Nuclear Data Sheets for A = 235*

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(Received March 12, 2014; Revised September 30, 2014)

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 $J\pi=53/2+$, $49/2+$, $41/2-$, and $43/2+$, respectively.

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

It is worth for historical knowledge to mention the report on the "Discovery of isotopes of the transuranium elements with $93 \leq Z \leq 98$ " (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>.

Acknowledgments: Thanks are due to B. Singh for his compilation of many experimental works into the Experimental Unevaluated Nuclear Data List (XUNDL), maintained and disseminated by the National Nuclear Data Center (NNDC) at the Brookhaven National Laboratory (BNL). Authors are extremely grateful to E. McCutchan for her thorough review.

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

* Research sponsored by Office of Nuclear Physics, Office of Science, US Department of Energy, under contract DE-AC02-98CH10946.

0090-3752/14 \$35.00

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Skeleton Scheme for A=235

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

Nuclide	Level	J π	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 ²³⁸U beam fragmentation. Measured lifetime.

²³⁵Ac 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 ²³⁵Th 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 ²³⁵Th: 2013Fr03.
Mass measurements: 2012Ch19, 2012Zh46.
Neutron fission cross-section measurements: 2012Pr13, 2011Ch57, 2010Pr07.
Cluster decay half-lives. ²³⁵Th (¹⁶O, ¹⁸O, ²⁰O, ²²O, ²⁴Ne, ²⁶Ne): 2012Sa31.
Nuclear Structure: 2005Pa73.

²³⁵Th 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 ²³⁵Th: 2013Fr03.
Mass measurements: 2012Ch19, 2012Zh46.
Neutron fission cross-section measurements: 2012Pr13.
Cluster decay half-lives. ²³⁵Pa(²³F, ²⁴Ne): 2012Sa31.
Calculated Q(α), t, single-particle energies: 2008Do12.
Other reaction: ¹⁶O, ¹⁹F on ²³²Th. Measured excitation functions (2000Si04).

²³⁵Pa Levels

Cross Reference (XREF) Flags

A ²³⁵Th β⁻ Decay
B ²³⁶U(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.
965 ^a 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 ²³³Pa (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(²³⁵Pa)

E(level)	Eγ	Iγ
(10)	(≤10)	
344. 69	292. 9 I	100
468. 79	417. 0 I	100

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{235}\text{Pa})$ (continued)

E(level)	E γ	I γ
468.79	450.4 2	15 4
	468.7 $\dagger$ 2	24.8 16
727.01	708.3 2	60 4
	727.2 $\dagger$ 2	100 5
747.90	696.1 2	100 6
	729.5 2	71 5
	747.8 $\dagger$ 2	67 5
755.75	704.0 2	100 6
	737.0 5	37 11

$\dagger$ Probably a doublet feeding the g.s. and first excited state.

(A) 1/2[530]

(B) 1/2[400]

(C) 3/2[651]

(D) 3/2[402]

(E) 9/2[514]?

(F) 1/2[541]?

(5/2-) 965

(11/2-) 751

^{235}Th β^- Decay 1986Mi10

Parent ^{235}Th : E=0; $J\pi=(1/2+)$; $T_{1/2}=7.1$ 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 , $\gamma(t)$; Ge(Li), $\alpha(\text{P})$.

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 (I γ 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)	J π
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)

²³⁵Th β⁻ Decay 1986Mi10 (continued)

β⁻ radiations

Eβ ⁻	E(level)	Iβ ^{-†‡}	Log <i>ft</i>	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(²³⁵Pa)

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 ²³⁵Th.

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			
^x 174.8 2		7.6 11		
292.9 1	344.69	14.8 2		
^x 406.1 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		
^x 484.2 2		19 4		
^x 644.9 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		
^x 837.8 2		13.7 14		
^x 932.8 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

 $^{236}\text{U}(\text{t}, \alpha)$ 1977Th04

E(t)=15 MeV, magnetic spectrograph, $\sigma(60^\circ)$, FWHM=19 keV, DWBA analysis (1977Th04).

 ^{235}Pa Levels

E(level)	$J\pi^\dagger$	Comments
0.0 $\ddagger$	3/2	
19 $\S$ 3	1/2	
55 $\ddagger$ 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-)	
965 a 8	(5/2-)	

† Based on a comparison of cross sections with theory, and on the analogy with ^{233}Pa level structure.

$\ddagger$ (A): 1/2[530].

$\S$ (B): 1/2[400].

$\#$ (C): 3/2[651].

$@$ (D): 3/2[402].

$\&$ (E): 9/2[514].

a (F): 1/2[541].

Adopted Levels, Gammas

$Q(\beta^-) = -124.0$ 9; $S(n) = 5297.5$ 2; $S(p) = 6709$ 4; $Q(\alpha) = 4678.2$ 7 2012Wa38.

Other reactions:

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

$^{235}\text{U}(n,n'\gamma)$: 2013Ke02, 2012LeZZ, 2008HuZW.

$^{235}\text{U}(\alpha,\alpha')$: 2011Bu11.

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

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

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

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

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

Cluster decay:

$^{235}\text{U}(^{29}\text{Mg})$: calculated half-life (2013Ta07).

$^{235}\text{U}(^{24}\text{Ne})$, $^{235}\text{U}(^{25}\text{Ne})$: Calculated half-life (2013Zd01, 2013Zd02).

$^{235}\text{U}(^{24}\text{Ne})$, $^{235}\text{U}(^{25}\text{Ne})$, $^{235}\text{U}(^{28}\text{Mg})$: Calculated half-life (2012Ba35, 2012Ku29). Others: $^{235}\text{U}(^{24}\text{Ne})$, $^{235}\text{U}(^{25}\text{Ne})$:

2010Ni13, 2004Ba64.

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

$^{235}\text{U}(^{24}\text{Mg})$: calculated half-life, isotope shift, $Q(\beta^-)$ value (2005Bh02).

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

$^{235}\text{U}(^{25}\text{Ne})$, $^{235}\text{U}(^{29}\text{Mg})$: calculated half-life (2011Sh13).

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

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

$^{232}\text{Th}(\alpha, \text{xnF})$ (1997Er02): Measured fission fragments.

$^{235}\text{U}(\text{SF})$: 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.

235U Levels**Cross Reference (XREF) Flags**

A ^{235}Pa β^- Decay

B ^{235}Np ε Decay

C ^{239}Pu α Decay

D Coulomb Excitation

E $^{233}\text{U}(t,p)$

F $^{234}\text{U}(n,\gamma)$ $E = \text{th}$

G $^{234}\text{U}(d,p)$

H $^{235}\text{U}(n,n')$

I $^{235}\text{U}(n,n'\gamma)$

J $^{235}\text{U}(d,d')$

K $^{236}\text{U}(d,t)$

L $^{236}\text{U}(^3\text{He}, \alpha)$

M Muonic Atom

N $^{235}\text{U}(\gamma, \gamma')$

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

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

²³⁵U Levels (continued)

E(level) [§]	Jπ [#]	XREF	T _{1/2}	Comments
0.0760 ^{†a} 4	1/2+	A CD F L	≈26 min	<p>T_{1/2}(SF)=1.0×10¹⁹ y 3, value recommended in 2000Ho27 from T_{1/2}(SF)=9.8×10¹⁸ y 28 (1981Vo02); T_{1/2}(SF)>1.8×10¹⁸ y (1974GrZA); T_{1/2}(SF)=0.35×10¹⁸ y 9 (1966Al23); T_{1/2}(SF)=0.18×10¹⁸ y (1952Se67). ²⁰Ne/%α=8×10⁻¹² 4 (1989Tr11,1991Bo20). ²⁴Ne emission (1997Ka11). T_{1/2}(²⁵Ne)=9×10¹⁹ yr. Other: 1997Tr17. T_{1/2}(²⁸Mg)=8.8×10²⁰ yr (1998Ro11,1997Ro24); other value: >9×10²⁰ (1997MiZP). Q(²³³U)/Q(²³⁵U)=0.975 3 (1990Ga28). %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 ²³⁵U (1992Bo26). Jπ: favored α decay from 1/2+ ²³⁹Pu. T_{1/2}: from ²³⁹Pu α decay (1970Ho02). 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). T_{1/2}: from ²³⁹Pu α decay (1970Ho02,1970ToZZ). 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'). Jπ: γ-ray de-excitation (E1 to 7/2-, M1 to 3/2+).</p>
13.0339 ^{†b} 21	3/2+	A CD FG K	0.50 ns 3	
46.103 ^{†&} 8	9/2-	CD F IJ M	≈14 ps	
51.6968 ^a 11	5/2+	A CD FGH K	191 ps 5	
81.724 ^b 4	7/2+	A CD FG KL		
103.903 ^{†@} 8	11/2-	CD GH JKLM	33 ps 5	
129.2995 ^{†c} 10	5/2+	A CD FG I K1		
150.356 ^{†a} 16	9/2+	CD FG K1		
171.358 ^{†d} 5	7/2+	CD F		
171.464 ^{†&} 13	13/2-	CD G J M	21.9 ps 13	
197.087 ^{†b} 15	11/2+	CD G K		
225.382 ^{†c} 7	9/2+	CD FG IJK1		
250.014 ^{†@} 21	15/2-	CD G JK1		
259.0 21		G		
291.135 ^{†d} 19	11/2+	CD G JK1		
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 JK1		
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 JK1		
426.741 ^{†f} 3	5/2+	A C FG JK1		
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 JK1		
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) [§]	J $\pi^{\#}$	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	J π : from (d,d').
761.017 ^{‡p} 6	(1/2)-	C FG K	
769.27 ^{‡s} 6	1/2+	C F	J π : 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	J π : 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	J π : from (d,d').
843.859 ^{‡t} 10	(1/2)+	C FG K	J π : γ -ray de-excitation (E2 to 5/2+; M1(+E0) to 1/2+).
845.357 ^{‡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	J π : From (d,p).
945.58 [@] 5	27/2-	D	
951.05 [‡] 3	1/2-, 3/2-	F	J π : 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	J π : 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	J π : E1 from 1/2+ in (n, γ).
992.64 [‡] 3	(5/2+)	C Fg K	J π : 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	J π : 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	J π : 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	J π : detected in thermal neutron (n, γ).
1078.03 ^b 7	27/2+	D	
1099.02 [‡] 11	(3/2-)	F	J π : 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	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)
 ^{235}U Levels (continued)

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

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) ^{235}U Levels (continued)

E(level) [§]	J π [#]	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 $^{234}\text{U}(\text{n},\text{F})$, $\sigma(\text{SF})=10 \mu\text{b}$ 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 $^{234}\text{U}(\text{n},\gamma)$.§ 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], $\alpha=+1/2$.& (B): 7/2[743], $\alpha=-1/2$.a (C): 1/2[631], $\alpha=+1/2$.b (D): 1/2[631], $\alpha=-1/2$.c (E): 5/2[622], $\alpha=+1/2$.d (F): 5/2[622], $\alpha=-1/2$.e (G): 3/2[631], $\alpha=+1/2$.f (H): 3/2[631], $\alpha=-1/2$.g (I): K=3/2 γ -vibrational band, $\alpha=+1/2$.h (J): K=3/2 γ -vibrational band. $\alpha=-1/2$.i (K): 5/2[752], $\alpha=+1/2$.j (L): 5/2[752], $\alpha=-1/2$.k (M): 9/2[734], $\alpha=+1/2$.l (N): 9/2[734], $\alpha=-1/2$.m (O): K=11/2 γ -vibrational band, $\alpha=+1/2$.

Footnotes continued on next page

Adopted Levels, Gammas (continued)
²³⁵U Levels (continued)

ⁿ (P): K=11/2 γ -vibrational band, $\alpha=-1/2$.

^o (Q): 1/2[501] + 1/2[770].

^p (R): 1/2[631] $\times$ 0-.

^q (S): 5/2[633].

^r (T): 7/2[624].

^s (U): 1/2[631] $\times$ 0+ β vibration.

^t (V): 5/2[622]-2+.

^u (W): 5/2[622] $\times$ 0+ β vibration.

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

E(level)	E $\gamma^{\dagger}$	I $\gamma^{\dagger}$	Mult.	$\delta^{\ddagger}$	α	Comments
0.0760	0.0765 4	100	E3		>1 $\times$ 10 ¹⁰	E γ : weighted average of 0.0768 keV 5 (1979Zh05) and 0.07616 keV 53 (1996PaZY). Others: 1995Pa45. B(E3)(W.u.)=1.57 $\times$ 10 ¹⁹ /(1+ α). B(E2)(W.u.)=28.7, B(M1)(W.u.)=0.041. B(E2)(W.u.)= 839, B(M1)(W.u.)=0.31 18. B(E2)(W.u.)=65 7, B(M1)(W.u.)=0.00141 7. B(E2)(W.u.)=215 10.
13.0339	12.975 10	100	(M1+E2)	0.02	497	
46.103	46.21 5	100	M1+E2	0.14 14	50 30	
51.6968	38.661 2	38.0 8	M1+E2	0.48 3	298 24	
	51.624 1	100 2	E2		310	
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. B(E2)(W.u.)=204.
	103.06 3	18.7 5	E2		11.58	
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. B(E2)(W.u.)=517 37.
	124.51 3	45 2	E2		5.01	
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) $\gamma(^{235}\text{U})$ (continued)

E(level)	$E\gamma^{\dagger}$	$I\gamma^{\dagger}$	Mult.	$\delta^{\ddagger}$	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			
	274.370§ 10	8 4	M1		1.282
445.648	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

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Adopted Levels, Gammas (continued) $\gamma(^{235}\text{U})$ (continued)

E(level)	$E_{\gamma}^{\dagger}$	$I_{\gamma}^{\dagger}$	Mult.	$\delta^{\ddagger}$	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) $\gamma(^{235}\text{U})$ (continued)

E(level)	$E_{\gamma}^{\dagger}$	$I_{\gamma}^{\dagger}$	Mult.	$\delta^{\ddagger}$	α
806.9	557.0 5	100 25			
	635.3 5	100 100			
811.96	760.26 $\S$ 5	45 9	[E1]		
	798.92 $\S$ 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 $\S$ CA		[E2]		
	821.3 $\#$ 2	100 $\#$ 25	[E1]		
843.859	714.70 $\S$ 10	65 7	E2		0.0215
	843.780 $\S$ 10	100 5	M1(+E0)		
845.35?	763.61 $\S\&$ 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 $\S$ 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 $\S$ 6	100 13	E2		0.0239
	733.93 $\S$ 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 $\S$ 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) $\gamma(^{235}\text{U})$ (continued)

E(level)	$E_{\gamma}^{\dagger}$	$I_{\gamma}^{\dagger}$	Mult.	$\delta^{\ddagger}$	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	1002.28 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) $\gamma(^{235}\text{U})$ (continued)

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

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued) $\gamma(^{235}\text{U})$ (continued)

E(level)	$E_{\gamma}^{\dagger}$	$I_{\gamma}^{\dagger}$	E(level)	$E_{\gamma}^{\dagger}$	$I_{\gamma}^{\dagger}$
2110.2	2063.3 6	51 13	2626.81	231.04 18	15 6
	2110.4 3	100		425.77 6	100 8
2193.0	934.9 5	100	2666.2	203.6 10	30 19
2201.00	214.10 3	19 3		407.6 10	100 30
	398.76 4	100 6	2709.4	395.5 10	100 5
2216.1	2216.1 3	100		605.7 10	50 4
2249.6	343.4 5	100 120	2754.7	2754.7 4	100
	447.3 5	20 120		416.37 20	100
	643.0 5	40 120	2829.97	202.90 18	17 5
2258.69	192.0 10	9 5		434.14 10	100 10
	381.10 15	100 13	2843.4	388.7 10	100
2314.5	371.1 10	79 4	2883.7	217.8 10	21 12
	583.3 10	100 3		420.96 7	100 12
2363.80	390.71 13	100	2927.9	425.40 5	100
2368.6	762.6 5	100 50	3075.98	245.6 5	29 11
	934.0 5	100 50		449.20 15	100 12
2395.90	195.21 20	13 3	3098.3	432.1 1	100
	409.00 5	100 7	3124.1	415.0 10	32 23
2416.1	2416.1 3	100		621.3 10	100 20
2454.7	357.5 10	100	3220.6	440.44 8	100
2462.7	203.0 10	25 7	3286.77	456.80 13	100
	395.27 7	100 9	3328.6	444.96 10	100
2502.5	398.9 10	100	3547.6	261.0 10	=20
2555.6	2555.6 6	100		471.4 10	=100
2626.2	376.2 5	=100	3683.5	462.91 10	100
	425.6 5	=100	3764.3	477.5 5	100
	639.4 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 $^{234}\text{U}(\text{n},\gamma)$.# From $^{234}\text{U}(\text{n},\gamma)$.@ Unresolved from a 1782 γ in ^{238}U .

& Placement of transition in the level scheme is uncertain.

a Multiply placed; undivided intensity given.

Adopted Levels, Gammas (continued)(A) $7/2[743]$, $\alpha=+1/2$ (B) $7/2[743]$, $\alpha=-1/2$ (C) $1/2[631]$, $\alpha=+1/2$ $^{235}_{92}\text{U}_{143}$

Adopted Levels, Gammas (continued)(D) $1/2[631]$, $\alpha=-1/2$ (E) $5/2[622]$, $\alpha=+1/2$ (F) $5/2[622]$, $\alpha=-1/2$ $^{235}_{92}\text{U}_{143}$

Adopted Levels, Gammas (continued)

 (G) $3/2[631]$, $\alpha=+1/2$

 (H) $3/2[631]$, $\alpha=-1/2$

 $^{235}_{92}\text{U}_{143}$

Adopted Levels, Gammas (continued)(I) $K=3/2$ γ -vibrational band, $\alpha=+1/2$ (J) $K=3/2$ γ -vibrational band, $\alpha=-1/2$

Adopted Levels, Gammas (continued)(K) $5/2[752]$, $\alpha=+1/2$ (L) $5/2[752]$, $\alpha=-1/2$ $^{235}_{92}\text{U}_{143}$

Adopted Levels, Gammas (continued)

 (M) 9/2[734], $\alpha=+1/2$

 (N) 9/2[734], $\alpha=-1/2$

Adopted Levels, Gammas (continued)

 (O) K=11/2 γ -vibrational
band, $\alpha=+1/2$

 (P) K=11/2 γ -vibrational
band, $\alpha=-1/2$

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

 (R) $1/2[631]\times 0-$

Adopted Levels, Gammas (continued)

(S) 5/2[633]

(T) 7/2[624]

 (U) 1/2[631]x0+ β vibration

Adopted Levels, Gammas (continued)

 (V) $5/2[622]-2+$

 (W) $5/2[622]\times 0+$
 β vibration

²³⁵Pa β⁻ Decay 1969KaZX,1986Mi10

Parent ²³⁵Pa: 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 ²³⁵U 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 ²³⁵Pa feeds almost exclusively (99.99%) levels below 50 keV. Other: 1992He12.

²³⁵U 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(²³⁵U)

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 ²³⁵Pa 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	^x 131.8		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)

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) [†]	$J\pi$	Comments
0.0	7/2-	$\beta(2)=0.2485$ 13; $\beta(4)=0.091$ 4. The quoted uncertainties are statistical only. 1984Zu02 estimated additional 0.5% and 2.0% model uncertainties for $\beta(2)$ and $\beta(4)$, respectively.
46.20 5	9/2-	$B(E2)(7/2- \text{ to } 9/2-)=4.834$ 16.
103.35 6	11/2-	$B(E2)(7/2- \text{ to } 11/2-)=1.19$ 4, $B(E2)(9/2- \text{ to } 11/2-)=4.65$ 7.
170.71 6	13/2-	$B(E2)(9/2- \text{ to } 13/2-)=2.12$ 5, $B(E2)(11/2- \text{ to } 13/2-)=3.78$ 10.

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

 ^{235}Np ϵ Decay 1958Gi05

Parent ^{235}Np : $E=0$; $J\pi=5/2+$; $T_{1/2}=396.2$ d 12; $Q(g.s.)=124.0$ 9; $\% \epsilon$ 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, $K\beta$ x ray=0.46% 11, calculated by evaluator using the computer program RADLST.

 ^{235}U Levels

E(level)	$J\pi^{\dagger}$	$T_{1/2}^{\dagger}$
0.0	7/2-	7.04×10^8 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)

²³⁵Np ε Decay 1958Gi05 (continued)

²³⁵U 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.

²³⁹Pu α Decay 1993Sc22

Parent ²³⁹Pu: 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.

²³⁵U 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-		

Continued on next page (footnotes at end of table)

²³⁹Pu α Decay ¹⁹⁹³Sc22 (continued)

²³⁵U 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 ²³⁹Pu 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 767 and 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	≤3×10 ⁻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.

Continued on next page (footnotes at end of table)

²³⁹Pu 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 r₀(²³⁵U)=1.5122, average of r₀(²³⁴U)=1.5075 and r₀(²³⁶U)=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.

²³⁹Pu α Decay ¹⁹⁹³Sc22 (continued)

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

K α_2 x ray=0.00417% 4, K α_1 x ray=0.00652% 9, K β_1 ' x ray=0.002387% 17, K β_2 ' x ray=0.000216% 15, L γ_1 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 (1992B107,1994Mo36).
L γ_1 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 α_2 x ray=0.00422% 1, K α_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.
I γ normalization: Based on measurements in 1994Mo36.

E $\gamma^{\dagger\ddagger}$	E(level)	I $\gamma^{\S\text{g}}$	Mult. [@]	$\delta^@$	α	Comments
0.0765 4	0.0765		E3		$\approx 1 \times 10^{10}$	I(γ +ce) g : 99.9 $\times 10^6$. I(γ +ce): from γ -ray transition intensity balance. E γ : from Adopted Gammas. I(γ +ce) g : 18.4 $\times 10^6$ 3. I γ : absolute intensity measurement (1994Mo36,1992B107). α : deduced by evaluator from γ -ray transition intensity balance at 13.0-keV level and I γ =0.0341% 9 (1992B107,1994Mo36). Mult., δ : deduced by evaluator from $\alpha(\text{exp})=538.6$, using $\alpha(\text{exp})(\text{Theory}, \text{M1})=513.7$ and $\alpha(\text{exp})(\text{Theory}, \text{E2})=76830$ from 1978Ro22.
12.975 10	13.0401	34100 900	M1+E2 ^a	0.02	497	Reported only in 1994Mo36. Other value: E γ =30.03 keV 10, I γ =280 80 (1994Mo36). I γ : other value: I γ =10460 150 (1992B107). Reported only in 1976GuZN. Other value: E γ =42.06 keV 3, I γ =165 5 (1976GuZN). I γ : other value: I γ =737 14 (1976GuZN). Other value: E γ =46.69 keV, I γ =58 4 (1976GuZN). Mult.: for pure M1 I γ <100 from γ -ray transition intensity balance.
^x 14.22 ^e 3		5.5 $\times 10^{3d}$ 4				
30.04 2	81.741	217 6	(M1) ^a		156.7	
38.661 2	51.7008	10440 ^d 130	M1+E2 ^a	0.48 3	298 24	
^x 40.41 ^f 5		162 16				
41.93 ^e 5	171.388	146 ^d 15	M1+E2 ^a	0.14 10	70 30	
46.21 5	46.207	72.1 ^d 11	M1(+E2) ^a	0.14 14	50 30	
46.68 ^e 3	197.119	46.5 ^d 25	(M1) ^a		42.7	
(47.60 ^e 3)	129.2961	62.5 ^d 25	(M1) ^a		40.4	
51.624 1	51.7008	27220 ^d 220	E2		310	
54.039 8	225.422	194.4 ^d 25	M1(+E2) ^a	0.1 1	30 7	
56.828 3	103.036	1152 ^d 13	M1+E2	0.23 2	32.6 16	
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	
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	
^x 74.96 ^f 10		38 6				
77.592 14	129.2961	380 ^d 5	M1(+E2)	0.5 5	17 11	
78.43 2	249.130	154.2 ^d 22	M1(+E2)	0.5 5	16 10	
89.64 ^{eh} 3	171.388	27 ^{dh} 2	(M1+E2)		14 8	
=89.7 ^h	338.52	2 ^h SY	[M1]		6.33	
96.14 ^e 3	225.422	37.9 ^{dd} 18	[E2]		16.02	

Continued on next page (footnotes at end of table)

²³⁹Pu α Decay 1993Sc22 (continued)

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

$E\gamma^{\ddagger}$	E(level)	$I\gamma^{\S g}$	Mult. [@]	$\delta^@$	α	Comments
97.6 3	294.668		M1+E2	0.5 3	7.0 19	I(γ +ce) $\bar{E}$: 700 500. Seen in ce only (1965Tr03).
98.780 20	150.467	1465 ^d 68	E2		14.11	I γ : other value: 1220 40 (1976GuZN).
103.060 30	103.036	215.6 ^d 54	E2		11.58	I γ : other value: I γ =230 12 (1976GuZN).
115.38 5	197.119	462 50	E2		6.87	I γ : from 1976GuZN and corrected for x-ray component.
116.26 2	129.2961	567 ^d 11	M1(+E2)	0.56 56	14 3	I γ : other value: I γ =597 9 (1976GuZN).
119.70 ^{eh} 3	171.388	21 ^{dh} 10	(M1+E2)		10 4	Other value; E γ =119.72 keV 3, I γ =22 10 (1976GuZN).
=119.7 ^{hi}	291.144	=9.5 ^h	[E2]		6.00	I γ : I γ =30.2 18 for the doublet (1994Mo36). Intensity split based on (n, γ). Other value: I γ =32 2 (1976GuZN).
122.35 ⁱ 12	225.422	0.95 ^d 12	[E1]		0.312	I γ : other value: I γ =3 2 (1976GuZN). From 1968C102.
(123.228 5)	761.05	0.0016 4	[M1]		12.19	I γ : from (n, γ).
123.62 5	414.779	23.7 ^d 9	[M1]		12.08	I γ : other value: I γ =19.7 12 (1976GuZN).
124.51 3	170.708	68.1 ^d 18	E2		5.06	I γ : other values: 61.3 25 (1976GuZN).
125.21 10	171.388	56.3 ^d 15	[E1]		0.296	I γ : other values: 71.1 20 (1976GuZN).
129.296 1	129.2961	6310 ^d 40	E1		0.275	I γ : other value: I γ =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	E γ : from Coul. ex. E γ =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	E γ : 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				E γ ,I γ : 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	E γ : 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	

Continued on next page (footnotes at end of table)

²³⁹Pu α Decay 1993Sc22 (continued)

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

$E\gamma^{\dagger\dagger}$	E(level)	$I\gamma^{\S g}$	Mult. [@]	$\delta^@$	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	$I\gamma$: from I(392 γ +393 γ)=552.7 11 (1976GuZN) and I(392 γ)/I(393 γ)=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	$E\gamma$: 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	

Continued on next page (footnotes at end of table)

^{239}Pu α Decay $^{1993}\text{Sc}22$ (continued) $\gamma(^{235}\text{U})$ (continued)

$E\gamma^{\dagger\dagger}$	E(level)	$I\gamma^{\S g}$	Mult. [@]	$\delta^@$	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	0.009j				Doublet.
670.99 ^{cij} 4	670.99	0.009j	[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&			I γ : from 1981UmZZ.
^x 693.2 ^h 5		0.03 ^h 1				
693.2 ^h 5	865.35	0.02 ^h CA	(E2)		0.0229	I γ : 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				I γ : from 1976GuZN I γ (720.3)=0.0485 and using Branching for 891 level in (n, γ).
720.3 ^h CA	891.89	0.020 ^h CA				I γ : 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 I γ 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				I γ : from (n, γ).
763.6 CA	845.3?	0.022 CA	E0(+M1)&		>0.9	I γ : from 1976GuZN I γ (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. I γ : from (n, γ). I γ (doublet)=0.275 in ^{239}Pu α decay.
767.29 ^{hi} 4	992.72	=0.14 ^h				Doublet. I γ : from (n, γ). I γ (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). I γ (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; I γ of doublet is 11.9 2 (1986LoZT).
(769.54 4)	821.25		(E0)&			I(γ +ce) $\S$: 0.08 2.
^x 777.1 3		0.028 7				
779.4	779.51	0.136 8	M1&		0.0760	E γ : 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.

Continued on next page (footnotes at end of table)

^{239}Pu α Decay $^{1993}\text{Sc22}$ (continued) $\gamma(^{235}\text{U})$ (continued)

$E\gamma^{\dagger\dagger}$	E(level)	$I\gamma^{\S g}$	Mult. [@]	$\delta^@$	α	Comments
821.3 h i 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	$E\gamma$: from (n, γ). Reported as 844.0 by $^{1976}\text{GuZN}$.
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				

[†] $E\gamma$ from (n, γ) (1979Al03) above 600 keV are ≈ 0.1 keV systematically higher than $E\gamma$ from $^{1976}\text{GuZN}$. Some ΔE of multiply placed γ rays have been estimated by evaluators on the basis of (n, γ) results.

[‡] From 1968Cl02, 1971GuZY, 1976GuZN, 1982He02, 1992B107.

[§] From $^{1976}\text{GuZN}$, 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 $I\gamma$, 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

²³⁹Pu 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

²³⁹Pu 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

^{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

$^{239}_{94}\text{Pu}_{145}$ $\xrightarrow{1/2+ \quad 0.0}$ $^{235}_{92}\text{U}_{143-35}$ 24110 y
 $\% \alpha = 100$
 $Q_{\alpha}(\text{g.s.}) = 5244.50^{21}$

^{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

 $^{235}_{92}\text{U}_{143}$

²³⁹Pu 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

²³³U(t,p) 1972Ri08

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

²³⁵U Levels

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

²³⁴U(n,γ) E=th 1972Ri08,1979A103

1979A103: 99.1% enriched ²³⁴U, 5.5×10¹⁴ thermal n/cm² s. γ rays bent crystal, internal conversion electrons, with a magnetic spectrometer (1979A103).

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

²³⁴U(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).

²³⁵U Levels

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

Continued on next page (footnotes at end of table)

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

²³⁵U 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(²³⁵U)

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

Partial radiation widths Γ(γ)=I_γ/E_γ³ (E_γ is the γ-ray energy in units of fractions of the n-binding energy in thermal n capture (1979Al03), I_γ 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).

E _γ [†]	E(level)	I _γ [#]	Mult. ^{‡§}	α	Comments
(0.077 1)	0.0768		E3		
12.975 10	13.0410				E _γ : From adopted levels, gammas.
*23.45 5		0.040 15			
29.86 5	81.739	0.02 1			
*30.90 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	
*53.51 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	
*89.90 5		0.02 1			
(98.78 2)	150.449		[E2]	14.11	E _γ : from ²³⁹ Pu α decay.
116.262 3	129.3009	0.19 3	[M1+E2]	4.99	
≈119.38	171.390	0.010 5			
*121.95 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, I _γ based on ²³⁹ Pu α decay.
129.302 2	129.3009	3.23 30	[E1]	0.275	
*132.187 4		0.02 1			
141.655 6	367.074	0.020 7	[M1]	8.22	
*142.18 8		0.02 7			
*146.65 7		0.020 5			
*148.14 13		0.010 5			
*158.960 4		0.04 2			
161.449 3	332.8413	0.15 3	M1	5.67	α(L1)exp=1.0 3.
*167.13 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	
*181.870 19		0.02 1			
*182.849 5		0.08 3			
*195.220 12		0.02 1			
195.70 2	367.074	0.08 2	M1	3.30	α(L1)exp=0.62 20.
*196.872 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	
*212.42 11		0.04 2			
229.24 2	990.247	0.05 3	[M1]	2.12	

Continued on next page (footnotes at end of table)

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

γ(²³⁵U) (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			

Continued on next page (footnotes at end of table)

$^{234}\text{U}(\text{n},\gamma) \text{ E=th}$ 1972Ri08,1979Al03 (continued) $\gamma(^{235}\text{U})$ (continued)

$E\gamma^\dagger$	E(level)	$I\gamma^\#$	Mult. ‡§	δ	α	$I(\gamma+\text{ce})^\#$	Comments
664.520 12	664.539	0.58 6	E2		0.0251		$\alpha(\text{K})\text{exp}=0.025$ 4. $I\gamma$: $I\gamma=0.31$ 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		$\alpha(\text{K})\text{exp}=0.03$ 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		$\alpha(\text{K})\text{exp}=0.07$ 5.
693.810 10	865.207	0.25 3	E2		0.0229		$\alpha(\text{K})\text{exp}=0.020$ 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		$\alpha(\text{K})\text{exp}=0.016$ 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		$\alpha(\text{K})\text{exp}=0.07$ 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		$\alpha(\text{K})\text{exp}=0.037$ 6.
747.970 10	761.018	1.24 10	E1				
$^x750.72$ 6		0.13 2	M1 (+E2)	0.3 3	0.079 12		$\alpha(\text{K})\text{exp}=0.058$ 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		$\alpha(\text{K})\text{exp}=0.012$ 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		$\alpha(\text{K})\text{exp}=0.011$ 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					$E\gamma, I\gamma$: 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					$E\gamma=832.3$ keV 1, $I\gamma=0.19$ 4 (1972Ri08) (In better agreement with values from ^{239}Pu α decay.). $I\gamma$: $I\gamma=0.017$ 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		$\alpha(\text{K})\text{exp}=0.11$ 2.
843.780 10	843.865	0.60 5	M1 (+E0)		0.09 1		$\alpha(\text{K})\text{exp}=0.075$ 10; $\alpha(\text{L1})\text{exp}=0.015$ 2.
847.100 13	1321.401	0.057 10	M1		0.0609		$I\gamma$: reported (probably in error) as 0.57 in 1979Al03.
849.9 3	1242.9	0.08 2					
$^x852.41$ 3		0.25 3					

Continued on next page (footnotes at end of table)

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

γ(²³⁵U) (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				

Continued on next page (footnotes at end of table)

$^{234}\text{U}(\text{n},\gamma) \text{ E=th}$ 1972Ri08,1979Al03 (continued)

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

$E_{\gamma}^{\dagger}$	E(level)	$I_{\gamma}^{\#}$
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

Continued on next page (footnotes at end of table)

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

γ(²³⁵U) (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.

Continued on next page (footnotes at end of table)

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

^γ(²³⁵U) (continued)

E _γ [†]	E(level)	I _γ [#]	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.
				I _γ : 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. E_γ 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.

²³⁴U(d,p) 1972Ri08

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

²³⁵U 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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²³⁴U(d,p) 1972Ri08 (continued)

²³⁵U 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 J π assignment in adopted levels.

²³⁵U(γ,γ') 2011Kw01

J π (²³⁵U 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 E γ , I γ . Deduced integrated cross sections and widths.

Others.

²³⁵U(γ,γ'): 2004Cl05.

2010Ye02: E=3.5, 4.4 MeV bremsstrahlung radiation. Measured E γ , I γ 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 E γ , I γ 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.

²³⁵U Levels

E(level)	J π [†]	Integrated σ (eVb) [‡]	Comments
0.0 $\S$	7/2- $\S$		
46.20 $\S$ 5	9/2- $\S$		
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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²³⁵U(γ, γ') 2011Kw01 (continued)

²³⁵U 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.

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

E(level)	$E\gamma^{\dagger}$	I_{γ}	Comments
46.20	46.21 5		$E\gamma$: 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	$E\gamma, I_{\gamma}$: unresolved from a 1782 γ 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.

²³⁵U(γ, n): Giant Resonances

²³⁵U(γ, n), ($\gamma, 2n$), (γ, F) studied for $E\gamma=5-18.3$ MeV. Deduced $\beta(2)=0.315$, $Q=11.0$ 5 from giant dipole resonance parameters (1980Ca08). Fission mass-asymmetry studied in ²³⁵U(γ, F) for bremsstrahlung of 15-55 MeV (1980Gu12).

²³⁵U(n, n') 1982Ha34

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

²³⁵U Levels

E(level)	$J\pi$
≈ 0.0	$7/2-, 1/2+, 3/2+$
≈ 50	$9/2-, 5/2+$
103	$11/2-$

²³⁵U(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 ²³⁵U), measured excitation function. Deduced cross section was corrected for fission neutrons (1986Ke09).

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

²³⁵U 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(²³⁵U)

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.

²³⁵U(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.

²³⁵U 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		

Continued on next page (footnotes at end of table)

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

²³⁵U 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

¹³⁶Xe beam at E=720 MeV on a ≈50 mg/cm² ²³⁵U target at the 88-Inch Cyclotron of the Lawrence Berkeley National Laboratory. Measured Eγ, Iγ, γγ-coinc 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(¹⁶O)=78 MeV; 1980Si16 for E(²⁰⁸Pb)=4.8 MeV/u; 1983Ku05 for E(²⁰⁸Pb)=5.3 MeV/u; 1986De28 for E(⁸⁴Kr)=370, 450 MeV. ²³⁵U enriched to 80%. Other: 1992Ch34.

²³⁵U 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+		

Continued on next page (footnotes at end of table)

Coulomb Excitation 2012Wa35 (continued) ^{235}U Levels (continued)

E(level) [†]	J π	Comments
249.73 ^s 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 ^s 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.
637.79 ^d 6	3/2-	
664.53 ^{1c} 12	(5/2)-	
666.4 ^a 8	19/2+	
670.81 ^f 8	7/2-	
671.65 ^s 7	23/2-	
701.01 ^{0d} 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 ^s 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 ^s 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)

²³⁵U Levels (continued)

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

[†] Deduced by evaluators from least-squares fit to γ -ray energies.

[‡] (A): v7/2[743] band, $\alpha=+1/2$. Magnetic properties: $g_K=-0.20$ 5, $g_R=0.18$ 5.

[§] (B): v7/2[743] band, $\alpha=-1/2$. Magnetic properties: See signature partner.

[#] (C): v1/2[631] band, $\alpha=+1/2$. Properties: $g_K=+0.62$ 5, $g_R=0.25$, $g_s=-2.30$, magnetic decoupling $b=+2.1$ 4.

[@] (D): v1/2[631] band, $\alpha=-1/2$. Properties: See signature partner.

[&] (E): v5/2[622] band, $\alpha=+1/2$. Properties: $g_K=-0.22$ 5, $g_R=0.25$ 5.

^a (F): v5/2[622] band, $\alpha=-1/2$. Properties: See signature partner.

^b (G): v3/2[631] band.

^c (H): K=3/2 γ -vibrational band, $\alpha=+1/2$.

^d (I): K=3/2 γ -vibrational band, $\alpha=-1/2$.

^e (J): v5/2[752] band, $\alpha=+1/2$.

^f (K): v5/2[752] band, $\alpha=-1/2$.

^g (L): v9/2[734] band, $\alpha=+1/2$. Crossed by K=11/2 γ -vibrational band at 17/2.

^h (M): v9/2[734] band, $\alpha=-1/2$. Crossed by K=11/2 γ -vibrational band at 17/2.

ⁱ (N): K=11/2 γ -vibrational band, $\alpha=+1/2$. Crossed by v9/2[734] band at 17/2.

^j (O): K=11/2 γ -vibrational band, $\alpha=-1/2$. Crossed by v9/2[734] band at 17/2.

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

E γ	E(level)	I $\gamma^{\dagger}$	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)
 $\gamma(^{235}\text{U})$ (continued)

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

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Coulomb Excitation 2012Wa35 (continued) $\gamma(^{235}\text{U})$ (continued)

$E\gamma$	E(level)	$I\gamma^\dagger$	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			

Continued on next page (footnotes at end of table)

Coulomb Excitation 2012Wa35 (continued) $\gamma(^{235}\text{U})$ (continued)

$E\gamma$	E(level)	$I\gamma^\dagger$	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				

Continued on next page (footnotes at end of table)

Coulomb Excitation 2012Wa35 (continued)
 $\gamma(^{235}\text{U})$ (continued)

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

[†] Relative to 100 for $E_\gamma=211.7$ 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.

²³⁶U(d,t) 1972Ri08

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

²³⁵U 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	

 $^{236}\text{U}(^3\text{He},\alpha)$ 1969E104

E(^3He)=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 $J\pi=(11/2-)$ 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:

²³⁵U(p,nf), ²³⁵U(d,2nf) (1998Er01,1997Er09). Other: 1995Da18.

²³⁶U(p,2n), ²³⁷Np(³He,2np) (1996Aa03).

²³⁸U(p,4n) (1994Be52).

²³⁵U(d,2n) (1993Be64).

²³⁵Np Levels

Cross Reference (XREF) Flags

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

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). Jπ: rotational parameter.
79.1 ^{\$} 4	(9/2+)	A CDE		Jπ: favored rotational band in ²³⁹ Am (Jπ=(5/2)-) α decay.
91.6 ^{&} 3	(7/2)-	B		Jπ: L=4 in (p,t); rotational parameter.
133 [#] 2	(11/2)+	DE		Jπ: favored rotational band in ²³⁹ Am (Jπ=(5/2)-) α decay.
146.8 ^{&} 7	(9/2)-	BC		Jπ: L=4 in (p,t); rotational parameter.
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		

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

²³⁵Np 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	
1160 ^c 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 (³He,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 πi_{13/2} orbital and comparison with the g.s. and assignments in ²³⁷Np. 2010Hu02 point out that πh_{9/2}, 5/2[523] assignment, thus a negative-parity sequence cannot be ruled out.

§ (A): 5/2[642], α=+1/2. The πh_{9/2}, 5/2[523] assignment is also possible (2010Hu02).

(B): 5/2[642], α=-1/2. The πh_{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(²³⁵Np)

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

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Adopted Levels, Gammas (continued)

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

<u>E(level)</u>	<u>E$\gamma^{\dagger}$</u>	<u>I$\gamma^{\dagger}$</u>
2336	387.8 10	100
2526	402.4 10	100
2751	414.9 10	100
2952	425.3 10	100
3191?	439.5 $\frac{\ddagger}{2}$ 10	100
3401?	449.4 $\frac{\ddagger}{2}$ 10	100

$\dagger$ From ²³⁵Pu ϵ decay or ²³⁷Np(¹¹⁶Sn, ¹¹⁸Sn γ).

$\ddagger$ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas (continued)

²³⁵Pu ε Decay 1973Ja03

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

²³⁵Np Levels

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

Kα₁ x ray=34% 5, Kα₂ 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.

I_γ normalization: from ε(K)/ε=0.72 and I_γ(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	I _γ : 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				
*940.7 3		95 4				

Continued on next page (footnotes at end of table)

²³⁵Pu ε Decay 1973Ja03 (continued)

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

$E_{\gamma}^{\dagger}$	E(level)	$I_{\gamma}^{\ddagger}$
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

Intensities: I_{γ} per 100 parent decays

²³⁹Am α Decay 1971Go01

Parent ²³⁹Am: E=0; $J\pi=(5/2)^-$; $T_{1/2}=11.9$ h 1; Q(g.s.)=5922.4 14; %α decay=0.010 1.

²³⁹Am-Q(α): From 2012Wa38.

²³⁹Am-%α decay: from 1972Po04.

²³⁵Np Levels

E(level)	$J\pi$	$T_{1/2}$	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

E_{α}	E(level)	$I_{\alpha}^{\ddagger}$	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	E_{α} : from 1991Ry01.
5825 4	0.0	0.33 2	630	

[†] Using $r_0(^{239}\text{Am})=1.5036$, average of $r_0(^{235}\text{U})=1.5122$ and $r_0(^{235}\text{Pu})=1.4949$ (1998Ak04).

[‡] For α intensity per 100 decays, multiply by 0.00010 1.

²³⁹Am α Decay 1971Go01 (continued)
 $\gamma(^{235}\text{Np})$

$E\gamma$	$E(\text{level})$	$I\gamma^{\dagger\ddagger}$	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

Intensity: $I(\gamma+\text{ce})$
per 100 parent decays

²³⁴U(³He,d),(α,t) 1978Gr12

$E(^3\text{He})=E(\alpha)=30$ 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.

²³⁵Np Levels

$E(\text{level})^{\ddagger}$	$J\pi^{\dagger}$	$E(\text{level})^{\ddagger}$	$J\pi^{\dagger}$	$E(\text{level})^{\ddagger}$	$J\pi^{\dagger}$
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-)	922 ^b 1	(7/2-)	1675 4	
408@ 2	7/2-	978 ^b 1	(9/2-)	1696 2	
441@ 3	5/2-	1024 1		1758 3	
520 1		1064 ^b 2	(9/2-)	1845 ^c 3	(7/2-)
565& 1	3/2-	1117 3		1918 4	
602& 3	5/2-	1160 ^a 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 ($J\pi=9/2-$), 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]?.

²³⁷Np(p,t) 1974Fr01

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

²³⁵Np Levels

E(level)	J π	L	E(level)	J π	L	E(level)	J π	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

²³⁷Np(¹¹⁶Sn,¹¹⁸Sn γ) 2010Hu02

¹¹⁶Sn⁺³¹ beam at E=801 MeV from ATLAS of ANL bombarded a 0.5 mg/cm² ²³⁷Np target through a 0.3 mg/cm² thick layer of Ni. The energy of the beam on the ²³⁷Np target was $\approx$ 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 4 π . Only particles emitted in 12°< θ <85° measured in lab system were detected.

Measurements: E γ , I γ , $\gamma\gamma$, and (particle) γ (θ). Deduced level scheme using ROOT and RADWARE codes.

²³⁵Np 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 ²³⁷Np. Therefore, parental Nilsson configuration of $\pi 5/2[642]$ for the g.s. is assigned as in ²³⁷Np, although $\pi 5/2[523]$ from h_{9/2} orbital cannot be ruled out, as explained in 2010Hu02.

E(level) [†]	J π [‡]	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
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 E γ '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 ²³⁷Np. 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): $\pi 5/2[642]$, $\alpha=+1/2$. The $\pi h_{9/2}$, 5/2[523] assignment is also possible (2010Hu02).

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

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

E γ [†]	E(level)	Comments
34.23 10	34.23	E γ : from Adopted Gammas.
78 [‡] 8	79.1	
101 [‡] 8	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)

 $^{237}\text{Np}(^{116}\text{Sn}, ^{118}\text{Sn}\gamma)$ **2010Hu02 (continued)**

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

$E\gamma^\dagger$	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 $E\gamma$ 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.

²³⁵Pu Levels

Cross Reference (XREF) Flags

A ²³⁵Am 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=v5/2[633]. Configuration=v5/2[633]. Suggested configuration=v1/2[631]. Suggested configuration=v3/2[631]. Suggested Configuration=v5/2[752]. Suggested Configuration=v5/2[622].
41.90 [†] 19	(7/2+)	A		
183.70 17	(3/2+)	A		
265.37 16	(5/2+)	A		
290.53 16	(5/2-)	A		
535.10 17	(5/2+)	A		
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(²³⁵Pu)

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]

²³⁵Am ε Decay 2004As12

Parent ²³⁵Am: E=0; Jπ=(5/2-); T_{1/2}=10.3 min 6; Q(g.s.)=2442 56; %ε+%β⁺ decay=99.60 5.

²³⁵Am-T_{1/2}: From 2004Sa05.

²³⁵Am-%ε+%β⁺ decay: %α=0.40 5 (2004Sa05).

2004As12: Activity produced by ²³³U(⁶Li,4n), E=34-42 MeV. Reaction products stopped in He gas loaded with PbI₂ 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: α, γ, αγ, γγ, Np K x ray, and Pu K x ray, L x ray, studied ²³⁵Am ε and α decay. Others: 2002As08, 2003Na10.

2004Sa05: Measured Eα, T_{1/2}.

2000SaZO: Activity produced by ²³³U(⁶Li,4n), E=45.5 MeV. Mass-separated and assigned to ²³⁵Am. 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.

²³⁵Pu Levels

E(level)	Jπ [†]	Comments
0.0	5/2+	Possible configuration=v5/2[633].
41.90 19	(7/2+)	possible configuration=v5/2[633].
183.70 17	(3/2+)	Jπ: Possible configuration=v1/2[631].
265.37 16	(5/2+)	Suggested configuration=v3/2[631].
290.53 16	(5/2-)	Suggested Configuration=v5/2[752].
535.10 17	(5/2+)	Suggested Configuration=v5/2[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(²³⁵Pu)

I(Pu K_{α1} x rays)=240 50; observed in coincidence with ²³⁵Pu γ rays.

Eγ	E(level)	Iγ [†]	Mult.	Comments
(41.9)	41.90			Eγ: transition not observed due to its large internal conversion coefficient.
^x 169.6 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		
^x 749.1 2		36 11		
828.3 2	1118.8	27 8		

Footnotes continued on next page

²³⁵Am ε Decay 2004As12 (continued)

γ(²³⁵Pu) (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.

Adopted Levels

$Q(\beta^-) = -3384$ SY; $S(n) = 7906$ SY; $S(p) = 3013$ 53; $Q(\alpha) = 6576$ 13 2012Wa38.

2012Wa38: $\Delta Q(\beta^-) = 208$ syst; $\Delta S(n) = 167$ syst.

1996KoZZ, 1996Gu11, 1997Sh21, 1999Ya13: Activity produced by $^{238}\text{Pu}(p,4n)$, $E = 35$ 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, X γ coin. Deduced $T_{1/2}$.

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

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

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

 ^{235}Am Levels

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

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 ²³⁵Cm.
2012Sa31: Calculated cluster-decay half-lives.

²³⁵Cm Levels

Cross Reference (XREF) Flags

A ²³⁹Cf α Decay

E(level)	XREF	Comments
(0 . 0)	A	T _{1/2} : not measured.
50 SY	A	E(level): from ²³⁹ Cf α decay.

²³⁹Cf α Decay 1981Mu12

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

²³⁵Cm 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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