *5*				
658.862 *5*	658.938	0.90 *9*	E1			

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#	Mult.‡§	δ	α	I(γ+ce)#	Comments
664.520 *12*	664.539	0.58 *6*	E2		0.0251		α(K)exp=0.025 *4*. Iγ: Iγ=0.31 *4* from ^{239}Pu α decay. This γ ray may be a doublet in (n,γ).
x670.7 *4*		0.18 *8*					
679.83 *6*	905.272	0.15 *2*	E2		0.0239		α(K)exp=0.03 *1*.
x685.861 *6*		0.65 *6*	E1				
690.73 *2*	703.757	0.34 *4*	E1				
x691.88 *2*		0.09 *2*	M1		0.1043		α(K)exp=0.07 *5*.
693.810 *10*	865.207	0.25 *3*	E2		0.0229		α(K)exp=0.020 *5*.
x698.3 *3*		0.15 *4*					
703.68 *2*	703.757	0.70 *7*	E1				
714.570 *10*	843.865	0.44 *5*	E2		0.0215		α(K)exp=0.016 *2*.
718.230 *10*	769.937	0.59 *6*	E1				
720.55 *3*	891.94	0.08 *2*					
x724.3 *4*		0.04 *2*					
727.86 *3*	779.509	0.15 *2*	M1		0.0911		α(K)exp=0.07 *2*.
733.93 *4*	905.272	0.13 *2*	M1		0.0891		
735.910 *15*	865.207	0.40 *4*	M1+E2	1.2 *2*	0.048 *7*		α(K)exp=0.037 *6*.
747.970 *10*	761.018	1.24 *10*	E1				
x750.72 *6*		0.13 *2*	M1(+E2)	0.3 *3*	0.079 *12*		α(K)exp=0.058 *9*.
756.19 *4*	769.25	0.14 *3*					
756.87 *6*	769.937	0.17 *3*					
760.26 *5*	811.96	0.10 *2*					
760.98 *4*	761.018	0.10 *2*					
762.6 *2*	891.94	0.04 *2*					
763.61 *2*	845.351?	<0.05	E0(+M1)			0.07 *2*	
766.47 *3*	779.509	0.16 *2*	E0+M1			0.76 *8*	K:L1:M1:N1=4.86 *25*:0.93 *5*:0.22 *2*:0.07 *1*.
x767.29 *4*		0.15 *2*					
769.15 *8*	769.25	0.30 *3*	E0+M1			0.87 *10*	K:L1:M1:N1=4.46 *30*:0.94 *6*:0.26 *3*:0.06 *1*.
769.59 *14*	821.24	<0.05	E0			0.7 *2*	
769.870 *16*	769.937	1.47 *15*	E1				
x775.300 *15*		0.23 *3*					
775.96 *2*	905.272	0.07 *2*	E0+M1			0.18 *3*	K:L1=1.39 *14*:0.25 *3*.
779.42 *2*	779.509	0.19 *2*	M1		0.0759		
783.49 *5*	865.207	0.05 *1*					
x786.90 *2*		0.35 *4*	E2		0.01771		α(K)exp=0.012 *4*.
792.58 *5*	805.649	0.27 *3*	E1,E2				
798.92 *3*	811.96	0.22 *2*	E1,E2				
x803.4 *4*		0.11 *3*					
805.650 *10*	805.649	0.35 *4*	E2		0.01689		α(K)exp=0.011 *4*.
808.19 *4*	821.24	0.11 *2*	M1		0.0690		
813.510 *17*	865.207	0.57 *6*	M1		0.0678		
821.3 *2*	821.24	0.12 *3*					Eγ,Iγ: From 1972Ri08; γ ray not detected in 1979Al03. Possible doublet.
x823.6 *2*		0.08 *2*					
x828.82 *4*		0.15 *2*					
831.550& *15*	1057.24	0.35 *5*					Eγ=832.3 keV *1*, Iγ=0.19 *4* (1972Ri08) (In better agreement with values from ^{239}Pu α decay.). Iγ: Iγ=0.017 from ^{239}Pu α decay suggests that this γ ray is a doublet in (n,γ).
840.26 *9*	891.94	0.19 *2*	M1(+E0)		0.14 *2*		α(K)exp=0.11 *2*.
843.780 *10*	843.865	0.60 *5*	M1(+E0)		0.09 *1*		α(K)exp=0.075 *10*; α(L1)exp=0.015 *2*.
847.100 *13*	1321.401	0.057 *10*	M1		0.0609		Iγ: reported (probably in error) as 0.57 in 1979Al03.
849.9 *3*	1242.9	0.08 *2*					
x852.41 *3*		0.25 *3*					

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#	Mult.‡§	δ	α	Comments
x856.7 *3*		0.06 *2*				
x863.67 *2*		0.17 *2*				
x878.75 *5*		0.21 *2*				
886.0 *5*	1057.24	0.02 *1*				
x889.50 *4*		0.32 *4*	M1+E2	0.6 *3*	0.043 *8*	α(K)exp=0.031 *7*.
x892.3 *2*		0.12 *3*				
894.6 *5*	1321.401	0.04 *2*				
x901.1 *3*		0.06 *2*				
x905.0 *2*		0.12 *3*				
x911.8 *2*		0.10 *3*				
916.78 *8*	968.447	0.07 *2*				
x918.2 *3*		0.10 *3*				
927.8 *2*	1057.24	0.12 *3*				
x931.1 *3*		0.05 *2*				
x938.9 *8*		0.07 *4*				
x941.2 *7*		0.08 *4*				
944.9 *4*	1116.21	0.12 *4*				
x948.50 *3*		0.70 *7*	M1		0.0451	
950.94 *3*	951.055	0.71 *7*	E1			
955.40 *2*	968.447	0.45 *5*	M1+E2	0.6 *2*	0.036 *5*	α(K)exp=0.024 *4*.
x962.2 *3*		0.07 *2*				
x965.3 *3*		0.10 *3*				
968.37 *2*	968.447	0.40 *4*	M1+E2	0.6 *3*	0.035 *6*	α(K)exp=0.025 *4*.
x969.82 *4*		0.26 *3*				
x977.51 *3*		0.19 *2*				
978.9 *7*	992.71	0.10 *3*				
x981.2 *5*		0.12 *3*				
x983.2 *3*		0.10 *3*				
986.92 *4*	1116.21	0.35 *3*	E1			
990.13 *4*	990.247	0.64 *6*				
992.64 *3*	992.71	0.29 *3*				Iγ: γ–ray branching is larger than in ^{239}Pu α decay, which suggests that this γ ray is a doublet.
x995.40 *4*		0.40 *6*				
x1000.0 *6*		0.04 *2*				
1002.2 *2*	1002.35	0.34 *8*				
1005.8 *5*	1057.24	0.04 *2*				
1009.2 *3*	1483.60	0.10 *3*				
x1015.9 *2*		0.25 *5*				
1019.8 *2*	1412.91	0.18 *4*				
1024.7 *6*	1038.372	0.06 *2*				
1028.1 *9*	1157.64	0.02 *2*				
x1032.7 *2*		0.15 *3*				
x1045.0 *2*		0.33 *7*				
1047.5 *2*	1099.11	0.26 *6*				
1057.3 *2*	1057.24	0.17 *4*				
1060.1 *3*	1072.91	0.10 *3*				
1072.6 *2*	1072.91	0.29 *6*				
x1078.2 *6*		0.07 *2*				
x1083.1 *4*		0.05 *2*				
1085.8 *2*	1099.11	0.13 *3*				
1090.9 *2*	1142.632	0.14 *3*				
x1095.6 *2*		0.18 *4*				
1099.0 *3*	1099.11	0.10 *3*				
1102.9 *7*	1116.21	0.03 *2*				
x1104.8 *4*		0.06 *2*				
1111.4 *3*	1157.64	0.07 *2*				
1115.6 *3*	1116.21	0.07 *2*				
x1117.7 *5*		0.05 *2*				
x1124.4 *3*		0.07 *2*				
1142.2 *2*	1142.632	0.58 *12*				
x1145.0 *3*		0.08 *2*				
1149.9 *5*	1321.401	0.03 *2*				

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#
x1153.2 *5*		0.04 *2*
1157.7 *3*	1157.64	0.09 *3*
x1161.8 *7*		0.04 *2*
x1164.8 *3*		0.16 *4*
x1167.7 *5*		0.08 *3*
x1170.6 *11*		0.03 *2*
x1173.0 *2*		0.21 *5*
x1177.0 *8*		0.07 *3*
x1182.9 *5*		0.05 *2*
x1185.5 *2*		0.27 *6*
1190.2[a] *6*	1202.7	0.03[a] *1*
	1242.9	0.03[a] *1*
1194.2 *2*	1194.35	0.24 *5*
x1197.5 *3*		0.10 *3*
1202.5 *3*	1202.7	0.09 *3*
1206.0 *8*	1288.196	0.04 *2*
x1210.5 *7*		0.04 *2*
x1213.0 *5*		0.06 *2*
x1220.6 *2*		0.20 *4*
x1224.4 *3*		0.18 *5*
x1226.6 *5*		0.14 *4*
1229.9 *8*	1242.9	0.05 *2*
x1233.1 *2*		0.35 *7*
x1238.1 *6*		0.05 *2*
1245.4 *3*	1296.91	0.14 *7*
x1246.4 *3*		0.23 *8*
x1252.4 *3*		0.14 *4*
x1256.0 *3*		0.05 *2*
x1265.4 *2*		0.17 *4*
x1269.0 *2*		0.18 *4*
1272.3 *5*	1272.5	0.08 *2*
x1279.8 *2*		0.08 *2*
1283.6 *2*	1412.91	0.25 *5*
x1286.1 *7*		0.04 *1*
x1289.8 *4*		0.05 *2*
x1293.6 *2*		0.47 *10*
1296.7 *2*	1296.91	0.19 *4*
x1301.3 *2*		0.28 *6*
x1304.8 *3*		0.09 *3*
1308.1 *2*	1321.401	0.28 *6*
x1318.2 *3*		0.11 *4*
x1319.6 *4*		0.13 *4*
x1324.3 *3*		0.09 *3*
x1328.8 *9*		0.05 *2*
x1331.4 *3*		0.17 *4*
x1333.9 *5*		0.10 *3*
x1337.1 *2*		0.25 *5*
1344.5 *3*	1396.4	0.11 *3*
x1349.7 *5*		0.07 *2*
1354.4 *3*	1483.60	0.19 *4*
x1357.9 *2*		0.42 *9*
x1364.1 *7*		0.06 *3*
x1367.1 *6*		0.12 *4*
1369.3 *5*	1382.54	0.18 *5*
x1372.0 *10*		0.08 *3*
x1377.4 *4*		0.09 *3*
1382.5 *2*	1382.54	0.40 *8*
1386.9 *4*	1438.63	0.11 *3*
x1391.3 *3*		0.28 *6*
x1393.9 *7*		0.10 *3*
1397.2 *7*	1396.4	0.10 *4*
1399.9 *3*	1412.91	0.23 *6*
1412.7 *2*	1412.91	0.24 *5*

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#	Mult.‡§	Comments
x1416.9 *6*		0.05 *2*		
x1422.9 *4*		0.08 *3*		
1425.6 *3*	1438.63	0.19 *5*		
x1428.0 *5*		0.06 *2*		
x1435.9 *3*		0.09 *3*		
x1438.3 *2*		0.16 *4*		
x1442.9 *4*		0.04 *2*		
x1449.0 *4*		0.13 *4*		
x1450.9 *4*		0.07 *3*		
x1461.6 *3*		0.16 *4*		
x1464.3 *3*		0.18 *4*		
x1468.3 *5*		0.08 *3*		
x1470.4 *8*		0.04 *2*		
x1473.1 *8*		0.03 *2*		
x1477.9 *3*		0.18 *4*		
x1480.8 *7*		0.05 *2*		
x1484.3 *7*		0.06 *2*		
x1493.7 *4*		0.09 *3*		
x1496.2 *5*		0.08 *3*		
3090.9 *3*	5297.65		E1	Γ=0.70 *21.*
3158.6 *8*	5297.65		E1	Γ=0.18 *9.*
3224.3 *20*	5297.65		E1	Γ=0.17 *8.*
3274.3 *12*	5297.65		E1	Γ=0.42 *12.*
3284.0 *15*	5297.65		E1	Γ=0.16 *7.*
3294.0 *13*	5297.65		E1	Γ=0.19 *7.*
3365.9 *9*	5297.65		E1	Γ=0.19 *7.*
3386.5 *7*	5297.65		E1	Γ=0.33 *7.*
3391.9 *5*	5297.65		E1	Γ=0.25 *7.*
3407.2 *4*	5297.65		E1	Γ=0.38 *7.*
3495.7 *12*	5297.65		E1	Γ=0.56 *11.*
3524.6 *10*	5297.65		E1	Γ=0.47 *8.*
3553.1 *7*	5297.65			Γ=0.07 *4.*
3590.2 *7*	5297.65		E1	Γ=0.29 *9.*
3608.0 *5*	5297.65		E1	Γ=0.11 *6.*
3675.0 *13*	5297.65		E1	Γ=0.47 *8.*
3683.6 *7*	5297.65		E1	Γ=0.32 *13.*
3725.2 *5*	5297.65		E1	Γ=0.39 *11.*
3743.8 *10*	5297.65			Γ=0.07 *4.*
3763.3 *7*	5297.65		E1	Γ=0.27 *6.*
3801.6 *9*	5297.65	0.037 *15*	(M1)	Γ=0.03 *3.*
3809.5 *9*	5297.65	0.078 *27*		
3813.7 *9*	5297.65	0.093 *25*		
3834.2 *5*	5297.65	0.12 *3*	E1	Γ=0.12 *3.*
3848.7 *3*	5297.65	0.31 *7*	E1	Γ=0.10 *3.*
3858.4 *4*	5297.65	0.11 *3*	E1	Γ=0.17 *4.*
3884.5 *2*	5297.65	0.64 *13*	E1	Γ=0.30 *4.*
3893.1 *5*	5297.65	0.10 *3*	(M1)	
3909.3 *4*	5297.65	0.21 *5*	E1	Γ=0.29 *5.*
3915.1 *3*	5297.65	0.55 *11*	E1	Γ=0.13 *3.*
3928.9 *8*	5297.65		E1	Γ=0.17 *3.*
3939.0 *3*	5297.65	0.21	E1	Γ=0.15 *3.*
3966.9 *3*	5297.65		E1	Γ=0.08 *2.*
3981.1 *4*	5297.65	0.019 *11*	E1	Γ=0.18 *10.*
3995.2 *4*	5297.65	0.16 *4*	E1	Γ=0.31 *5.*
4000.5 *4*	5297.65	0.16 *4*		Γ=0.05 *2.*
4025.0 *3*	5297.65	0.31 *7*	E1	Γ=0.16 *5.*
4031.8 *3*	5297.65	0.11 *3*	E1	Γ=0.13 *3.*
4045.8 *7*	5297.65		M1	Γ=0.02 *2.*
4071.7 *7*	5297.65	0.046 *13*	E1	Γ=0.15 *3.*
4103.1 *3*	5297.65	0.58 *12*	E1	Γ=0.14 *3.*
4112.0 *4*	5297.65	0.09 *2*	E1	Γ=0.13 *3.*
4154.8 *3*	5297.65	0.95 *20*	E1	Γ=0.21 *4.*
4168.3 *3*	5297.65	0.37 *7*	E1	Γ=0.33 *3.*

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^{234}U(n,γ) E=th 1972Ri08,1979Al03 (continued)

γ(^{235}U) (continued)

Eγ†	E(level)	Iγ#	Mult.‡§	Comments
4191.6 *7*	5297.65	0.018 *10*		Γ=0.05 *3*.
4197.8 *4*	5297.65	0.046 *13*	E1	Γ=0.14 *3*.
4214.7 *7*	5297.65	0.033 *10*		Γ=0.024 *7*.
4223.9 *5*	5297.65	0.10 *2*		Γ=0.071 *14*.
4252.5 *15*	5297.65			Γ=0.07 *2*.
4262.7 *3*	5297.65	0.15 *4*	E1	Γ=0.27 *3*.
4286.9 *19*	5297.65	0.10 *4*	E1	Γ=0.10 *3*.
4290.1 *7*	5297.65		E1	Γ=0.08 *2*.
4295.1 *3*	5297.65	0.37 *8*	E1	Γ=0.10 *3*.
4305.2 *3*	5297.65	0.021 *5*		
4307.1 *4*	5297.65		E1	Γ=0.21 *3*.
4319.9 *10*	5297.65			Γ=0.05 *2*.
4327.6 *13*	5297.65			Γ=0.06 *3*.
4338.9 *10*	5297.65			Γ=0.07 *2*.
4347.4 *12*	5297.65			Γ=0.14 *3*.
4405.6 *3*	5297.65	0.10 *2*	M1,E2	Γ=0.022 *12*.
4432.6 *3*	5297.65	0.068	M1	Γ=0.016 *13*.
4453.7 *13*	5297.65		E1,M1	Γ=0.08 *3*.
4462.6 *6*	5297.65			Γ=0.04 *2*.
4492.3	5297.65	0.09 *2*	E1	Γ=0.16 *4*.
4517.1 *5*	5297.65	0.037 *12*		Γ=0.047 *13*.
4527.8 *3*	5297.65	0.89 *18*	E1	Γ=0.36 *4*. Iγ: probably a doublet from ^{235}U level scheme.
4536.9 *3*	5297.65	0.11 *3*	E1	Γ=0.15 *3*.
4594.0 *2*	5297.65	0.77 *16*	E1	Γ=0.25 *3*.
4639.3 *4*	5297.65	0.027 *8*	E1	Γ=0.26 *4*.
4659.7 *12*	5297.65	0.018 *6*	E1	Γ=0.10 *2*.
4904.4 *7*	5297.65	0.020 *10*	M1,E2	Γ=0.009 *4*.
5245.9 *2*	5297.65	0.078 *18*	M1,E2	Γ=0.011 *10*.
5284.6 *3*	5297.65	0.033 *9*	M1,E2	Γ=0.005 *3*.
5297.6 *3*	5297.65	0.018 *6*	M1,E2	Γ=0.011 *11*.

† Low energy (secondary) γ rays are from 1972Ri08,1979Al03. Eγ with accuracies better than 0.1 keV are from cryst results of 1979Al03. High energy (primary) γ rays are from thermal capture results of 1972Ri08, and from capture at resonances of 5.2, 31 and 49 eV (1977Ko15).
‡ Multipolarities of primary γ–ray transitions are from average radiation widths (1977Ko15).
§ From ce data (1979Al03).
# Absolute intensity per 100 neutron captures.
@ Multiply placed; intensity suitably divided.
& Placement of transition in the level scheme is uncertain.
a Multiply placed; undivided intensity given.
x γ ray not placed in level scheme.

^{234}U(d,p) 1972Ri08

E(d)=20 MeV, measured angular distribution at 9 angles (1972Ri08). Other: 1970Br01 (E(d)=12 MeV).

^{235}U Levels

E(level)	L	E(level)	L	E(level)	L
0.0 *21*		225.0	4	475.0 *34*	
13.0 *24*		247.0 *21*		494.0 *32*	
52.0 *26*		259.0 *21*		511.0 *28*	2†
83.0 *26*	(4)	293.0 *22*		532.0 *29*	
103.0 *26*		329.0 *39*		548.0 *22*	
131.0 *22*	2	368.0 *57*		585.0 *32*	
151.0 *32*		395.0 *26*		590.0 *22*	
171.0 *39*		415.0 *22*		604.0 *42*	
197.0 *24*		427.0 *25*		639.0 *20*	

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^{234}U(d,p) 1972Ri08 (continued)

^{235}U Levels (continued)

E(level)	L	E(level)	L	E(level)	L
661.0 *31*	1	1038.0 *21*		1352.0 *24*	
703.0 *25*		1049.0 *21*		1364.0 *20*	
711.0 *24*		1057.0 *22*		1372.0 *21*	
729.0 *29*		1072.0 *54*		1385.0 *25*	
763.0 *30*		1103.0 *21*		1395.0 *22*	(1)
771.0 *31*		1112.0 *25*		1403.0 *21*	
794.0 *31*		1130.0 *33*		1411.0 *20*	
804.0 *29*		1135.0 *23*		1422.0 *21*	
827.0 *24*		1150.0 *26*		1435.0 *21*	
844.0 *33*		1178.0 *20*		1442.0 *29*	
869.0 *29*		1192.0 *24*	1	1455.0 *29*	
882.0 *20*		1203.0 *23*	1	1474.0 *27*	
893.0 *20*		1212.0 *21*		1482.0 *20*	
913.0 *21*		1233.0 *28*		1495.0 *51*	
924.0 *46*		1242.0 *23*		1511.0 *34*	
942.0 *21*	3	1258.0 *22*		1524.0 *23*	
961.0 *27*		1273.0		1528.0 *20*	
970.0 *41*		1287.0 *26*		1543.0 *21*	
983.0 *21*		1297.0 *25*	(2)	1559.0 *35*	
991.0 *34*		1314.0 *23*			
1002.0 *22*		1321.0 *24*			
1030.0 *24*		1342.0 *21*			

† Inconsistent with Jπ assignment in adopted levels.

^{235}U(γ,γ') 2011Kw01

Jπ(^{235}U g.s.)=7/2–.

2011Kw01: E=1.6–3.0 MeV circularly polarized photon beams. Scattered γ rays were detected with an array of six HPGe detectors. Measured Eγ, Iγ. Deduced integrated cross sections and widths.

Others.

^{235}U(γ,γ'): 2004Cl05.

2010Ye02: E=3.5, 4.4 MeV bremsstrahlung radiation. Measured Eγ, Iγ using two HPGe detectors. Levels found at 0.0–, 46.21–, 1733.18–, 1815–, 1828–, 1862–, 2003–, and 2010–keV.

2008Be31: E=2.2 MeV bremsstrahlung radiation. Measured Eγ, Iγ using two HPGe detectors. Levels found at 0.0–, 46.21–, 1656.2–, 1733.57–, 1815.35–, 1827.55–, 1862.32–, 2003.3–, and 2006.2–keV.

^{235}U Levels

E(level)	Jπ†	Integrated σ (eVb)‡	Comments
0.0§	7/2–§		
46.20§ *5*	9/2–§		
1656.4 *7*		3.0 *11*	$g\Gamma_0^2/\Gamma$=2.1 meV *8*.
1733.55 *19*		22 *4*	$g\Gamma_0^2/\Gamma$=17 meV *3*.
1769.3 *4*		6.4 *15*	$g\Gamma_0^2/\Gamma$=5.2 meV *12*.
1815.27 *18*		8.9 *11*	$g\Gamma_0^2/\Gamma$=7.7 meV *9*.
1827.68 *19*		5.5 *13*	$g\Gamma_0^2/\Gamma$=4.8 meV *12*.
1862.41 *10*		9.6 *7*	$g\Gamma_0^2/\Gamma$=8.7 meV *7*.
1973.8 *3*		4.6 *6*	$g\Gamma_0^2/\Gamma$=4.7 meV *6*.
2003.42 *17*		6.7 *12*	$g\Gamma_0^2/\Gamma$=7.0 meV *13*.
2005.9 *4*		4.6 *9*	$g\Gamma_0^2/\Gamma$=4.8 meV *9*.
2010.6 *3*		3.0 *5*	$g\Gamma_0^2/\Gamma$=3.2 meV *6*.
2067.1 *4*		3.0 *5*	$g\Gamma_0^2/\Gamma$=3.4 meV *6*.
2074.2 *3*		1.4 *3*	$g\Gamma_0^2/\Gamma$=1.5 meV *4*.
2086.7 *6*		1.1 *4*	$g\Gamma_0^2/\Gamma$=1.2 meV *4*.
2110.2 *3*		3.0 *7*	$g\Gamma_0^2/\Gamma$=3.5 meV *8*.
2216.1 *3*		2.8 *5*	$g\Gamma_0^2/\Gamma$=3.6 meV *6*.
2416.1 *3*		3.6 *6*	$g\Gamma_0^2/\Gamma$=5.4 meV *9*.

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^{235}U(γ,γ') 2011Kw01 (continued)

^{235}U Levels (continued)

E(level)	Integrated σ (eVb)‡	Comments
2555.6 *6*	2.5 *6*	$g\Gamma_0^2/\Gamma$=4.3 meV *10*.
2754.7 *4*	3.6 *6*	$g\Gamma_0^2/\Gamma$=7.2 meV *11*.

† Above the 46.21 level, the assignments J=(5/2,7/2,9/2) are from expected predominance of dipole excitation in a low–momentum transfer reaction (γ,γ'). No spins were assigned in 2011Kw01.
‡ From 2011Kw01.
§ From Adopted Levels, Gammas.

γ(^{235}U)

E(level)	Eγ†	Iγ	Comments
46.20	46.21 *5*		Eγ: from Adopted Levels, Gammas.
1656.4	1656.4 *7*		
1733.55	1687.0 *5*	60 *20*	
	1733.6 *2*	100	
1769.3	1769.3‡§ *4*	100§	
1815.27	1769.3‡§ *4*	62§ *4*	
	1815.2 *2*	100	
1827.68	1782.1 *6*	45 *18*	Eγ,Iγ: unresolved from a 1782γ in ^{238}U.
	1827.6 *2*	100	
1862.41	1862.4 *1*	100	
1973.8	1973.8 *3*	100	
2003.42	1957.4 *2*	62 *13*	
	2003.0 *3*	100	
2005.9	2005.9 *4*	100	
2010.6	2010.6 *3*	100	
2067.1	2067.1 *4*	100	
2074.2	2074.2 *3*	100	
2086.7	2086.7 *6*	100	
2110.2	2063.3 *6*	51 *13*	
	2110.4 *3*	100	
2216.1	2216.1 *3*	100	
2416.1	2416.1 *3*	100	
2555.6	2555.6 *6*	100	
2754.7	2754.7 *4*	100	

† Corrected for recoil (0.006 keV to 0.017 keV) (2011Kw01).
‡ Ground state or transition from 1815 to 46 level.
§ Multiply placed; undivided intensity given.

^{235}U(γ,n): Giant Resonances

^{235}U(γ,n), (γ,2n), (γ,F) studied for Eγ=5–18.3 MeV. Deduced β(2)=0.315, Q=11.0 *5* from giant dipole resonance parameters (1980Ca08). Fission mass–asymmetry studied in ^{235}U(γ,F) for bremsstrahlung of 15–55 MeV (1980Gu12).

^{235}U(n,n') 1982Ha34

E(n)=700, 3400 keV. Optical model analysis; deduced deformations β(2)=0.220 *11*, β(4)=0.080 *8*. Other: 1995Ko62.

^{235}U Levels

E(level)	Jπ
≈0.0	7/2−, 1/2+, 3/2+
≈50	9/2−, 5/2+
103	11/2−

^{235}U(n,n'γ) 1986Ke09

E(n)=100 to 500 keV, pulsed beam; γ rays: Ge(Li). Detected 129–keV γ ray (de–exciting the 129–keV (Jπ=5/2+) level in ^{235}U), measured excitation function. Deduced cross section was corrected for fission neutrons (1986Ke09).

E(n)=3 MeV, preliminary report on 90 γ rays possibly from ^{235}U(n,n'γ); Most of the Iγ data are inconsistent with well established portions of the ^{235}U decay scheme (1984BlZS). Therefore, the evaluator has considered unreliable these γ rays.

^{235}U Levels

E(level)†	Jπ	E(level)†	Jπ	E(level)†	Jπ
0.0	7/2−	393.2	3/2+	701.01	(7/2)−
46.20	9/2−	445.7	7/2+	1057.4	(7/2)
129.29	5/2+	658.93	1/2−	1116.21	(5/2−)
225.41	9/2+	670.98	(7/2)−		

† From adopted levels.

γ(^{235}U)

Eγ†	E(level)
129	129.29
392.94 *6*	393.2
400.2 *2*	445.7
445.7 *1*	445.7
625.2 *2*	670.98
654.6 *3*	701.01
658.7 *2*	658.93
831.8 *5*	1057.4
987.4 *4*	1116.21

† From 1984BlZS.

^{235}U(d,d') 1976Th01,1978St11

E(d)=16 MeV (1976Th01), E(d)=13.1 MeV (1978St11). FWHM 10–14 keV, Measured σ at 90° and 125°; some transferred L–values were estimated (1976Th01). Deduced BEL (1978St11). Others: 1968St22, 1968St24, 1972Ri08, 1977St31, 1978St11. Level at 257 keV *4*, reported in 1972Ri08, has not been observed in recent work.

^{235}U Levels

E(level)	Jπ†	Comments
0.0	7/2−	
45 *1*	9/2−	B(E2)=8.0 *12*.
103 *2*	11/2−	B(E2)=2.2 *3*.
170 *1*	13/2−	
225 *2*	9/2+	
247 *1*	15/2−	
288 *2*	11/2+	
338 *1*	17/2−	
366 *2*	7/2+	
392 *3*	3/2+	
414 *3*	9/2+	B(E3)=0.027 *10*.
430 *4*	5/2+	
444 *2*	7/2+	B(E3)=0.078 *20*. Jπ: Jπ=9/2+, assigned in 1978St11, disagrees with Jπ=7/2+, assigned in (n,γ) (1979Al03).
474 *2*		
510 *3*	(9/2+)	B(E3)=0.060 *15*.
537 *5*		
554 *5*		
585 *1*	(11/2+)	B(E3)=0.066 *20*.
610 *2*		

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^{235}U(d,d') 1976Th01,1978St11 (continued)

^{235}U Levels (continued)

E(level)	Jπ†	Comments
636 *3*	3/2−	B(E2)≤0.036.
663 *4*	5/2−	
670 *2*	7/2−,13/2+	B(E2)=0.04 *2*.
701 *3*	7/2−	
720 *2*	9/2−	B(E2)≤0.026.
751 *3*	9/2−	B(E2)=0.010 *5*.
774 *4*	11/2−	
820 *2*	9/2−	B(E2)=0.028 *10*.
829 *3*		
886 *2*	11/2−	B(E2)=0.017 *5*.
920 *2*	11/2−	B(E2)=0.041 *10*.
948 *3*	(13/2−)	
960 *4*	13/2−	
986 *3*	(9/2+)	B(E3)=0.034 *15*.
986+x *3*	(13/2−)	
1001 *3*		
1040 *2*	11/2+	B(E3)=0.063 *15*.
1063 *2*	7/2−	B(E2)=0.032 *10*.
1094 *4*	13/2+	B(E3)=0.021 *10*.
1108 *4*	9/2−	B(E2)=0.017 *5*.
1152 *6*	(11/2−)	
1253 *5*		
1275 *5*		
1303 *5*		B(E3)=0.029 *10*.
1326 *5*	(3/2+)	B(E3)=0.032 *10*.
1361 *4*	(5/2+)	B(E3)=0.067 *15*.
1411 *5*	(7/2+)	B(E3)=0.040 *10*.
1455 *6*	(9/2+)	B(E3)=0.021 *10*.

† From 1976Th01. See adopted levels for recommended Jπ.

Coulomb Excitation 2012Wa35

^{136}Xe beam at E=720 MeV on a ≈50 mg/cm^2 ^{235}U target at the 88–Inch Cyclotron of the Lawrence Berkeley National Laboratory. Measured Eγ, Iγ, γγ–coin using the Gammasphere array comprising 100 Compton–suppressed HPGe detectors and the 8π array of HPGe detectors in two separate experiments. Deduced levels, J, π, rotational bands, branching ratios, B(M1), B(E2), B(E3), and magnetic properties.

See also 1968St15 for E(^{16}O)=78 MeV; 1980Si16 for E(^{208}Pb) =4.8 MeV/u; 1983Ku05 for E(^{208}Pb)=5.3 MeV/u; 1986De28 for E(^{84}Kr)=370, 450 MeV. ^{235}U enriched to 80%. Other: 1992Ch34.

^{235}U Levels

E(level)†	Jπ	$T_{1/2}$	Comments
0.0§	7/2−	7.04×10^8 y *1*	$T_{1/2}$: From Adopted Levels.
0.012@ *11*	1/2+	≈26 min	$T_{1/2}$: From Adopted Levels.
12.975@ *10*	3/2+	0.50 ns *3*	$T_{1/2}$: From Adopted Levels.
46.19‡ *5*	9/2−	≈14 ps	$T_{1/2}$: from B(E2)=6.7, average of B(E2)=4.834 *16* in muonic atom. B(E2)=7.4 *7* in Coulomb excitation (1957Ne07), and B(E2)=8.0 *12* in (d,d'). The approximate value of the half–life is due to the large uncertainty in the E2 γ–ray mixing ratio (δ=0.14 *14*).
51.636@ *11*	5/2+	191 ps *5*	E(level),$T_{1/2}$: From Adopted Levels.
81.672@ *12*	7/2+		
103.35§ *6*	11/2−	33 ps *5*	$T_{1/2}$: from B(E2)=1.18 *16* (1957Ne07) and B(E2)=1.19 *4* in muonic atom (1984Zu02). Other value: B(E2)=2.2 *3*, in (d,d').
129.3& *10*	5/2+		
149.90# *17*	9/2+		
171.32‡ *6*	13/2−	21.9 ps *13*	$T_{1/2}$: From Adopted Levels.
197.09@ *13*	11/2+		
225.42& *4*	9/2+		

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Coulomb Excitation 2012Wa35 (continued)

^{235}U Levels (continued)

E(level)[†]	Jπ	Comments
249.73[§] *6*	15/2−	
290.8[a] *8*	11/2+	
294.29[#] *16*	13/2+	
339.75[‡] *6*	17/2−	
357.17[@] *14*	15/2+	
368.6[&] *8*	13/2+	
439.13[§] *7*	19/2−	
456.5[a] *8*	15/2+	
481.77[#] *16*	17/2+	
550.95[‡] *7*	21/2−	
556.9[&] *8*	17/2+	
559.26[@] *14*	19/2+	
632.9[e] *3*	5/2−	B(E2)=0.0202 *21*.
637.794[d] *6*	3/2−	
664.531[c] *12*	(5/2)−	
666.4[a] *8*	19/2+	
670.81[f] *8*	7/2−	
671.65[§] *7*	23/2−	
701.010[d] *25*	7/2−	
709.82[#] *16*	21/2+	
720.22[e] *3*	(9/2)−	
750.07[c] *16*	9/2−	
778.36[f] *19*	(11/2)−	
787.5[&] *8*	21/2+	
790.9[b] *8*	15/2+	
800.47[@] *14*	23/2+	
805.48[‡] *7*	25/2−	
806.7[d] *4*	11/2−	
821.5[g] *3*	9/2−	
850.47[e] *7*	13/2−	
879.6[c] *4*	13/2−	
885.9[h] *4*	11/2−	
916.6[a] *8*	23/2+	
921.1[j] *4*	13/2−	
924.3[f] *5*	15/2−	
945.35[§] *7*	27/2−	
953.2[d] *3*	15/2−	
961.2[g] *4*	13/2−	
975.75[#] *16*	25/2+	
987.5[i] *4*	13/2−	
1020.5[b] *7*	19/2+	
1023.56[e] *9*	17/2−	
1047.1[h] *4*	15/2−	
1053.9[c] *4*	17/2−	
1057.1[&] *8*	25/2+	
1066.2[j] *5*	15/2−	
1077.91[@] *15*	27/2+	
1100.78[‡] *7*	29/2−	
1108.8[f] *3*	19/2−	
1141.0[g] *3*	17/2−	
1142.4[d] *3*	19/2−	
1155.9[i] *3*	17/2−	
1203.9[a] *8*	27/2+	
1235.3[e] *5*	21/2−	
1240.7[h] *3*	19/2−	
1257.86[§] *7*	31/2−	
1260.9[j] *3*	19/2−	
1275.0[c] *3*	21/2−	
1276.65[#] *17*	29/2+	
1292.1[b] *4*	23/2+	
1333.3[f] *3*	23/2−	
1349.69[g] *25*	21/2−	
1362.2[&] *8*	29/2+	

Continued on next page (footnotes at end of table)

Coulomb Excitation 2012Wa35 (continued)

^{235}U Levels (continued)

E(level)[†]	Jπ
1374.3[d] *3*	23/2−
1389.11[@] *16*	31/2+
1434.10[‡] *8*	33/2−
1467.15[h] *25*	23/2−
1485.39[e] *10*	25/2−
1504.6[j] *4*	23/2−
1524.8[a] *8*	31/2+
1542.2[c] *4*	25/2−
1595.2[g] *3*	25/2−
1599.4[f] *3*	27/2−
1600.6[b] *6*	27/2+
1606.11[§] *8*	35/2−
1609.85[#] *18*	33/2+
1646.6[d] *3*	27/2−
1699.8[&] *8*	33/2+
1731.53[@] *17*	35/2+
1731.6[h] *3*	27/2−
1773.28[e] *11*	29/2−
1802.02[‡] *8*	37/2−
1851.4[c] *5*	29/2−
1877.2[a] *8*	35/2+
1878.89[g] *10*	29/2−
1905.9[f] *3*	31/2−
1943.32[b] *17*	31/2+
1958.7[d] *4*	31/2−
1972.90[#] *19*	37/2+
1986.70[§] *8*	39/2−
2033.2[h] *3*	31/2−
2067.1[&] *8*	37/2+
2097.0[e] *5*	33/2−
2103.24[@] *18*	39/2+
2192.8[g] *5*	33/2−
2200.79[‡] *8*	41/2−
2249.4[f] *3*	35/2−
2258.4[a] *8*	39/2+
2314.3[b] *7*	35/2+
2363.61[#] *23*	41/2+
2368.4[h] *4*	35/2−
2395.69[§] *9*	43/2−
2454.5[e] *12*	37/2−
2462.4[&] *8*	41/2+
2502.4[@] *9*	43/2+
2626.0[f] *4*	39/2−
2626.60[‡] *10*	45/2−
2665.8[a] *10*	43/2+
2709.3[b] *8*	39/2+
2780.0[#] *3*	45/2+
2829.76[§] *13*	47/2−
2843.2[e] *15*	41/2−
2883.3[&] *8*	45/2+
2927.8[@] *9*	47/2+
3075.77[‡] *18*	49/2−
3097.9[a] *10*	47/2+
3124.0[b] *10*	43/2+
3220.4[#] *4*	49/2+
3286.56[§] *18*	51/2−
3328.3[&] *8*	49/2+
3547.4[‡] *8*	53/2−
3683.3[#] *4*	53/2+
3764.1[§] *6*	55/2−
4040.5[‡] *13*	57/2−

[†] Deduced by evaluators from least–squares fit to γ–ray energies.
[‡] (A): ν7/2[743] band,α=+1/2. Magnetic properties: g_K=−0.20 *5*, g_R=0.18 *5*.
[§] (B): ν7/2[743] band,α=−1/2. Magnetic properties: See signature partner.
[#] (C): ν1/2[631] band,α=+1/2. Properties: g_K=+0.62 *5*, g_R=0.25, g_s=−2.30, magnetic decoupling b=+2.1 *4*.
[@] (D): ν1/2[631] band,α=−1/2. Properties: See signature partner.
[&] (E): ν5/2[622] band,α=+1/2. Properties: g_K=−0.22 *5*, g_R=0.25 *5*.
[a] (F): ν5/2[622] band,α=−1/2. Properties: See signature partner.
[b] (G): ν3/2[631] band.
[c] (H): K=3/2 γ–vibrational band,α=+1/2.
[d] (I): K=3/2 γ–vibrational band,α=−1/2.
[e] (J): ν5/2[752] band,α=+1/2.
[f] (K): ν5/2[752] band,α=−1/2.
[g] (L): ν9/2[734] band,α=+1/2. Crossed by K=11/2 γ–vibrational band at 17/2.
[h] (M): ν9/2[734] band,α=−1/2. Crossed by K=11/2 γ–vibrational band at 17/2.
[i] (N): K=11/2 γ–vibrational band,α=+1/2. Crossed by ν9/2[734] band at 17/2.
[j] (O): K=11/2 γ–vibrational band,α=−1/2. Crossed by ν9/2[734] band at 17/2.

γ(^{235}U)

Eγ	E(level)	Iγ[†]	Mult.	δ
12.975[§] *10*	12.975			
38.661[§] *2*	51.636		M1+E2	0.48 *3*
46.21[§] *5*	46.19			
51.624[§] *1*	51.636		E2	
57.50 *4*	103.35	3.4 *17*		
62.6 *10*	357.17	0.31 *8*		
63.5 *5*	885.9			
68.30 *3*	171.32	17 *5*		
68.696[§] *6*	81.672			
68.74[§] *CA*	149.90			
74.88 *7*	961.2			
76.6 *10*	559.26	0.22 *4*		
78.7 *10*	368.6	0.36 *14*		
78.78 *3*	249.73	21.2 *25*		
85.15 *12*	1047.1			
88.0 *10*	456.5	0.64 *20*		
90.17 *3*	339.75	27.5 *20*		
90.65 *6*	800.47	0.17 *5*		
98.92 *3*	439.13	21 *4*		

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Coulomb Excitation 2012Wa35 (continued)

$\gamma(^{235}U)$ (continued)

Eγ	E(level)	Iγ†
100.0 *10*	556.9	1.15 *24*
102.9 *10*	1077.91	0.04 *5*
103.0‡ *4*	103.35	2.7 *3*
108.7 *5*	885.9	
110.0 *10*	666.4	1.12 *16*
111.67 *3*	550.95	34 *5*
115.31 *14*	197.09	14.3 *14*
119.0 *10*	290.8	0.21 *24*
120.5 *2*	670.81	
120.93 *3*	671.65	14.3 *10*
121.4 *10*	787.5	0.64 *11*
122.1 *2*	1047.1	
124.4 *5*	1047.1	
124.79 *4*	171.32	8.6 *22*
125.2 *10*	481.77	0.11 *4*
129.0 *10*	916.6	0.43 *8*
129.3 *10*	129.3	1.4 *14*
134.16 *4*	805.48	18.6 *8*
138.3 *5*	961.2	
140.13 *4*	945.35	14.4 *7*
141.0 *10*	1057.1	0.31 *8*
143.7 *10*	368.6	0.9 *4*
144.39 *4*	294.29	14.3 *14*
146.25 *3*	249.73	21 *4*
146.5 *10*	1203.9	0.29 *8*
151.1 *1*	821.5	
152.0 *10*	709.82	0.10 *4*
155.74 *4*	1100.78	14.2 *7*
157.31 *4*	1257.86	9.9 *6*
159.0 *10*	1362.2	0.30 *9*
160.08 *4*	357.17	8.0 *16*
160.1 *2*	1047.1	
162.0 *10*	1524.8	0.29 *6*
165.70 *6*	456.5	1.3 *3*
165.8 *5*	885.9	
168.13 *3*	339.75	39 *3*
172.28 *5*	1606.11	5.0 *4*
174.3 *5*	1053.9	0.20 *8*
174.6 *10*	975.75	0.11 *5*
175.0 *10*	1699.8	0.15 *7*
176.45 *4*	1434.10	8.9 *5*
178.0 *10*	1877.2	0.21 *6*
183.5 *5*	961.2	
184.81 *5*	1986.70	2.4 *3*
187.48 *4*	481.77	6.3 *8*
188.30 *13*	556.9	3.3 *6*
189.0 *10*	2067.1	0.13 *6*
189.56 *3*	439.13	51.4 *21*
192.0 *10*	2258.4	0.14 *7*
195.21 *20*	2395.69	1.02 *24*
195.5 *5*	1047.1	
196.18 *6*	1802.02	4.2 *4*
202.08 *4*	559.26	8.1 *8*
202.90 *18*	2829.76	0.43 *13*
203.0 *10*	2462.4	0.36 *9*
203.6 *10*	2665.8	0.13 *8*
209.0 *5*	1349.69	0.05 *3*
209.84 *8*	666.4	4.8 *6*
211.67 *4*	550.95	100 *3*
214.10 *3*	2200.79	2.0 *3*
215.6 *5*	885.9	
217.8 *10*	2883.3	0.15 *8*
221.0 *6*	1275.0	0.10 *5*
224.5 *5*	1333.3	0.1 *6*
225.42§ *4*	225.42	
227.0 *5*	1467.15	0.10 *5*
228.06 *4*	709.82	8.2 *6*
230.0 *10*	1020.5	0.12 *12*
230.64 *10*	787.5	2.4 *4*
231.04 *18*	2626.60	0.63 *24*
232.4 *2*	670.81	
232.40 *3*	671.65	56.4 *25*
240.3 *5*	961.2	
241.19 *4*	800.47	9.4 *6*
245.5 *5*	1595.2	0.10 *6*
245.6 *5*	3075.77	0.29 *11*
250.17 *8*	916.6	3.3 *3*
250.4 *10*	1485.39	0.3 *1*
254.42 *3*	805.48	67 *3*
261.0 *10*	3547.4	0.1 *6*
264.6 *5*	1731.6	0.2 *1*
265.93 *4*	975.75	6.7 *4*
266.1 *5*	1599.4	0.3 *6*
267.1 *7*	1542.2	0.28 *10*
268.2 *4*	1047.1	
269.60 *9*	1057.1	3.7 *3*
272.0 *10*	1292.1	0.08 *10*
273.63 *3*	945.35	76 *3*
277.44 *4*	1077.91	7.7 *4*
284.0 *5*	1878.89	0.15 *6*
287.28 *8*	1203.9	3.1 *3*
287.7 *10*	1773.28	0.4 *1*
295.21 *3*	1100.78	72 *3*
297.9 *5*	885.9	
300.90 *4*	1276.65	4.7 *3*
301.7 *5*	2033.2	0.10 *5*
305.08 *9*	1362.2	2.50 *24*
306.4 *5*	1905.9	0.4 *6*
308.0 *10*	1600.6	0.17 *9*
309.1 *10*	1851.4	0.17 *6*
311.20 *5*	1389.11	5.3 *3*
311.6 *2*	821.5	
312.43 *3*	1257.86	61.7 *23*
320.97 *8*	1524.8	2.29 *23*
323.8 *10*	2097.0	0.3 *1*
333.20 *6*	1609.85	2.57 *24*
333.26 *3*	1434.10	51.1 *20*
337.66 *9*	1699.8	2.4 *3*
342.42 *5*	1731.53	3.41 *23*
342.6 *10*	1943.32	0.137 *7*
343.4 *5*	2249.4	0.5 *6*
348.18 *3*	1606.11	38.4 *15*
352.37 *11*	1877.2	1.93 *18*
357.5 *10*	2454.5	0.2 *1*
363.05 *7*	1972.90	1.52 *16*
367.37 *15*	2067.1	1.38 *23*
367.89 *3*	1802.02	27.7 *12*
371.1 *10*	2314.3	0.124 *6*
371.71 *8*	2103.24	2.18 *20*
376.2 *5*	2626.0	0.1 *6*
380.55 *3*	1986.70	20.7 *10*
381.10 *15*	2258.4	1.64 *20*
388.7 *10*	2843.2	0.10 *5*
390.71 *13*	2363.61	0.63 *11*
395.27 *7*	2462.4	1.43 *13*
395.5 *10*	2709.3	0.062 *3*

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Coulomb Excitation 2012Wa35 (continued)

$\gamma(^{235}U)$ (continued)

Eγ	E(level)	Iγ†	Mult.	δ	α
398.76 *4*	2200.79	10.7 *6*			
398.9 *10*	2502.4	0.71 *13*			
407.6 *10*	2665.8	0.43 *12*			
409.00 *5*	2395.69	7.9 *5*			
415.0 *10*	3124.0	0.0035 *25*			
416.37 *20*	2780.0	0.30 *7*			
420.96 *7*	2883.3	0.71 *8*			
425.40 *5*	2927.8	0.163 *7*			
425.6 *5*	2626.0	0.1 *6*			
425.77 *6*	2626.60	4.1 *3*			
431.4 *10*	1235.3	0.31 *3*			
432.1 *1*	3097.9	0.19 *4*			
434.1 *10*	790.9	0.4 *4*			
434.14 *10*	2829.76	2.57 *25*			
440.44 *8*	3220.4	0.055 *4*			
444.96 *10*	3328.3	0.22 *8*			
447.3 *5*	2249.4	0.1 *6*			
449.20 *15*	3075.77	1.00 *12*			
456.80 *13*	3286.56	0.71 *14*			
461.2 *10*	1020.5	0.41 *20*			
462.91 *10*	3683.3	0.0242 *20*			
471.4 *10*	3547.4	0.6 *6*			
472.0 *5*	1905.9	0.1 *6*			
477.5 *5*	3764.1	0.12 *1*			
490.6 *10*	2097.0	0.19 *6*			
491.6 *3*	1292.1	0.50 *12*			
493.0[@] *3*	664.531		[E1]		0.01387
493.1 *10*	4040.5	0.1 *6*			
498.5 *5*	1599.4	0.3 *6*			
515.40 *8*	1773.28	0.31 *10*			
522.9 *10*	1600.6	0.33 *10*			
524.5 *5*	1958.7	0.19 *3*			
527.8 *5*	1333.3	0.3 *13*			
539.80 *10*	1485.39	0.47 *12*			
545.8 *5*	1646.6	0.31 *3*			
550.5[§] *2*	701.010				
554.21 *5*	1943.32	0.174 *6*			
557.0 *5*	806.7	0.62 *15*			
557.6 *5*	1108.8	0.4 *6*			
563.5 *10*	1235.3	0.31 *5*			
568.2 *5*	1646.6	0.19 *3*			
568.7 *5*	1374.3	0.7 *2*			
573.4 *5*	1374.3	0.19 *2*			
579.4[§] *3*	750.07				
582.89 *10*	664.531		[E1]		0.01001
583.1 *5*	1142.4	0.26 *3*			
583.3 *10*	2314.3	0.156 *4*			
583.90 *12*	1023.56	0.87 *4*			
584.5 *5*	921.1	0.24 *6*			
586.3 *3*	637.794				
592.0 *5*	1142.4	0.30 *6*			
593.5 *6*	1851.4	0.29 *9*			
595.8 *5*	953.2	0.19 *2*			
596.9 *5*	1542.2	0.35 *10*			
597.99[§] *5*	701.010				
599.6[§] *2*	750.07				
600.47 *6*	850.47	0.53 *8*			
603.3 *5*	1275.0	0.60 *10*			
605.7 *10*	2709.3	0.0311 *22*			
606.7 *5*	1047.1				
606.9 *2*	778.36	23.3 *23*	M1(+E2)	<1	0.12 *3*
612.83 *3*	664.531		E1		
614.2 *5*	953.2	0.50 *5*			

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Coulomb Excitation 2012Wa35 (continued)

$\gamma(^{235}U)$ (continued)

Eγ	E(level)	Iγ†	Mult.	α	Comments
614.6 *5*	1053.9	0.9 *3*			
617.10 *10*	720.22	100 *5*	M1		
618.28 *6*	664.531		(E2)	0.0292	
619.21§ *6*	701.010				
621.3 *10*	3124.0	0.0111 *22*			
622.3 *6*	961.2				
624.7 *2*	821.5				
624.78 *5*	637.794		(E1)		
629.7 *5*	879.6	0.50 *6*			
633.15 *6*	632.9		M1(+E2)		
635.3 *5*	806.7	0.6 *6*			
637.7	637.794		(E1)		
637.8	637.794	100 *10*	E2	0.0273	
639.4 *5*	2626.0	0.1 *6*			B(M1)↓=0.044 *15*.
643.0 *5*	2249.4	0.2 *6*			
647.8 *5*	1905.9	0.2 *6*			
649.32§ *6*	701.010				
651.6 *5*	821.5				
654.2 *5*	1599.4	0.3 *6*			
654.88§ *8*	701.010				
661.8 *5*	1333.3	0.47 *22*			
663.2 *10*	2097.0	0.25 *9*			
664.58 *5*	664.531		E2	0.0251	
668.2§ *5*	750.07				
669.3 *5*	1108.8	0.6 *6*			
670.9 *3*	821.5				
671.1	921.1				
672.7 *3*	1773.28	0.5 *2*			
674.05 *3*	720.22	38 *2*	M1		
674.4 *5*	778.36	100 *3*	(M1)	0.1116	
679.22 *3*	850.47	0.40 *9*			
680.10 *9*	1485.39	0.44 *17*			
683.99 *7*	1023.56	0.76 *5*			
684.1 *10*	1235.3	0.31 *5*			
701.0 *5*	1958.7	0.17 *3*			
701.01§ *2*	701.010				
701.8 *5*	1646.6	0.15 *2*			
702.9 *5*	953.2	0.12 *1*			
	1142.4	0.31 *6*			
703.1 *5*	1374.3	0.6 *1*			
706.5 *5*	1047.1				
708.4 *5*	879.6	0.21 *6*			
714.6 *8*	1053.9	0.35 *7*			
715.3 *5*	885.9				
716.1 *5*	1155.9	0.3 *1*			
719.1 *4*	821.5				
720.3 *5*	720.22	2.1	[M1]		
724.1 *4*	1275.0	0.53 *20*			
734.4 *3*	885.9				
736.7 *6*	1542.2	0.35 *12*			
737.2 *5*	987.5	0.3 *1*			
750.7 *10*	1851.4	0.26 *9*			
762.6 *5*	2368.4	0.10 *5*			
763.3 *5*	961.2				
769.6 *5*	1108.8	0.5 *6*			
774.8 *5*	2033.2	0.10 *5*			
775.7 *3*	821.5				
778.2 *5*	1878.89	0.20 *6*			
782.8 *3*	885.9				
785.9 *5*	1731.6	0.3 *1*			
789.7 *5*	1595.2	0.4 *1*			
790.3 *5*	961.2				

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Coulomb Excitation 2012Wa35 (continued)

γ(^{235}U) (continued)

Eγ	E(level)	Iγ†
795.2 *10*	1235.3	0.12 *4*
795.3 *5*	1467.15	0.3 *1*
796.4 *4*	1047.1	
798.3 *5*	1349.69	0.30 *4*
801.6 *5*	1240.7	0.6 *2*
802.0 *5*	1141.0	0.30 *4*
813.6 *10*	1485.39	0.2 *1*
816.5 *5*	1066.2	0.6 *2*
816.7 *5*	987.5	0.2 *1*
	1155.9	0.3 *1*
821.5 *3*	821.5	
822.0 *5*	1260.9	0.6 *2*
827.8 *10*	1773.28	0.3 *1*
833.3 *5*	1504.6	0.3 *1*
839.1 *10*	2097.0	0.19 *9*
839.5 *5*	885.9	
858.8 *4*	961.2	
874.7 *2*	1047.1	
890.9 *5*	1141.0	0.30 *6*
901.4 *5*	1240.7	0.6 *2*
906.3 *5*	1155.9	0.6 *2*
910.1 *5*	1349.69	0.50 *3*
916.2 *5*	1467.15	0.3 *1*
921.8 *5*	1260.9	0.6 *2*
923.9 *5*	1595.2	0.6 *2*
926.5 *5*	1731.6	0.3 *1*
932.8 *5*	2033.2	0.2 *1*
933.53 *7*	1878.89	0.4 *1*
934.0 *5*	2368.4	0.10 *5*
934.9 *5*	2192.8	0.20 *6*
953.2 *5*	1504.6	0.2 *1*
991.0 *5*	1240.7	0.6 *2*
1010.4 *5*	1260.9	0.6 *2*
1010.5 *5*	1349.69	0.30 *3*
1027.8 *5*	1467.15	0.3 *1*
1073.3 *5*	1878.89	0.10 *6*

† Relative to 100 for Eγ=211.7 keV, unless otherwise specified.
‡ Private communication from one of the authors (D. Ward) 2012Wa35.
§ From Adopted Levels, Gammas.
@ Placement of transition in the level scheme is uncertain.

^{236}U(d,t) 1972Ri08

E(d)=20 MeV, angular distribution at 6 angles (1972Ri08). Other: 1970Br01 (E(d)=12 MeV).

^{235}U Levels

E(level)	E(level)	E(level)
0.0 *21*	587.0 *43*	1129.0 *21*
13.0 *22*	606.0 *22*	1149.0 *24*
52.0 *21*	635.0 *30*	1186.0 *24*
83.0 *34*	658.0 *28*	1194.0 *24*
103.0 *32*	675.0 *24*	1243.0 *30*
129.0 *22*	692.0 *21*	1266.0 *20*
151.0 *24*	702.0 *22*	1274.0 *20*
166.0 *22*	725.0 *21*	1303.0 *23*
197.0 *30*	761.0 *34*	1314.0 *24*
225.0	777.0 *41*	1323.0 *27*
247.0 *20*	797.0 *20*	1341.0 *22*
257.0 *20*	804.0 *20*	1355.0 *26*
293.0 *32*	821.0 *20*	1363.0 *30*
324.0 *41*	828.0 *20*	1385.0 *22*
335.0 *36*	844.0 *21*	1400.0 *25*
366.0 *39*	887.0 *25*	1413.0 *29*
393.0 *26*	921.0 *22*	1429.0 *23*
413.0 *20*	945.0 *22*	1439.0 *28*
426.0 *20*	967.0 *22*	1458.0 *32*
437.0 *21*	993.0 *24*	1485.0 *22*
474.0 *27*	1000.0 *39*	1494.0 *28*
509.0 *34*	1035.0	1521.0 *21*
532.0 *20*	1052.0 *23*	1528.0 *23*
540.0 *30*	1073.0 *21*	1539.0 *26*
550.0 *24*	1095.0 *28*	

^{236}U(^{3}He,α) 1969El04

E(^{3}He)=20 MeV, spectroscopic factors deduced and compared with theory, angular distributions used to deduce L–values in angular momentum transfer. Other: 2009Go28.

^{235}U Levels

E(level)	L	Comments
≈9		
81 *4*		
103 *5*	4,5,6	
143 *4*		
242 *3*	7	
292 *4*	5,6	
361 *6*		
419 *3*	4	
474 *3*	5,6	
535 *2*	4,5,6	
654 *4*	(1),2	
702 *5*	2	E(level): probable doublet.
778 *3*	5,6,(7)	
884 *4*	(3)	L: L=5 from Jπ=(11/2–) in Adopted Levels.
929 *3*	7	
955 *8*		
1001 *4*		
1044? *8*		
1090 *5*	6,7	
1132 *4*		
1217 *8*		
1247? *5*		
≈1350		
1401 *4*		
1478 *5*		
1639 *4*	5,6,7	
1690 *5*		
1737 *2*	6,7	
1857 *3*		
1900 *6*		
1953 *4*		

Adopted Levels, Gammas

Q(β⁻)=–1139 *21*; S(n)=6983 *8*; S(p)=4391.8 *9*; Q(α)=5194.0 *15* 2012Wa38.
Other reactions:
^{235}U(p,nf), ^{235}U(d,2nf) (1998Er01,1997Er09). Other: 1995Da18.
^{236}U(p,2n), ^{237}Np(^{3}He,2np) (1996Aa03).
^{238}U(p,4n) (1994Be52).
^{235}U(d,2n) (1993Be64).

^{235}Np Levels

Cross Reference (XREF) Flags

A ^{235}Pu ε Decay
B ^{239}Am α Decay
C ^{234}U(^{3}He,d),(α,t)
D ^{237}Np(p,t)
E ^{237}Np(^{116}Sn,^{118}Snγ)

E(level)	Jπ‡	XREF	$T_{1/2}$	Comments
0.0§	5/2+	ABCDE	396.1 d *12*	$T_{1/2}$: from 1970La08. Other values: 410 d *10* (1952Ja01), 403 d (1958Gi05). %ε=99.99740 *13*; %α=0.00260 *13*. %α from measurements of x–rays from ^{235}Np and ^{236}Np ε decay, and alpha particles from ^{237}Np α decay (1986AgZV). %α=0.0035 *4* from Iα/K x ray+L x ray (it is not clear whether this result had been corrected for M+ electron capture) (1956Ho46). %α=0.0012 *1* unpublished results (1957Th37). %α=0.00159 from Iα/K x ray+L x ray, after correcting for εM+/εL=0.46 (1958Gi05). %α≈0.002 from K x ray/Iα (1984Wh02). Jπ: L(p,t)=0.
34.23# *10*	(7/2)+	A DE		Jπ: L=2 in (p,t); rotational parameter; 34.2γ (M1+E2) to 5/2+.
49.10& *10*	(5/2)–	ABC	6.9 ns *3*	Jπ: HF=1.4 for α decay from (5/2)–, Nilsson band systematics (1972El21). $T_{1/2}$: K x ray–49γ(t) delayed coincidence in ^{235}Pu ε decay (1971Go01).
79.1§ *4*	(9/2+)	A CDE		Jπ: rotational parameter.
91.6& *3*	(7/2)–	B		Jπ: favored rotational band in ^{239}Am (Jπ=(5/2)–) α decay.
133# *2*	(11/2)+	DE		Jπ: L=4 in (p,t); rotational parameter.
146.8& *7*	(9/2)–	BC		Jπ: favored rotational band in ^{239}Am (Jπ=(5/2)–) α decay.
206.2§ *10*	(13/2)+	CDE		Jπ: L=4 in (p,t); rotational parameter.
276.4# *10*	(15/2+)	E		
352[a] *2*	(3/2–)†	C		
359.9§ *15*	(17/2+)	E		
371?[a] *3*	(1/2–)†	C		
408[a] *2*	(7/2–)†	C		
441[a] *3*	(5/2–)†	C		
463.0# *15*	(19/2+)	E		
520[a] *1*	(11/2–)†	C		Jπ: in analogy with ^{237}Np.
560.4§ *18*	(21/2+)	E		
565[b] *1*	(3/2–)†	C		
602[b] *3*	(5/2–)†	C		
644[b] *1*	(7/2–)†	C		Jπ: suggested by large cross sections in (^{3}He,d) and (α,t).
≈681		C		
690.4# *18*	(23/2+)	E		
700[b] *3*	(9/2–)†	C		
756.4 *3*	(3/2+,5/2,7/2)	A		Jπ: log *ft*=6.3 from ^{235}Pu (Jπ=(5/2+)) ε decay, γ to (7/2)+.
761[b] *2*	(11/2–)†	C		
779.5 *2*	(3/2+,5/2,7/2)	A		Jπ: log *ft*=6.8 from ^{235}Pu (Jπ=(5/2+)) ε decay, γ to (7/2)+.
806.3§ *20*	(25/2+)	E		
819.0 *4*	(5/2+,7/2)	A C		Jπ: log *ft*=7.5 from ^{235}Pu (Jπ=(5/2+)) ε decay. γ ray to (9/2+).
834 *4*	5/2+	D		Jπ: L=0 in (p,t); pairing excitation state (1974Fr01).
870 *3*		C		
922 *1*	(7/2–)†@	C		
936.8 *3*	(5/2+,7/2)	A		Jπ: log *ft*=6.6 from ^{235}Pu (Jπ=(5/2+)) ε decay. γ ray to (9/2+).
944.5 *2*	(3/2+,5/2,7/2)	A		Jπ: log *ft*=5.7 from ^{235}Pu (Jπ=(5/2+)) ε decay, γ to (7/2)+.
956.1# *20*	(27/2+)	E		
962 *2*		D		
978 *1*	(9/2–)†@	C		

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Adopted Levels, Gammas (continued)

^{235}Np Levels (continued)

E(level)	Jπ‡	XREF	Comments
998 *1*		D	
1024 *1*		CD	
1064 *2*	(9/2−)†@	C	
1088.9§ *23*	(29/2+)	E	
1117 *3*		C	
1160c *2*	(13/2+)†	C	
1227 *3*		C	
1256.1# *23*	(31/2+)	E	
1260 *2*	5/2+	CD	Jπ: L=0 in (p,t).
1293 *6*		D	
1310 *2*		C	
1364 *2*		C	
1405.3§ *25*	(33/2+)	E	
1510 *2*		C	
1588.0# *25*	(35/2+)	E	
1607 *2*		C	
1675 *4*		C	
1696 *2*		C	
1752§ *3*	(37/2+)	E	
1818 *2*	5/2+	D	Jπ: L=0 in (p,t).
1845 *3*	(7/2−)	C	
1918 *4*		C	
1948# *3*	(39/2+)	E	
2050 *5*		C	
2124§ *3*	(41/2+)	E	
2336# *3*	(43/2+)	E	
2526§ *3*	(45/2+)	E	
2751# *3*	(47/2+)	E	
2952§ *4*	(49/2+)	E	
3191?# *4*	(51/2+)	E	
3401?§ *4*	(53/2+)	E	

† From (^{3}He,α) based on transferred L–values, systematics of Nilsson configuration assignments, and reaction cross sections.
‡ For members of 5/2+[642] bands Jπ are from 2010Hu02, based on the assumption of $\pi i_{13/2}$ orbital and comparison with the g.s. and assignments in ^{237}Np. 2010Hu02 point out that $\pi h_{9/2}$, 5/2[523] assignment, thus a negative–parity sequence cannot be ruled out.
§ (A): 5/2[642], α=+1/2. The $\pi h_{9/2}$, 5/2[523] assignment is also possible (2010Hu02).
# (B): 5/2[642], α=−1/2. The $\pi h_{9/2}$, 5/2[523] assignment is also possible (2010Hu02).
@ configuration=7/2[514]?
& (C): 5/2[523].
a (D): 1/2[530].
b (E): 3/2[521].
c (F): 7/2[633]?

γ(^{235}Np)

E(level)	Eγ†	Iγ†	Mult.†	α
34.23	34.23 *10*	100	[M1+E2]	1.3×10^3 *12*
49.10	49.10 *10*	100	E1	0.833 *13*
79.1	78‡	100		
133	101‡	100		
206.2	127.1 *10*	100		
276.4	143.4 *10*	100		
359.9	153.7 *10*	100		
463.0	186.6 *10*	100		
560.4	200.5 *10*	100		
690.4	227.4 *10*	100		
756.4	722.2 *5*	1.0 *3*		
	756.4 *3*	100 *4*		
779.5	745.1 *3*	100 *9*		
	779.6 *3*	41 *4*		
806.3	245.9 *10*	100		
819.0	739.8 *4*	100 *20*		
	785.0 *4*	60 *20*		
936.8	858.0 *5*	60 *20*		
	902.6 *4*	100 *13*		
	936.7 *4*	60 *20*		
944.5	910.1 *3*	100 *3*		
	944.7 *3*	69 *3*		
956.1	265.7 *10*	100		
1088.9	282.6 *10*	100		
1256.1	300.0 *10*	100		
1405.3	316.4 *10*	100		
1588.0	331.9 *10*	100		
1752	346.3 *10*	100		
1948	360.4 *10*	100		
2124	372.4 *10*	100		

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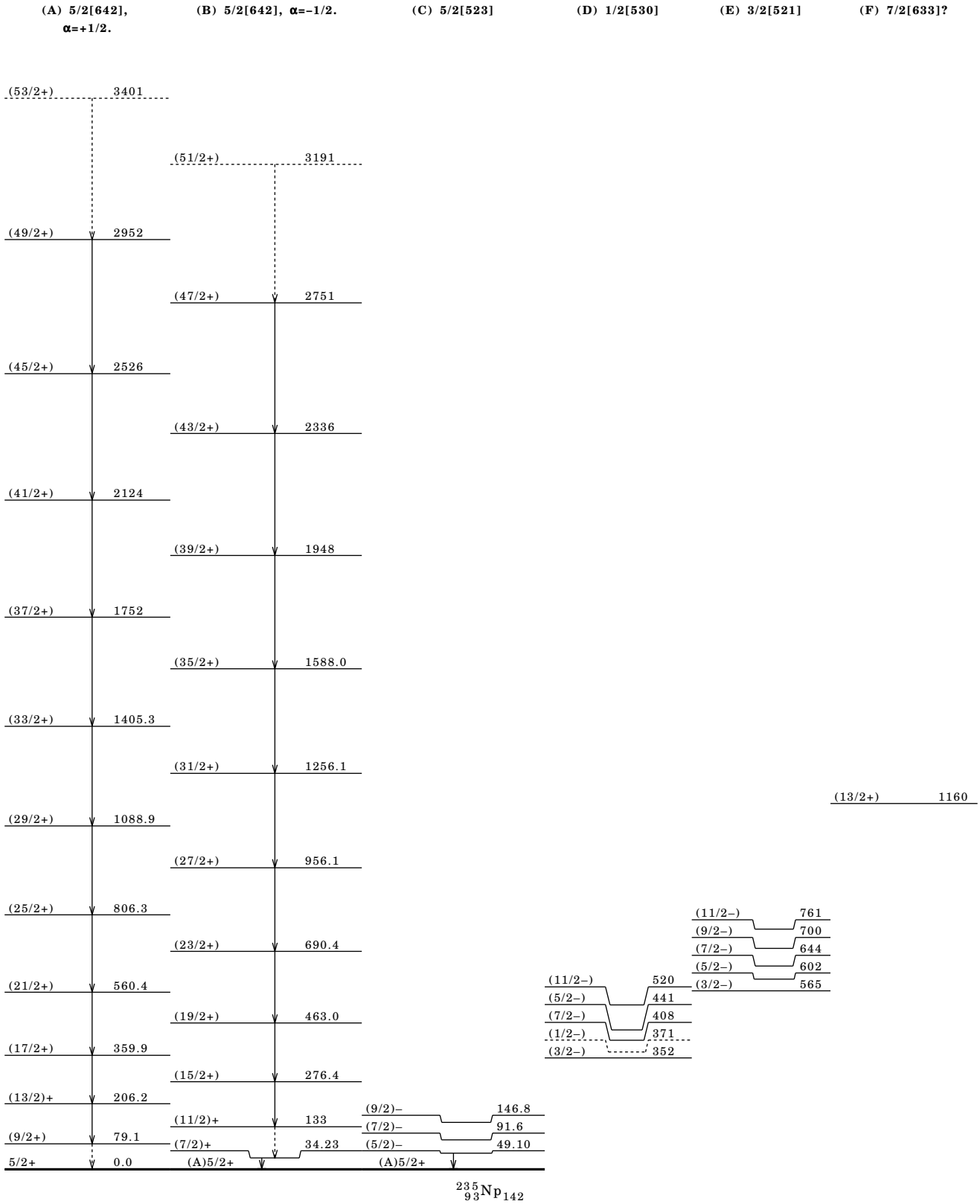
Adopted Levels, Gammas (continued)

$\gamma(^{235}Np)$ (continued)

E(level)	$E\gamma^{\dagger}$	$I\gamma^{\dagger}$
2336	387.8 *10*	100
2526	402.4 *10*	100
2751	414.9 *10*	100
2952	425.3 *10*	100
3191?	439.5‡ *10*	100
3401?	449.4‡ *10*	100

† From ^{235}Pu ε decay or $^{237}Np(^{116}Sn,^{118}Sn\gamma)$.
‡ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas (continued)



^{235}Pu ε Decay 1973Ja03

Parent ^{235}Pu: E=0; Jπ=(5/2+); $T_{1/2}$=25.3 min *5*; Q(g.s.)=1139 *21*; %ε+%β$^+$ decay=99.997 *1*.
^{235}Pu–Q(ε): From 2012Wa38.

^{235}Np Levels

The levels at 756, 779 and 819 were suggested in 1973Ja03 that they belong to the 3/2[521] rotational band; however, (^{3}He,d) and (α,t) results suggest that this bandhead is at 565 keV. Analogy with ^{231}Th β$^-$ decay suggests that the main ε branches should feed the 3/2[651] and 3/2[532] rotational bands in ^{235}Np, in addition to the well established 5/2[642] and 5/2[523] rotational bands.

E(level)	Jπ†	$T_{1/2}$	Comments
0.0	5/2+	396.1 d *12*	$T_{1/2}$: from Adopted Levels.
34.23 *10*	(7/2+)		
49.10 *10*	(5/2)−	6.9 ns *3*	$T_{1/2}$: from K x ray–49γ(t) delayed coincidence (1971Go07).
79.1 *4*	(9/2+)		
756.4 *3*	(3/2,5/2,7/2)		
779.46 *22*	(3/2,5/2,7/2)		
819.0 *4*	(5/2+,7/2)		
936.8 *3*	(5/2+,7/2)		
944.51 *22*	(3/2,5/2,7/2)		

† From adopted levels.

β$^+$,ε Data

β$^+$<0.01% from limit on γ$^\pm$ (1973Ja03).

Eε	E(level)	Iε†	Log *ft*
(194 *21*)	944.51	0.28 *5*	5.70 *19*
(202 *21*)	936.8	0.041 *8*	6.60 *19*
(320 *21*)	819.0	0.019 *4*	7.53 *13*
(360 *21*)	779.46	0.13 *2*	6.84 *10*
(383 *21*)	756.4	0.48 *8*	6.34 *10*
(1090 *21*)	49.10	4.3 *8*	6.46 *9*
(1105 *21*)	34.23	37 *10*	5.54 *12*
(1139 *21*)	0.0	57 *10*	5.38 *8*

† For intensity per 100 decays, multiply by 0.99997 *1*.

γ(^{235}Np)

Kα$_1$ x ray=34% *5*, Kα$_2$ x ray=22% *3*, Kβ x ray=17% *3*; L x ray=39% *5*, calculated by evaluator using the computer program radlst.
K x ray and L x ray intensities not reported by 1973Ja03.
Iγ normalization: from ε(K)/ε=0.72 and Iγ(49γ)=1.74 per 100 K x ray.

Eγ†	E(level)	Iγ‡	Mult.	δ	α	Comments
34.2 *1*	34.23	192 *36*	(M1+E2)	≈0.12	≈152	δ: by analogy with 33.2γ in ^{237}Np.
(44.7)	79.1					
49.1 *1*	49.10	1967 *50*	E1		0.833 *13*	Iγ: 1.74 *27* photons per 100 K x ray (in coin measurement), 2.67 *7* (in singles measurement) (1971Go01).
(79.0)	79.1					
722.2 *5*	756.4	4 *1*				
739.8 *4*	819.0	10 *2*				
745.1 *3*	779.46	75 *7*				
756.4 *3*	756.4	399 *14*				
779.6 *3*	779.46	31 *3*				
785.0 *4*	819.0	6 *2*				Could also be placed de–exciting the 834–keV 5/2+ state.
819.0§ *6*	819.0	1 *1*				
858.0 *5*	936.8	9 *3*				
902.6 *4*	936.8	15 *2*				
910.1 *3*	944.51	137 *4*				
936.7 *4*	936.8	9 *3*				
x940.7 *3*		95 *4*				

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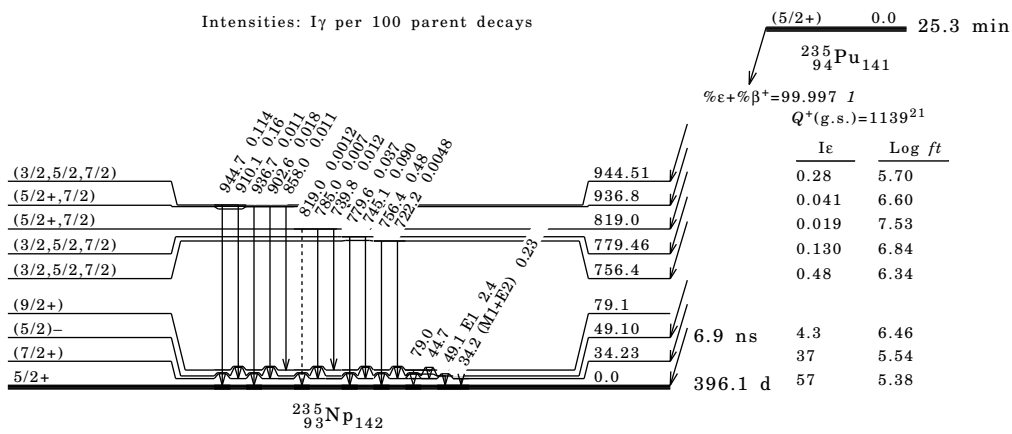
^{235}Pu ε Decay 1973Ja03 (continued)

γ(^{235}Np) (continued)

Eγ†	E(level)	Iγ‡
944.7 *3*	944.51	95 *4*

† From 1973Ja03. Others: 1996Gu11, 1971Ke22, 1971Go01.
‡ For absolute intensity per 100 decays, multiply by 0.00120 *20*.
§ Placement of transition in the level scheme is uncertain.
x γ ray not placed in level scheme.

Decay Scheme



^{239}Am α Decay 1971Go01

Parent ^{239}Am: E=0; Jπ=(5/2)−; $T_{1/2}$=11.9 h *1*; Q(g.s.)=5922.4 *14*; %α decay=0.010 *1*.
^{239}Am–Q(α): From 2012Wa38.
^{239}Am–%α decay: from 1972Po04.

^{235}Np Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	5/2+	396.1 d *12*	$T_{1/2}$: from Adopted Levels.
48.8 *9*	(5/2)−		
91.6 *3*	(7/2)−		
146.8 *7*	(9/2)−		

α radiations

Eα	E(level)	Iα‡	HF†	Comments
5680 *2*	146.8	1.98 *3*	17	
5734 *2*	91.6	13.75 *7*	5.0	
5774.2 *15*	48.8	83.7 *4*	1.4	Eα: from 1991Ry01.
5825 *4*	0.0	0.33 *2*	630	

† Using r_0(^{239}Am)=1.5036, average of r_0(^{235}U)=1.5122 and r_0(^{235}Pu)≈1.4949 (1998Ak04).
‡ For α intensity per 100 decays, multiply by 0.00010 *1*.

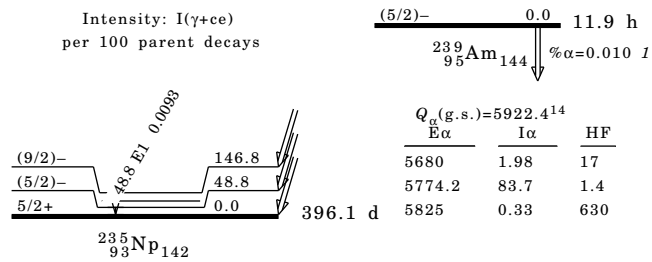
^{239}Am α Decay 1971Go01 (continued)

γ(^{235}Np)

Eγ	E(level)	Iγ†‡	Mult.	α
48.8 *9*	48.8	50 *10*	E1	0.85 *5*

† From 1955As48.
‡ For absolute intensity per 100 decays, multiply by 0.00010 *1*.

Decay Scheme



^{234}U(^{3}He,d),(α,t) 1978Gr12

E(^{3}He)=E(α)=30 MeV; magnetic spectrograph, FWHM=16–20 keV; angular distributions, DWBA analysis. Deduced transferred L–values from ratios of cross sections, with an accuracy of ±1 unit.

^{235}Np Levels

E(level)‡	Jπ†	E(level)‡	Jπ†	E(level)‡	Jπ†
3§ *3*	5/2+	644& *1*	7/2–	1227 *3*	
46# *3*	5/2–	≈681		1262 *2*	
82§ *1*	9/2+	700& *3*	9/2–	1310 *2*	
146.8# *CA*	9/2–	761& *2*	(11/2–)	1364 *2*	
200§ *1*	13/2+	820 *3*		1510 *2*	
352@ *2*	3/2–	870 *3*		1607 *2*	
371?@ *3*	(1/2–)	922b *1*	(7/2–)	1675 *4*	
408@ *2*	7/2–	978b *1*	(9/2–)	1696 *2*	
441@ *3*	5/2–	1024 *1*		1758 *3*	
520 *1*		1064b *2*	(9/2–)	1845c *3*	(7/2–)
565& *1*	3/2–	1117 *3*		1918 *4*	
602& *3*	5/2–	1160a *2*	(13/2+)	2050 *5*	

† From experimental transferred L–values, systematics of Nilsson configurations, and comparison of experimental cross sections with theoretical values.
‡ Energies are relative to 146.8 keV (Jπ=9/2–), from Adopted Levels.
§ (A): 5/2[642].
# (B): 5/2[523].
@ (C): 1/2[530].
& (D): 3/2[521].
a (E): 7/2[633]?
b (F): 7/2[514]?
c (G): 5/2[512]?

^{237}Np(p,t) 1974Fr01

E(p)=16.5 MeV, angular distributions studied (1974Fr01).

^{235}Np Levels

E(level)	Jπ	L	E(level)	Jπ	L	E(level)	Jπ	L
0.0	5/2+	0	201 *2*	(13/2)+	4	1024 *2*		2
32 *1*	(7/2)+	2	834 *4*	5/2+	0	1260 *2*	5/2+	0
77 *2*	(9/2+)	(2,4)	962 *2*			1293 *6*		2
133 *2*	(11/2)+	4	998 *1*		2	1818 *2*	5/2+	0

^{237}Np(^{116}Sn,^{118}Snγ) 2010Hu02

$^{116}Sn^{+31}$ beam at E=801 MeV from ATLAS of ANL bombarded a 0.5 mg/cm^2 ^{237}Np target through a 0.3 mg/cm^2 thick layer of Ni. The energy of the beam on the ^{237}Np target was ≈ 20% above the Coulomb barrier of the reacting nuclei.

Detection system: Gammasphere comprising 101 Compton suppressed HPGe was used to detect γ rays in coincidence with particles detected in Chico. CHICO consisted of 20 PPACs covering 4π. Only particles emitted in 12°<θ<85° measured in lab system were detected.

Measurements: Eγ, Iγ, γγ, γγγ, and (particle)γ(θ). Deduced level scheme using ROOT and RADWARE codes.

^{235}Np Levels

About 70% of the production cross section of this nucleus feeds the ground state band, based on comparison with intensity of similar levels in ^{237}Np. Therefore, parental Nilsson configuration of π5/2[642] for the g.s. is assigned as in ^{237}Np, although π5/2[523] from $h_{9/2}$ orbital cannot be ruled out, as explained in 2010Hu02.

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
0.0#	5/2+	690.4@ *18*	(23/2+)	2124# *3*	(41/2+)
34.23§@ *10*	(7/2+)	806.3# *20*	(25/2+)	2336@ *3*	(43/2+)
79.1§# *4*	(9/2+)	956.1@ *20*	(27/2+)	2526# *3*	(45/2+)
133§@ *2*	(11/2+)	1088.9# *23*	(29/2+)	2751@ *3*	(47/2+)
206.2# *10*	(13/2+)	1256.1@ *23*	(31/2+)	2952# *4*	(49/2+)
276.4@ *10*	(15/2+)	1405.3# *25*	(33/2+)	3191?@ *4*	(51/2+)
359.9# *15*	(17/2+)	1588.0@ *25*	(35/2+)	3401?# *4*	(53/2+)
463.0@ *15*	(19/2+)	1752# *3*	(37/2+)		
560.4# *18*	(21/2+)	1948@ *3*	(39/2+)		

† From Eγ's, except where noted.

‡ From 2010Hu02, based on the assumption of $\pi i_{13/2}$ orbital and comparison with the g.s. and assignments in ^{237}Np. 2010Hu02 point out that $\pi h_{9/2}$, 5/2[523] assignment, thus a negative–parity sequence cannot be ruled out.

§ From adopted levels.

(A): π5/2[642], α=+1/2. The $\pi h_{9/2}$, 5/2[523] assignment is also possible (2010Hu02).

@ (B): π5/2[642], α=–1/2. The $\pi h_{9/2}$, 5/2[523] assignment is also possible (2010Hu02).

γ(^{235}Np)

Eγ†	E(level)	Comments
34.23 *10*	34.23	Eγ: from Adopted Gammas.
78‡§	79.1	
101‡§	133	
127.1 *10*	206.2	
143.4 *10*	276.4	
153.7 *10*	359.9	
186.6 *10*	463.0	
200.5 *10*	560.4	
227.4 *10*	690.4	
245.9 *10*	806.3	
265.7 *10*	956.1	
282.6 *10*	1088.9	
300.0 *10*	1256.1	
316.4 *10*	1405.3	
331.9 *10*	1588.0	

Continued on next page (footnotes at end of table)

^{237}Np(^{116}Sn,^{118}Snγ) 2010Hu02 (continued)

γ(^{235}Np) (continued)

Eγ†	E(level)
346.3 *10*	1752
360.4 *10*	1948
372.4 *10*	2124
387.8 *10*	2336
402.4 *10*	2526
414.9 *10*	2751
425.3 *10*	2952
439.5§ *10*	3191?
449.4§ *10*	3401?

† Uncertainty in Eγ is stated as 0.5 to 1 keV in 2010Hu02. The evaluators assign 1.0 keV, since no intensity data are available.
‡ Transition not well established due to expected high internal conversion and superposition by X rays.
§ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Q(β⁻)=–2442 *56*; S(n)=6237 *22*; S(p)=5062 *22*; Q(α)=5951 *20* 2012Wa38.

^{235}Pu Levels

Cross Reference (XREF) Flags

A ^{235}Am ε Decay

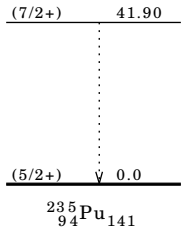
E(level)	Jπ	XREF	$T_{1/2}$	Comments
0.0†	(5/2+)	A	25.3 min *5*	$T_{1/2}$: weighted average of 25.6 min *1* (1973Ja03), 25.9 min *1* (1971Ke22), 24.3 min *1* (1971Go01). Other values: 26 min *2* (1957Th10), 25 min *4* (1996Gu11), 26 min *2* (1952Or03). Calculated $T_{1/2}$(SF): 1991Bh04, 2013BeZU. Jπ: log *ft*=5.4 to g.s. (Jπ=5/2+) and log *ft*=5.5 to 34–keV level (Jπ=(7/2+)) in ^{235}Np from ^{235}Pu ε decay. Systematics of Nilsson configuration assignments in this region suggests Jπ=5/2+. %ε+%β⁺=99.9972 *7*; %α=0.0028 *7*. %α: from $T_{1/2}$(α)=1.7 y *4* (1957Th10) and adopted $T_{1/2}$=25.3 min *5*. Jπ: Configuration=ν5/2[633].
41.90† *19*	(7/2+)	A		Configuration=ν5/2[633].
183.70 *17*	(3/2+)	A		Suggested configuration=ν1/2[631].
265.37 *16*	(5/2+)	A		Suggested configuration=ν3/2[631].
290.53 *16*	(5/2–)	A		Suggested Configuration=ν5/2[752].
535.10 *17*	(5/2+)	A		Suggested Configuration=ν5/2[622].
639.1 *3*		A		
825.9 *3*		A		
1029.5 *3*		A		
1118.8 *3*		A		
3000 *200*			25 ns *5*	%SF≤100. E(level),$T_{1/2}$: from 1969Me11, 1970Bu02, 1972Ga42 $T_{1/2}$≈23 ns in ^{233}U(α,2n) and $T_{1/2}$=18 ns *9* in ^{234}U(^{3}He,2n) (1978SoZP).

† (A): 5/2[633].

γ(^{235}Pu)

E(level)	Eγ	Iγ	Mult.	E(level)	Eγ	Iγ
41.90	(41.9)			535.10	244.6 *2*	34 *16*
183.70	183.7 *2*	100	M1+E2		269.7 *2*	100 *30*
265.37	223.5 *2*	100 *22*			351.4 *2*	79 *24*
	265.3 *2*	83 *19*		639.1	373.7 *2*	100
290.53	248.6 *2*	19 *8*		825.9	642.2 *2*	100
	290.6 *2*	100 *14*		1029.5	739.0 *2*	100

(A) 5/2[633]



^{235}Am ε Decay 2004As12

Parent ^{235}Am: E=0; Jπ=(5/2−); $T_{1/2}$=10.3 min *6*; Q(g.s.)=2442 *56*; %ε+%β$^+$ decay=99.60 *5*.
^{235}Am–$T_{1/2}$: From 2004Sa05.
^{235}Am–%ε+%β$^+$ decay: %α=0.40 *5* (2004Sa05).
2004As12: Activity produced by ^{233}U(^{6}Li,4n), E=34–42 MeV. Reaction products stopped in He gas loaded with PbI_2 clusters, and transported into an ion source of ISOL by gas–jet stream. Products mass separated with a resolution of M/ΔM=800. Separated ions implanted into a Si α detector, two Ge detectors used for γ–rays. Measured: a, γ, αγ, γγ, Np K x ray, and Pu K x ray, L x ray, studied ^{235}Am ε and α decay. Others: 2002As08, 2003Na10.
2004Sa05: Measured Eα, $T_{1/2}$.
2000SaZO: Activity produced by ^{233}U(^{6}Li,4n), E=45.5 MeV. Mass–separated and assigned to ^{235}Am. Measured γ rays, Pu K x ray, Np K x ray, α particles (Eα). Detectors: Si–pin photodiodes for α particles; High–purity Ge for γ rays. Deduced half–life, α/ε branching ratio. No specific γ rays were reported, and no decay scheme was constructed.
All data are from 2004As12, unless otherwise stated.

^{235}Pu Levels

E(level)	Jπ†	Comments
0.0	5/2+	Possible configuration=ν5/2[633].
41.90 *19*	(7/2+)	possible configuration=ν5/2[633].
183.70 *17*	(3/2+)	Jπ: Possible configuration=ν1/2[631].
265.37 *16*	(5/2+)	Suggested configuration=ν3/2[631].
290.53 *16*	(5/2−)	Suggested Configuration=ν5/2[752].
535.10 *17*	(5/2+)	Suggested Configuration=ν5/2[622].
639.1 *3*		
825.9 *3*		
1029.5 *3*		
1118.8 *3*		

† Configurations are suggested based on expected log *ft* values and similar transitions in neighboring nuclides.

β$^+$,ε Data

Eε	E(level)	Iβ$^+$	Iε	Log *ft*	I(ε+β$^+$)†	Comments
(2440 *60*)	0.0	<0.40	<32	>6.0	<32‡	I(ε+β$^+$): Estimated intensity to g.s.+42 level based on observed K x ray − K x ray based on all γ's, except 183.7γ, assumed E1. 183.7γ is M1+E2.

† Not determined explicitly in 2004As12 due to lack of knowledge of total internal conversion coefficients of observed γ transitions.
‡ Combined for 0+41.9 level is deduced (2004As12) as 20 *12* from analysis of Pu K x ray intensity.

γ(^{235}Pu)

I(Pu $K_{\alpha1}$ x rays)=240 *50*; observed in coincidence with ^{235}Pu γ rays.

Eγ	E(level)	Iγ†	Mult.	Comments
(41.9)	41.90			Eγ: transition not observed due to its large internal conversion coefficient.
x169.6 *2*		13 *4*		
183.7 *2*	183.70	20 *6*	M1+E2	α(K)exp=3.3 *13*. α(K)exp: from intensity ratio between the 183.7 γ–rays and Pu K_α x– contribution of x rays from electron capture was subtracted in this analysis by 2004As12.
223.5 *2*	265.37	42 *9*		
244.6 *2*	535.10	13 *6*		
248.6 *2*	290.53	19 *8*		
265.3 *2*	265.37	35 *8*		
269.7 *2*	535.10	38 *11*		
290.6 *2*	290.53	100 *14*		
351.4 *2*	535.10	30 *9*		
373.7 *2*	639.1	33 *12*		
642.2 *2*	825.9	20 *6*		
739.0 *2*	1029.5	36 *11*		
x749.1 *2*		36 *11*		
828.3 *2*	1118.8	27 *8*		

Footnotes continued on next page

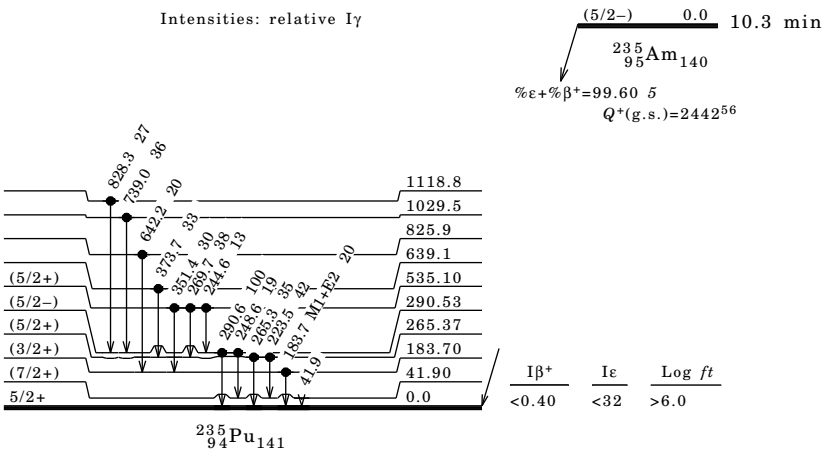
^{235}Am ε Decay 2004As12 (continued)

γ(^{235}Pu) (continued)

† Determined from both singles and coincidence γ–ray spectra. The large uncertainties are due to low statistics and poor peak–to–background ratios.

x γ ray not placed in level scheme.

Decay Scheme



Adopted Levels

Q(β⁻)=−3384 *SY*; S(n)=7906 *SY*; S(p)=3013 *53*; Q(α)=6576 *13* 2012Wa38.

2012Wa38: ΔQ(β⁻)=208 syst; ΔS(n)=167 syst.

1996KoZZ, 1996Gu11, 1997Sh21, 1999Ya13: Activity produced by ^{238}Pu(p,4n), E=35 MeV. Chemically separated and assigned to ^{235}Am on the basis of detected Pu K x ray, as well as Np K x ray and a 49.1−keV γ ray from ^{235}Pu (daughter nucleus of ^{235}Am) electron−capture decay. Activity was transported using a He−jet recoil technique. Measured γ rays, Xγ coin. Deduced $T_{1/2}$.

1999SaZT: Activity produced by ^{235}U(^{6}Li,6n), E=60 MeV. Mass−separated and assigned to ^{235}Am on the basis of detected Pu K x ray. Measured γ rays in singles, Xγ coin, and γγ coin experiments. No γ rays coincident with Pu K x ray were detected. Deduced $T_{1/2}$.

2000SaZO: Activity produced by ^{233}U(^{6}Li,4n), E=45.5 MeV. Mass−separated and assigned to ^{235}Am. Measured γ rays, Pu K x ray, Np K x ray, α particles (Eα). Detectors: Si−pin photodiodes for α particles; High−purity Ge for γ rays. Deduced half−life, Iα/ε branching ratio.

2004As12, 2004Sa05: Activity produced by ^{233}U(^{6}Li,4n), E=34−42 MeV. Separated ions implanted in a Si α detector, two Ge detectors used for γ−rays. Measured: α, γ, αγ, γγ, Np K x ray, and Pu K x ray, L x ray, studied ^{235}Am ε and α decay.

^{235}Am Levels

E(level)	Jπ	$T_{1/2}$	Comments
0.0	5/2−	10.3 min *6*	$T_{1/2}$: from α(t) 2004Sa05, 2000SaZO. Other: 9.3 min *7* (1999SaZT), 15 min *5* (1996KoZZ,1996Gu11,1997Sh21,1999Ya13). Jπ: Configuration=(π 5/2[523]) (2004As12). %ε=99.60 *5*; %α=0.40 *5*. %α: from Pu K x ray and α particles measured simultaneously in a known geometry using calibrated detectors (2004Sa05,2000SaZO).

Adopted Levels

Q(β⁻)=−4693 *SY*; S(n)=6785 *SY*; S(p)=3740 *SY*; Q(α)=7300 *SY* 2012Wa38.
Systematic uncertainties: ΔQ(β⁻)=448, ΔS(n)=203, ΔS(p)=257, ΔQ(α)=200 (2012Wa38).
No substantial change since last evaluations by E. Browne (2003Br12) and M. Schmorak (1993Sc22).
1981Mu12 did not detect α decay of ^{235}Cm.
2012Sa31: Calculated cluster−decay half−lives.

^{235}Cm Levels

Cross Reference (XREF) Flags

A ^{239}Cf α Decay

E(level)	XREF	Comments
(0.0)	A	$T_{1/2}$: not measured.
50 *SY*	A	E(level): from ^{239}Cf α decay.

^{239}Cf α Decay 1981Mu12

Parent ^{239}Cf: E=0; Jπ=?; $T_{1/2}$=39 s *+37−12*; Q(g.s.)=7810 syst; %α decay≤100.
^{239}Cf: ΔQ(α)=56 syst (2012Wa38).
No substantial change since last evaluations by E. Browne (2003Br12) and M. Schmorak (1993Sc22).

^{235}Cm Levels

E(level)	Comments
(0.0)	Alpha decay from ^{239}Cf to the gs of ^{235}Cm was not observed.
50 *SY*	E(level): from Q(α)=7810 syst (2012Wa38) and Eα=7630.

α radiations

Eα	E(level)	Comments
7630 *25*	50	HF: HF=1.24 for %α=100 and r_0=1.51.

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