Adopted Levels, Gammas

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 107,2323 (2006)	15-Mar-2006

Q(β^-)=518.6 *5*; S(n)=5125.8 *5*; S(p)=7231 *14*; Q(α)=4233.5 *10* 2012Wa38
Note: Current evaluation has used the following Q record 518.6 5 *5125.8 5* 7240 *200* 4233.7 *10* 2003Au03.

^{237}U Levels

Cross Reference (XREF) Flags

A	^{241}Pu α decay	F	^{236}U(n,γ):resonance capture
B	^{237}Pa β^- decay	G	^{236}U(n,γ) res:secondary γ's
C	^{236}U(d,p)	H	^{238}U(n,2nγ)
D	^{238}U(d,t)	I	^{238}U(^{207}Pb,^{208}Pbγ)
E	^{238}U(^{3}He,α)		

E(level)[†]	J$^\pi$[#]	$T_{1/2}$	XREF	Comments
0.0[a]	1/2$^+$	6.752 d *2*	ABCDEFGHI	%β^-=100 J$^\pi$: primary γ intensities from average-resonance neutron capture; L=0,1 for (0.0 + 11) keV levels in (^{3}He,α). High hindrance factor for the α decay from ^{241}Pu is consistent with a spin-flip transition from 5/2[622] state to 1/2[631] state. $T_{1/2}$: From 1958Ca16. Others: 6.63 d *5* (1949Me43), 6.75 d *1* (Huizenga and Flynn, quoted in 1953Wa05), 6.3 d *1* and 6.6 d *1* from γ- and β-activity, respectively, in 1963Ak04.
11.393[b] *14*	3/2$^+$		ABCDEFGHI	J$^\pi$: hindrance factor for the α decay from ^{241}Pu; L=0 or 1 in (^{3}He,α) for a 5 keV level, doublet with g.s.; primary γ intensities from average-resonance neutron capture. Band member.
56.282[a] *15*	5/2$^+$		AB D FG I	J$^\pi$: α hindrance factor; (d,t) reaction; weakly populated in 2-keV average-resonance neutron capture. Band member.
82.86[b] *5*	7/2$^+$		A CDE GHI	J$^\pi$: From L=4 in (d,t), α hindrance factor, and band assignment.
159.962[c] *14*	5/2$^+$	3.1 ns *1*	A CD FGHI	J$^\pi$: favored α feeding from ^{241}Pu. Band assignment. $T_{1/2}$: From $\alpha\gamma$(t) in ^{241}Pu α decay (1968Ah01).
162.3[a] *19*	9/2$^+$		CDE I	J$^\pi$: (^{3}He,α) cross section data. Band member.
204.06[b] *21*	11/2$^+$		DE HI	J$^\pi$: (^{3}He,α) cross reaction data. Band member.
204.17[d] *7*	7/2$^+$		A D G I	J$^\pi$: 44.2γ M1+E2 to 5/2$^+$. Band member.
260.93[c] *12*	9/2$^+$		A CDE I	J$^\pi$: From L=4 in (d,t). Band member.
274.0[f] *10*	(7/2)$^-$	155 ns *6*	A I	J$^\pi$: 114.0γ E1 to 5/2$^+$ state. α HF=90 is consistent with the assignment. Band assignment from analogy with the 391.6 keV ^{239}Pu level of half-life 193 ns. $T_{1/2}$: From $\alpha\gamma$(t) in ^{241}Pu α decay (1968Ah01).
316[e] *3*	(9/2$^-$)		A I	E(level): From ^{241}Pu α decay. J$^\pi$: α hindrance factor and level spacing from 274-keV level suggest (9/2$^-$), 7/2[743] assignment.
317.3[a] *16*	13/2$^+$[@]		I	
327.3[d] *10*	11/2$^+$		A E I	J$^\pi$: Band member. α hindrance factor.
367.0[f] *15*	(11/2$^-$)		A DE I	J$^\pi$: From (d,t) and (^{3}He,α) expt. spectroscopic factor and α hindrance factor.
375.1[b] *11*	15/2$^+$[@]		I	
409.8[c] *10*	(13/2$^+$)[@]		I	
426.15[g] *6*	(7/2$^+$)		G	J$^\pi$: γ transition to 5/2 state, no gammas to the 1/2[631] band.
432[e] *3*	(13/2$^-$)		E I	Level was assumed doublet; 13/2$^-$,7/2[743] and 13/2$^+$, 5/2[622]

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
			assignments were suggested in 1970Vo03 from (^{3}He,α) data.
482[g] *1*	(9/2$^+$)	C	Jπ: From (d,p) based on cross section data by 1965Br22.
484 *3*		D	
501.4[d] *12*	(15/2$^+$)[@]	I	
506.0[f] *18*	(15/2)$^-$	DE I	Jπ: L=7 in (d,t). Band member.
518.2[a] *13*	17/2$^+$[@]	I	
530 *4*		D	
540.62[h] *4*	1/2$^-$	B FG	Jπ: primary γ intensities from average-resonance neutron capture; γ branchings to 1/2$^+$, 3/2$^+$ levels.
545 *4*		D	
551[g] *2*	(11/2$^+$)	C E	E(level): From (^{3}He,α). Jπ: (d,p) and (^{3}He,α) reaction data.
554.97[h] *4*	3/2$^-$	B FG	Jπ: primary γ intensities from average-resonance neutron capture; γ to 5/2$^+$ rules out 1/2$^-$.
575 *3*		D	
578.01[h] *5*	(5/2$^-$)	G	Jπ: γ branchings to 3/2$^+$, 5/2$^+$ and 7/2$^+$ levels. Band member.
592.0[b] *13*	19/2$^+$[@]	I	
592[e] *3*	(17/2$^-$)[@]	I	
607.7[c] *12*	(17/2$^+$)[@]	I	
632[g] *3*	(13/2$^+$)	E	Jπ: From cross section data in (^{3}He,α).
657 *3*		C	
664.25[i] *4*	3/2$^+$	D FG	Jπ: primary γ intensities from average-resonance neutron capture; γ to 7/2$^+$ level.
666.44 *7*	(5/2)$^+$	FG	Jπ: populated only in 24-keV resonance average and the 43.7-eV resonance neutron capture.
677.58 *5*	3/2$^+$,5/2$^+$	FG	Jπ: Populated weakly in average-resonance neutron capture; γ′s to 5/2$^+$, 7/2$^+$ levels.
688 *2*		E	
690.0[f] *20*	(19/2$^-$)[@]	I	
697.65[i] *5*	(5/2$^+$)	D FG	Jπ: populated weakly in average-resonance neutron capture; gammas to 3/2$^+$ and 7/2$^+$ states.
698 *2*		C	
718 *6*		E	
720.48 *5*	3/2$^-$	FG	Jπ: primary γ intensities from average-resonance neutron capture; γ transition to 5/2$^+$ level.
721.5[d] *13*	(19/2$^+$)[@]	I	
734.34[j] *5*	(1/2$^-$)	B FG	Jπ: primary γ intensities from average-resonance neutron capture; γ branchings to 1/2$^+$, 3/2$^+$ levels.
758.15[j] *5*	3/2$^-$	FG	Jπ: primary γ intensities from average-resonance neutron capture; γ to 5/2$^+$.
762.8[a] *14*	21/2$^+$[@]	I	
798[i] *2*	(9/2$^+$)	DE	E(level): From (^{3}He,α). Jπ: (^{3}He,α) and (d,t) data.
798.0[e] *24*	(21/2$^-$)[@]	I	
832.45?[k] *6*	(5/2$^+$)	FG	Jπ: weakly populated in average-resonance neutron capture.
846.4[p] *16*	(15/2$^-$)	I	Jπ: 529γ (E1) to 13/2$^+$ state.
846.94[l] *9*	(1/2)$^+$	C FG	Jπ: J^π=1/2$^+$, 3/2$^+$ from primary γ intensities measured in average-resonance neutron capture. Energy spacing from 872.15 (3/2$^+$) and 893.4 *3* (5/2$^+$) levels is consistent with this level being the 1/2$^+$ member of a K=1/2 band.
848[i] *1*	(11/2$^+$)	E	Jπ: From cross section data in (^{3}He,α).
850.6[c] *13*	(21/2$^+$)[@]	I	
853.0[b] *14*	23/2$^+$[@]	I	
865.09[m] *12*	1/2$^-$	B DEFG	Jπ: primary γ intensities from average-resonance neutron capture; γ branching to the

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
			$1/2^+$, $3/2^+$ levels of the g.s. band; L=0,1 in (d,t).
866 *3*		C	
872.14[l] *7*	$3/2^+$	FG	Jπ: primary γ intensities from average-resonance neutron capture; γ to $7/2^+$ level.
893.41[l] *12*	$(5/2^+)$	C FG	Jπ: populated weakly in average-resonance neutron capture.
903.4 *5*	$(3/2,5/2^-)$	B	Jπ: From log *ft* value in ^{237}Pa β^- feeding from $(1/2^+)$ level; γ to $5/2^+$ level; (d,t) data. $3/2^-$, 1/2[501] state was assigned in ^{237}Pa β^- decay. Nonobservation of this level in average n-capture, casts doubt on this assignment.
905.73[n] *7*	$(1/2)^+$	FG	Jπ: primary γ intensities from average-resonance neutron capture; γ branching to the $1/2^+$, $3/2^+$, $5/2^+$ states of the g.s. band.
909.34 *11*	$1/2^-,3/2^-$	FG	Jπ: primary γ intensities from average-resonance neutron capture. $3/2^-$, 1/2[501] assignment was suggested in 1979Vo03.
911[m] *4*	$(5/2^-)$	DE	E(level): From (^{3}He,α). Jπ: From spectroscopic factor in (^{3}He,α) and (d,t) ($J^\pi=3/2^-$ and $5/2^-$ in (d,t) dataset).
917.0[f] *23*	$(23/2^-)$[@]	I	
920.63[n] *10*	$(3/2)^+$	FG	Jπ: primary γ intensities from average-resonance neutron capture; gammas to $3/2^+$, $5/2^+$ levels.
930.0[q] *13*	$(17/2^-)$[@]	I	Jπ: 555γ (E1) to $15/2^+$ state.
946[k] *2*	$(9/2^+)$	DE	E(level): From (^{3}He,α). Jπ: (^{3}He,α) and (d,t) reaction data.
947.91[n] *12*	$(5/2)^+$	FG	Jπ: L=4 in (d,t) and (^{3}He,α). Populated weakly in average-resonance neutron. capture.
952 *2*		C	
971 *2*		E	L=4 or 5 in (^{3}He,α).
981.27 *5*	$3/2^+$	FG	Jπ: populated in average-resonance neutron capture with moderate intensity; γ to $5/2^-$ level.
984.5[d] *14*	$(23/2^+)$[@]	D I	
987 *3*		C	
1013 *4*	$(7/2^-, 9/2^-)$	D	E(level): Possibly doublet. Jπ: From expt. spectroscopic factor − twice than calculated value. $7/2^-$ and $9/2^-$ states of the 1/2[501] band were suggested in 1970Bo31 for this level, assumed to be a doublet.
1027.5[p] *14*	$(19/2^-)$[@]	I	Jπ: 509γ (E1) to $17/2^+$ state.
1033?[‡] *2*		F	
1040[k] *1*	$(11/2^+)$	E	Jπ: From cross section data in (^{3}He,α).
1048.0[e] *24*	$(25/2^-)$[@]	I	
1048.7[a] *14*	$25/2^+$[@]	I	
1050.0 *5*	$1/2^+,3/2^+$[&]	C F	E(level): From (n,γ) resonance.
1068.2 *9*	$1/2,3/2^+$[&]	F	
1078.8 *4*	$1/2^+,3/2^+,5/2^+$[&]	F	
1085.0 *3*	$1/2^+,3/2^+$[&]	C F	E(level): From (n,γ) resonance.
1094.7 *5*	$(5/2^+)$	F	Jπ: populated only in 24-keV resonance average neutron capture.
1108.8[‡] *2*	$1/2^-,3/2^-$[&]	F	
1110 *2*		C	$J^\pi=(1/2^+)$ and 1/2[620] assignment is suggested in (d,p). This level might be the same state observed in (n,γ) at 1108.8 keV.
1112 *3*		D	
1122.9[‡] *2*	$1/2^-,3/2^-$	F	Jπ: Iγ in resonance capture.
1126 *2*		C	$J^\pi=(9/2^+)$ and 7/2[613] assignment is suggested in (d,p).
1128.0 *7*	$5/2^+$	F	Jπ: populated in 24-keV average resonance and in 5.45-eV resonance neutron capture.

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
1131.0[q] *14*	(21/2$^-$)[@]	I	Jπ: 278γ (E1) to 23/2$^+$ state, 539γ (E1) to 19/2$^+$ state.
1133.8[c] *15*	(25/2$^+$)[@]	I	
1140[k] *3*	(13/2$^+$)	E	Jπ: From cross section data in (^{3}He,α).
1155.1[b] *15*	27/2$^+$	D I	Jπ: Assignment from (^{207}Pb,^{208}Pbγ), based on rotational band structure.
1162 *2*		C	J^π=(5/2$^+$) and 1/2[620] assignment was suggested in (d,p).
1175.3[‡] *3*	1/2$^-$,3/2$^-$[&]	F	
1183.1[‡] *2*	1/2$^+$,3/2$^+$[&]	F	
1186.0[f] *24*	(27/2$^-$)[@]	I	
1189 *3*		DE	E(level): From (d,t).
1192 *2*		C	The level may be a member of the 3/2[622], proposed in (d,p).
1201.4[‡] *3*	(1/2$^-$,3/2$^-$)[&]	F	
1208 *4*		D	
1215?[‡] *2*		F	
1229.6[‡] *5*	1/2$^+$,3/2$^+$[&]	F	
1235 *3*		C	The level may be a member of the 3/2[622], proposed in (d,p).
1247 *3*		D	
1250.7[p] *14*	(23/2$^-$)[@]	I	Jπ: 202γ (E1) to 25/2$^+$ state, 488γ (E1) to 21/2$^+$ state.
1259[o] *2*	(15/2$^-$)	E	Jπ: L=7 in (^{3}He,α). Band assignment.
1268.8 *7*	1/2$^+$,3/2$^+$,5/2$^+$	F	Jπ: populated in 24-keV average resonance and 71.1-eV resonance neutron capture.
1286.9[d] *16*	(27/2$^+$)[@]	I	
1287.0 *5*	1/2$^+$,3/2$^+$[&]	F	
1299 *3*		E	L=5,6, or 7 in (^{3}He,α).
1301?[‡] *2*		F	
1340.0[e] *24*	(29/2$^-$)[@]	I	
1344.7 *4*	(1/2$^-$)	B F	Jπ: primary γ intensities in average-resonance neutron capture suggest J^π=1/2$^{(-)}$,3/2$^{(-)}$. Relative photon intensities of the gammas deexciting the level are not in good agreement with the Alaga rule for K=J=3/2.
1371.7 *17*		C	
1372.2[a] *15*	29/2$^+$[@]	I	
1375 *3*		D	
1376.1[q] *15*	(25/2$^-$)[@]	I	Jπ: 221γ (E1) to 27/2$^+$ state, 523γ (E1) to 23/2$^+$ state.
1380.4 *4*	1/2$^+$,3/2$^+$[&]	F	
1407.4 *4*	(1/2)$^+$	B F	Jπ: populated in 2-keV average-resonance neutron capture with a moderate intensity, suggesting J^π=1/2$^+$,3/2$^+$. Relative photon intensities of the gammas deexciting the level are not in good agreement with the Alaga rule for K=J=3/2.
1424.0[‡] *2*	1/2$^-$,3/2$^-$[&]	F	
1441[‡] *2*		F	
1454.9[c] *16*	(29/2$^+$)[@]	I	
1485[‡] *2*		F	
1488[‡] *2*		F	
1493[‡] *2*		F	
1494.1[b] *16*	31/2$^+$[@]	I	
1495.0[f] *25*	(31/2$^-$)[@]	I	
1508[‡] *2*		F	
1515.7[p] *15*	(27/2$^-$)[@]	I	Jπ: 467γ (E1) to 25/2$^+$ state.
1527[‡] *2*		F	
1531 *2*		E	L=6 or 7 in (^{3}He,α).

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
1550[‡] *2*		F	
1561 *3*		E	L=4, 5, or 6 in (^{3}He,α).
1563[‡] *2*		F	
1567[‡] *2*		F	
1579[‡] *2*		F	
1583 *3*		D	
1588[‡] *2*		F	
1605 *3*		E	L=4, 5, or 6 in (^{3}He,α).
1612 *3*		D	
1622[‡] *2*		F	
1625.0[d] *17*	(31/2$^+$)[@]	I	
1634[‡] *2*		F	
1647[‡] *2*		F	
1651[‡] *2*		F	
1659[‡] *2*		F	
1662.3[q] *16*	(29/2$^-$)[@]	I	Jπ: 507γ (E1) to 27/2$^+$ state.
1667[‡] *2*		F	
1669.9[e] *25*	(33/2$^-$)[@]	I	
1694[‡] *2*		F	
1696[‡] *2*		F	
1698[‡] *2*		F	
1712[‡] *2*		F	
1717 *4*		D	
1719[‡] *2*		F	
1727[‡] *2*		F	
1729.2[a] *16*	33/2$^+$[@]	I	
1733[‡] *2*		F	
1738[‡] *2*		F	
1741 *4*		D	
1755[‡] *2*		F	
1757[‡] *2*		F	
1760[‡] *2*		F	
1798[‡] *2*		F	
1803[‡] *2*		F	
1809.0[c] *17*	(33/2$^+$)[@]	I	
1821.8[p] *16*	(31/2$^-$)[@]	I	Jπ: 450γ (E1) to 29/2$^+$ state.
1823[‡] *2*		F	
1838[‡] *2*		F	
1839[f] *3*	(35/2$^-$)[@]	I	
1849 *2*		E	
1864[‡] *2*		F	
1868.2[b] *17*	35/2$^+$[@]	I	
1873[‡] *2*		F	
1883[‡] *2*		F	
1888 *2*		E	

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
1889[‡] 2		F	
1896[‡] 2		F	
1900[‡] 2		F	
1915[‡] 2		F	
1929[‡] 2		F	
1940[‡] 2		F	
1955[‡] 2		F	
1961[‡] 2		F	
1962[‡] 2		F	
1968[‡] 2		F	
1977[‡] 2		F	
1987.7[q] 17	(33/2$^-$)[@]	I	Jπ: 494γ (E1) to 31/2$^+$ state.
1990[‡] 2		F	
1993.0[d] 18	(35/2$^+$)[@]	I	
1999[‡] 2		F	
2004[‡] 2		F	
2035[e] 3	(37/2$^-$)[@]	I	
2039[‡] 2		F	
2057[‡] 2		F	
2061[‡] 2		F	
2063[‡] 2		F	
2069[‡] 2		F	
2076[‡] 2		F	
2079[‡] 2		F	
2092[‡] 2		F	
2101[‡] 2		F	
2108[‡] 2		F	
2117.2[a] 17	37/2$^+$[@]	I	
2133[‡] 2		F	
2136[‡] 2		F	
2139[‡] 2		F	
2148[‡] 2		F	
2154[‡] 2		F	
2166.5[p] 17	(35/2$^-$)[@]	I	Jπ: 437γ (E1) to 33/2$^+$ state.
2171[‡] 2		F	
2176[‡] 2		F	
2191.0[c] 19	(37/2$^+$)[@]	I	
2211[‡] 2		F	
2217[f] 3	(39/2$^-$)[@]	I	
2221[‡] 2		F	
2226[‡] 2		F	
2237[‡] 2		F	
2244[‡] 2		F	

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Adopted Levels, Gammas (continued)

^{237}U Levels (continued)

E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF	E(level)†	Jπ#	XREF
2255‡ 2		F	2805.0[d] 20	(43/2+)@	I	3770[e] 3	(53/2−)@	I
2263‡ 2		F	2855[e] 3	(45/2−)@	I	3865[p] 3	(51/2−)@	I
2272.2[b] 19	39/2+@	I	2960.5[p] 22	(43/2−)@	I	3886.8[a] 25	53/2+@	I
2274‡ 2		F	2963.8[a] 20	45/2+@	I	3940.0[c] 24	(53/2+)@	I
2282‡ 2		F	3024.0[c] 21	(45/2+)@	I	3985[f] 3	(55/2−)@	I
2294‡ 2		F	3057[f] 3	(47/2−)@	I	4105[q] 3	(53/2−)@	I
2297‡ 2		F	3154.5[b] 23	47/2+@	I	4115[b] 3	(55/2+)@	I
2308‡ 2		F	3174.7[q] 24	(45/2−)@	I	4182[d] 3	(55/2+)@	I
2349.7[q] 20	(37/2−)@	I	3243.0[d] 21	(47/2+)@	I	4257[e] 3	(57/2−)@	I
2388.0[d] 19	(39/2+)@	I	3302[e] 3	(49/2−)@	I	4344[p] 3	(55/2−)@	I
2431[e] 3	(41/2−)@	I	3401.5[p] 24	(47/2−)@	I	4377[a] 3	(57/2+)@	I
2530.1[a] 19	41/2+@	I	3415.8[a] 23	49/2+@	I	4427[c] 3	(57/2+)@	I
2547.5[p] 20	(39/2−)@	I	3472.0[c] 22	(49/2+)@	I	4477[f] 3	(59/2−)@	I
2597.0[c] 20	(41/2+)@	I	3511[f] 3	(51/2−)@	I	4597[q] 3	(57/2−)@	I
2625[f] 3	(43/2−)@	I	3625.5[b] 25	51/2+@	I	4835[p] 3	(59/2−)@	I
2702.5[b] 20	43/2+@	I	3630[q] 3	(49/2−)@	I			
2746.7[q] 22	(41/2−)@	I	3702.0[d] 23	(51/2+)@	I			

† From a least squares fit to the adopted γ-ray energies, when available, otherwise from (d,p), (d,t), or (^{3}He,α). Some of the high-energy levels, close in energy, and observed in pickup, stripping and/or (n,γ) reactions might be identical.

‡ From ^{236}U(n,γ) Resonance capture. Uncertainties for the (n,γ) primary gammas with Eγ<3702 keV (feeding levels above 1440 keV) are not given in 1979Vo05. An upper limit of 2 keV for those levels is assumed by the evaluator.

Assignments given as being (d,p), (d,t) and/or (^{3}He,α) data without further explanation are based on measured differential cross sections at various angles and on comparison of experimental spectroscopic factors with the calculated values.

@ From rotational band structure and γ-ray angular correlation analysis in ^{238}U(^{207}Pb,^{208}Pbγ).

& From average-resonance (n,γ). See resonance-capture dataset for J^π assignment criteria.

[a] Band(A): 1/2[631] band: $\alpha=1/2^+$.

[b] Band(B): 1/2[631] band: $\alpha=1/2^-$.

[c] Band(C): 5/2[622] band: $\alpha=1/2^+$.

[d] Band(D): 5/2[622] band: $\alpha=1/2^-$.

[e] Band(E): 7/2[743] band: $\alpha=1/2^+$.

[f] Band(F): 7/2[743] band: $\alpha=1/2^-$.

[g] Band(G): 7/2[624] band?

[h] Band(H): $K^\pi=1/2^-$.

[i] Band(I): 3/2[631] band.

[j] Band(J): $K^\pi=1/2^-$ band Assignment of the levels to a band and its possible character of octupole vibration on the 1/2[631] g.s. band were suggested in 1979Vo05 on the basis of reduced transition rates of gammas to the g.s. band and the level energies.

[k] Band(K): 5/2[633] band.

[l] Band(L): $K^\pi=1/2^+$ Possibly K=1/2,1/2[620]+ γ vibration on 5/2[622] band. The assignment was proposed in 1979Vo05 from comparison of theoretical and experimental (d,p) cross sections.

[m] Band(M): 1/2[501] band.

[n] Band(N): $K^\pi=1/2^+$ band? Assignment as β vibration on 1/2[631] band was suggested in 1979Vo05.

[o] Band(O): 5/2[752] band.

[p] Band(P): Rotational band: $\alpha=1/2^-$ based on $15/2^-$ at 846 keV level, feeding the 1/2[631] band.

[q] Band(Q): Rotational band: $\alpha=1/2^+$ based on $17/2^-$ at 930 keV level, feeding the 1/2[631] band.

Adopted Levels, Gammas (continued)

γ(^{237}U)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[&]	δ	α[a]	Comments
11.393	3/2$^+$	11.39[‡] *2*	100[‡]	0.0	1/2$^+$				ΔE is from E(148.57γ) and E(159.96γ).
56.282	5/2$^+$	44.86[‡] *10*	33[‡] *4*	11.393	3/2$^+$				
		56.32[‡] *10*	100[‡] *6*	0.0	1/2$^+$				
82.86	7/2$^+$	(26.6)		56.282	5/2$^+$				Eγ: from level scheme; transition has not been observed. I(γ+ce)(26.6γ)/Iγ(71.6)=37 was deduced by the evaluator from ^{241}Pu α decay.
		71.6[#] *2*		11.393	3/2$^+$				
159.962	5/2$^+$	77.10[‡] *10*	11.4[‡] *4*	82.86	7/2$^+$				If δ is negligible, B(M1)(W.u.)=1.36×10^{-4} *9*.
		103.680[‡] *5*	54.8[‡] *7*	56.282	5/2$^+$				If δ=0.0689 *10*, B(M1)(W.u.)=2.69×10^{-4} *15*, B(E2)(W.u.)=0.0351 *22*.
		148.567[‡] *10*	100[‡] *1*	11.393	3/2$^+$				If δ=0.169 *3*, B(M1)(W.u.)=1.63×10^{-4} *10*, B(E2)(W.u.)=0.062 *5*.
		159.955[‡] *20*	3.53[‡] *8*	0.0	1/2$^+$				B(E2)(W.u.)=0.055 *3*.
204.06	11/2$^+$	121.2[#] *2*	100	82.86	7/2$^+$				Eγ: Placement of 121.2γ from 2004Fo01. In ^{241}Pu α decay the placement is shown from the 7/2$^+$ state at 204.15 keV level.
204.17	7/2$^+$	44.20 *10*	100	159.962	5/2$^+$	M1+E2	0.194 *13*	75.3 *31*	
260.93	9/2$^+$	56.76[#] *10*	100	204.17	7/2$^+$				
		101[@]		159.962	5/2$^+$				
274.0	(7/2)$^-$	114.0[#] *10*	100	159.962	5/2$^+$	E1		0.090	B(E1)(W.u.)=7.1×10^{-7} *4*
317.3	13/2$^+$	155[b@]		162.3	9/2$^+$				
327.3	11/2$^+$	123[@]		204.17	7/2$^+$				
367.0	(11/2$^-$)	93[@]		274.0	(7/2)$^-$				
375.1	15/2$^+$	171[b@]		204.06	11/2$^+$				
409.8	(13/2$^+$)	149[b@]		260.93	9/2$^+$				
426.15	(7/2$^+$)	266.17 *6*	100	159.962	5/2$^+$				
432	(13/2$^-$)	116[@]		316	(9/2$^-$)				
501.4	(15/2$^+$)	174[@]		327.3	11/2$^+$				
506.0	(15/2)$^-$	139[@]		367.0	(11/2$^-$)				
518.2	17/2$^+$	143[@]		375.1	15/2$^+$				
		201[b@]		317.3	13/2$^+$				
540.62	1/2$^-$	529.26 *5*	100 *7*	11.393	3/2$^+$				
		540.61 *5*	62 *5*	0.0	1/2$^+$				
554.97	3/2$^-$	498.62 *5*	100 *8*	56.282	5/2$^+$				
		543.68 *6*	12.5 *11*	11.393	3/2$^+$				
		555.02 *9*	95 *9*	0.0	1/2$^+$				

$^{237}_{92}U_{145}$-8

Adopted Levels, Gammas (continued)

γ(^{237}U) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Comments
578.01	(5/2$^-$)	495.09 *6*	80 *6*	82.86	7/2$^+$	
		521.53[b] *11*	≤6.8	56.282	5/2$^+$	
		566.65 *6*	100 *7*	11.393	3/2$^+$	
592.0	19/2$^+$	217[b@]		375.1	15/2$^+$	
592	(17/2$^-$)	160[@]		432	(13/2$^-$)	
607.7	(17/2$^+$)	198[b@]		409.8	(13/2$^+$)	
664.25	3/2$^+$	504.32 *10*	24 *3*	159.962	5/2$^+$	
		581.90 *20*	28 *5*	82.86	7/2$^+$	
		652.87 *6*	100 *8*	11.393	3/2$^+$	
		664.21[c] *6*	≤170[c]	0.0	1/2$^+$	
666.44	(5/2)$^+$	610.29 *11*	28 *5*	56.282	5/2$^+$	
		654.80 *20*	16 *5*	11.393	3/2$^+$	
		666.41 *9*	100 *12*	0.0	1/2$^+$	
677.58	3/2$^+$,5/2$^+$	251.20 *20*	14 *6*	426.15	(7/2$^+$)	
		473.42 *7*	81 *8*	204.17	7/2$^+$	
		517.50 *10*	53 *8*	159.962	5/2$^+$	
		594.60 *20*	58 *14*	82.86	7/2$^+$	
		621.37 *7*	100 *11*	56.282	5/2$^+$	
690.0	(19/2$^-$)	184[b@]		506.0	(15/2)$^-$	
697.65	(5/2$^+$)	537.61 *9*	27 *4*	159.962	5/2$^+$	
		614.86 *10*	32 *5*	82.86	7/2$^+$	
		641.34 *6*	84 *7*	56.282	5/2$^+$	
		686.29 *8*	100 *10*	11.393	3/2$^+$	
720.48	3/2$^-$	664.21[c] *6*	≤592[c]	56.282	5/2$^+$	
		709.06 *12*	100 *16*	11.393	3/2$^+$	
		720.44 *12*	68 *11*	0.0	1/2$^+$	
721.5	(19/2$^+$)	220[@]		501.4	(15/2$^+$)	
734.34	(1/2$^-$)	179.5 *3*	32 *8*	554.97	3/2$^-$	
		722.88 *6*	100 *8*	11.393	3/2$^+$	
		734.42 *7*	68 *7*	0.0	1/2$^+$	
758.15	3/2$^-$	701.87 *6*	100 *8*	56.282	5/2$^+$	
		746.80 *20*	14 *3*	11.393	3/2$^+$	
		758.15 *6*	68 *6*	0.0	1/2$^+$	
762.8	21/2$^+$	171[b@]		592.0	19/2$^+$	
		245[b@]		518.2	17/2$^+$	
798.0	(21/2$^-$)	206[@]		592	(17/2$^-$)	
832.45?	(5/2$^+$)	672.51 *6*	100 *9*	159.962	5/2$^+$	
		820.4 *3*	33 *9*	11.393	3/2$^+$	

I_γ: branching is from ^{237}Pa β^- decay. Other possible multiplet (placed from the 947.97 level which is not populated in ^{237}Pa β^- decay) is suggested only in (n,γ).

$^{237}_{92}U_{145}$-9

Adopted Levels, Gammas (continued)

γ(^{237}U) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[&]	Comments
846.4	(15/2$^-$)	529[@]		317.3	13/2$^+$	(E1)[@]	
846.94	(1/2)$^+$	687.5 *3*	11 *4*	159.962	5/2$^+$		
		846.89 *9*	100 *8*	0.0	1/2$^+$		
850.6	(21/2$^+$)	129[@]		721.5	(19/2$^+$)		
		243[@]		607.7	(17/2$^+$)		
853.0	23/2$^+$	261[b@]		592.0	19/2$^+$		
865.09	1/2$^-$	310.2 *2*	5.1 *7*	554.97	3/2$^-$		
		853.6 *2*	100 *8*	11.393	3/2$^+$		
		865.1[b] *2*	46 *5*	0.0	1/2$^+$		I_γ: branching from ^{237}Pa β^- decay. Other possible multiplet (placed from the 947.97 level which is not populated in ^{237}Pa β^- decay) is suggested only in (n,γ). See ^{237}Pa β^- decay for a comment on branching measured in β^- decay and in (n,γ).
872.14	3/2$^+$	317.14[c] *12*	<12[c]	554.97	3/2$^-$		
		331.2 *3*	≤6	540.62	1/2$^-$		
		667.5 *3*	17 *6*	204.17	7/2$^+$		
		712.10 *20*	15 *4*	159.962	5/2$^+$		
		815.95 *9*	100 *8*	56.282	5/2$^+$		
893.41	(5/2$^+$)	837.14 *14*	100 *18*	56.282	5/2$^+$		
		882.00 *20*	87 *15*	11.393	3/2$^+$		
903.4	(3/2,5/2$^-$)	847.1 *5*	100	56.282	5/2$^+$		E_γ: From ^{237}Pa β^- decay.
905.73	(1/2)$^+$	849.45 *13*	49 *8*	56.282	5/2$^+$		
		894.14 *10*	100 *10*	11.393	3/2$^+$		
		906.01 *12*	87 *12*	0.0	1/2$^+$		
909.34	1/2$^-$,3/2$^-$	909.34[c] *11*	100[c]	0.0	1/2$^+$		
917.0	(23/2$^-$)	119[@]		798.0	(21/2$^-$)		
		227[@]		690.0	(19/2$^-$)		
920.63	(3/2)$^+$	864.00 *20*	100 *18*	56.282	5/2$^+$		
		909.34[c] *11*	≤107[c]	11.393	3/2$^+$		
930.0	(17/2$^-$)	338[b@]		592.0	19/2$^+$		
		555[@]		375.1	15/2$^+$	(E1)[@]	
947.91	(5/2)$^+$	283.40[bd] *20*		664.25	3/2$^+$		
		521.53[bd] *11*		426.15	(7/2$^+$)		
		865.1[bd] *2*		82.86	7/2$^+$		
		936.40 *20*	90 *17*	11.393	3/2$^+$		
		947.97 *14*	100 *20*	0.0	1/2$^+$		
981.27	3/2$^+$	283.40[b] *20*	10 *4*	697.65	(5/2$^+$)		
		317.14[c] *12*	≤25[c]	664.25	3/2$^+$		

$^{237}_{92}U_{145}$-10

Adopted Levels, Gammas (continued)

γ(^{237}U) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[&]	Comments
981.27	3/2$^+$	403.16 *7*	38 *3*	578.01	(5/2$^-$)		
		426.33 *8*	51 *7*	554.97	3/2$^-$		
		440.69 *6*	100 *8*	540.62	1/2$^-$		
984.5	(23/2$^+$)	134[@]		850.6	(21/2$^+$)		
		263[@]		721.5	(19/2$^+$)		
1027.5	(19/2$^-$)	181[@]		846.4	(15/2$^-$)		
		265[b@]		762.8	21/2$^+$		
		509[@]		518.2	17/2$^+$	(E1)[@]	
1048.0	(25/2$^-$)	131[@]		917.0	(23/2$^-$)		
		250[@]		798.0	(21/2$^-$)		
1048.7	25/2$^+$	196[b@]		853.0	23/2$^+$		
		286[b@]		762.8	21/2$^+$		
1131.0	(21/2$^-$)	201[b@]		930.0	(17/2$^-$)		
		278[@]		853.0	23/2$^+$	(E1)[@]	
		539[@]		592.0	19/2$^+$	(E1)[@]	
1133.8	(25/2$^+$)	149[b@]		984.5	(23/2$^+$)		
		283[@]		850.6	(21/2$^+$)		
1155.1	27/2$^+$	302[@]		853.0	23/2$^+$		
1186.0	(27/2$^-$)	138[@]		1048.0	(25/2$^-$)		
		269[@]		917.0	(23/2$^-$)		
1250.7	(23/2$^-$)	202[b@]		1048.7	25/2$^+$	(E1)[@]	
		223[@]		1027.5	(19/2$^-$)		
		488[@]		762.8	21/2$^+$	(E1)[@]	
1286.9	(27/2$^+$)	153[@]		1133.8	(25/2$^+$)		
		303[@]		984.5	(23/2$^+$)		
1340.0	(29/2$^-$)	154[@]		1186.0	(27/2$^-$)		
		292[@]		1048.0	(25/2$^-$)		
1344.7	(1/2$^-$)	1333.2 *5*	100 *50*	11.393	3/2$^+$		E_γ,I_γ: From ^{237}Pa β^- decay.
		1344.8 *5*	60 *30*	0.0	1/2$^+$		E_γ,I_γ: From ^{237}Pa β^- decay.
1372.2	29/2$^+$	217[b@]		1155.1	27/2$^+$		
		324[@]		1048.7	25/2$^+$		
1376.1	(25/2$^-$)	221[@]		1155.1	27/2$^+$	(E1)[@]	
		245[b@]		1131.0	(21/2$^-$)		

Adopted Levels, Gammas (continued)

γ(^{237}U) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[&]	Comments
1376.1	(25/2$^-$)	523[@]		853.0	23/2$^+$	(E1)[@]	
1407.4	(1/2)$^+$	1395.9 *5*	100 *50*	11.393	3/2$^+$		E_γ,I_γ: From ^{237}Pa β^- decay.
		1407.5 *5*	60 *30*	0.0	1/2$^+$		E_γ,I_γ: From ^{237}Pa β^- decay.
1454.9	(29/2$^+$)	168[@]		1286.9	(27/2$^+$)		
		321[@]		1133.8	(25/2$^+$)		
1494.1	31/2$^+$	339[@]		1155.1	27/2$^+$		
1495.0	(31/2$^-$)	155[b@]		1340.0	(29/2$^-$)		
		309[@]		1186.0	(27/2$^-$)		
1515.7	(27/2$^-$)	265[b@]		1250.7	(23/2$^-$)		
		467[@]		1048.7	25/2$^+$	(E1)[@]	
1625.0	(31/2$^+$)	170[@]		1454.9	(29/2$^+$)		
		338[b@]		1286.9	(27/2$^+$)		
1662.3	(29/2$^-$)	286[b@]		1376.1	(25/2$^-$)		
		507[@]		1155.1	27/2$^+$	(E1)[@]	
1669.9	(33/2$^-$)	175[@]		1495.0	(31/2$^-$)		
		330[@]		1340.0	(29/2$^-$)		
1729.2	33/2$^+$	235[@]		1494.1	31/2$^+$		
		357[@]		1372.2	29/2$^+$		
1809.0	(33/2$^+$)	184[b@]		1625.0	(31/2$^+$)		
		354[@]		1454.9	(29/2$^+$)		
1821.8	(31/2$^-$)	306[@]		1515.7	(27/2$^-$)		
		450[@]		1372.2	29/2$^+$	(E1)[@]	
1839	(35/2$^-$)	169[@]		1669.9	(33/2$^-$)		
		344[@]		1495.0	(31/2$^-$)		
1868.2	35/2$^+$	374[@]		1494.1	31/2$^+$		
1987.7	(33/2$^-$)	325[@]		1662.3	(29/2$^-$)		
		494[@]		1494.1	31/2$^+$	(E1)[@]	
1993.0	(35/2$^+$)	184[b@]		1809.0	(33/2$^+$)		
		368[@]		1625.0	(31/2$^+$)		
2035	(37/2$^-$)	196[b@]		1839	(35/2$^-$)		
		365[@]		1669.9	(33/2$^-$)		
2117.2	37/2$^+$	249[@]		1868.2	35/2$^+$		
		388[@]		1729.2	33/2$^+$		

$^{237}_{92}U_{145}$-12

Adopted Levels, Gammas (continued)

γ(^{237}U) (continued)

E_i(level)	J_i^π	E_γ †	E_f	J_f^π	Mult.&
2166.5	(35/2⁻)	345@	1821.8	(31/2⁻)	
		437@	1729.2	33/2⁺	(E1)@
2191.0	(37/2⁺)	198b@	1993.0	(35/2⁺)	
		382@	1809.0	(33/2⁺)	
2217	(39/2⁻)	183@	2035	(37/2⁻)	
		378@	1839	(35/2⁻)	
2272.2	39/2⁺	404@	1868.2	35/2⁺	
2349.7	(37/2⁻)	362@	1987.7	(33/2⁻)	
2388.0	(39/2⁺)	197@	2191.0	(37/2⁺)	
		395@	1993.0	(35/2⁺)	
2431	(41/2⁻)	214@	2217	(39/2⁻)	
		396@	2035	(37/2⁻)	
2530.1	41/2⁺	258@	2272.2	39/2⁺	
		413b@	2117.2	37/2⁺	
2547.5	(39/2⁻)	381@	2166.5	(35/2⁻)	
2597.0	(41/2⁺)	209b@	2388.0	(39/2⁺)	
		406@	2191.0	(37/2⁺)	
2625	(43/2⁻)	194@	2431	(41/2⁻)	
		407@	2217	(39/2⁻)	
2702.5	43/2⁺	430@	2272.2	39/2⁺	
2746.7	(41/2⁻)	397@	2349.7	(37/2⁻)	
2805.0	(43/2⁺)	208@	2597.0	(41/2⁺)	
		417@	2388.0	(39/2⁺)	
2855	(45/2⁻)	230@	2625	(43/2⁻)	
		424@	2431	(41/2⁻)	
2960.5	(43/2⁻)	413b@	2547.5	(39/2⁻)	
2963.8	45/2⁺	261b@	2702.5	43/2⁺	
		434@	2530.1	41/2⁺	
3024.0	(45/2⁺)	219b@	2805.0	(43/2⁺)	
		427@	2597.0	(41/2⁺)	
3057	(47/2⁻)	202b@	2855	(45/2⁻)	
		432@	2625	(43/2⁻)	
3154.5	47/2⁺	452b@	2702.5	43/2⁺	
3174.7	(45/2⁻)	428@	2746.7	(41/2⁻)	
3243.0	(47/2⁺)	219b@	3024.0	(45/2⁺)	
		438@	2805.0	(43/2⁺)	
3302	(49/2⁻)	245b@	3057	(47/2⁻)	
		447@	2855	(45/2⁻)	
3401.5	(47/2⁻)	441@	2960.5	(43/2⁻)	
3415.8	49/2⁺	452b@	2963.8	45/2⁺	
3472.0	(49/2⁺)	229@	3243.0	(47/2⁺)	
		448@	3024.0	(45/2⁺)	
3511	(51/2⁻)	209b@	3302	(49/2⁻)	
		454@	3057	(47/2⁻)	
3625.5	51/2⁺	471b@	3154.5	47/2⁺	
3630	(49/2⁻)	455@	3174.7	(45/2⁻)	
3702.0	(51/2⁺)	459@	3243.0	(47/2⁺)	
3770	(53/2⁻)	259@	3511	(51/2⁻)	
		468b@	3302	(49/2⁻)	
3865	(51/2⁻)	463@	3401.5	(47/2⁻)	
3886.8	53/2⁺	471b@	3415.8	49/2⁺	
3940.0	(53/2⁺)	468b@	3472.0	(49/2⁺)	
3985	(55/2⁻)	215@	3770	(53/2⁻)	
		474@	3511	(51/2⁻)	
4105	(53/2⁻)	475@	3630	(49/2⁻)	
4115	(55/2⁺)	489@	3625.5	51/2⁺	
4182	(55/2⁺)	480@	3702.0	(51/2⁺)	
4257	(57/2⁻)	487b@	3770	(53/2⁻)	
4344	(55/2⁻)	479@	3865	(51/2⁻)	
4377	(57/2⁺)	490@	3886.8	53/2⁺	
4427	(57/2⁺)	487b@	3940.0	(53/2⁺)	
4477	(59/2⁻)	492b@	3985	(55/2⁻)	
4597	(57/2⁻)	492b@	4105	(53/2⁻)	
4835	(59/2⁻)	491@	4344	(55/2⁻)	

$^{237}_{92}U_{145}$-13

Adopted Levels, Gammas (continued)

$\gamma(^{237}U)$ (continued)

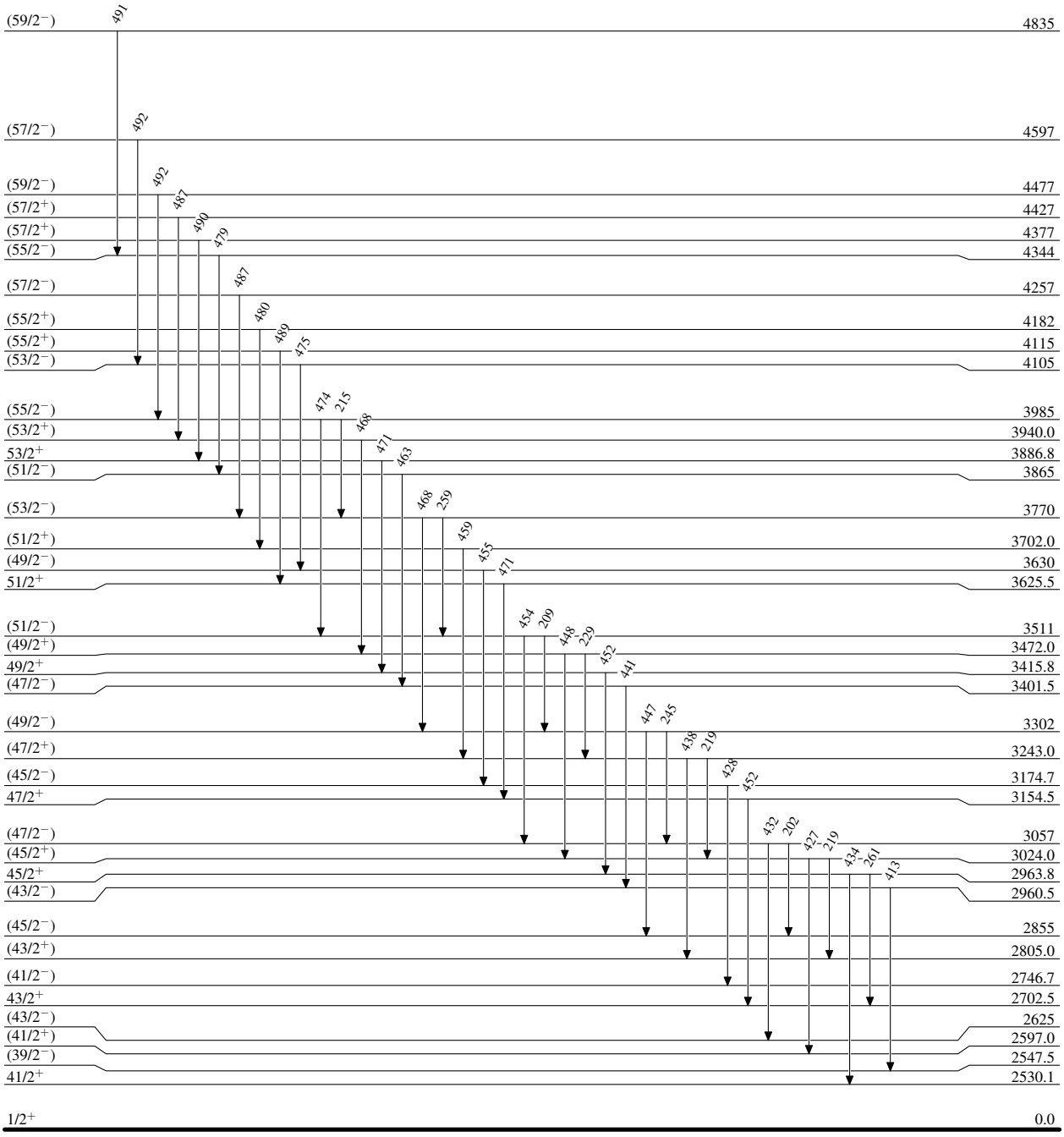
† From $^{236}U(n,\gamma)$ res:secondary γ's, except otherwise noted.
‡ From ^{241}Pu α decay.
# From ^{241}Pu α decay.
@ From $^{238}U(^{207}Pb,^{208}Pb\gamma)$.
& From ^{241}Pu α decay, except otherwise noted.
[a] Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.
[b] Multiply placed.
[c] Multiply placed with undivided intensity.
[d] Placement of transition in the level scheme is uncertain.

$^{237}_{92}U_{145}$-14

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

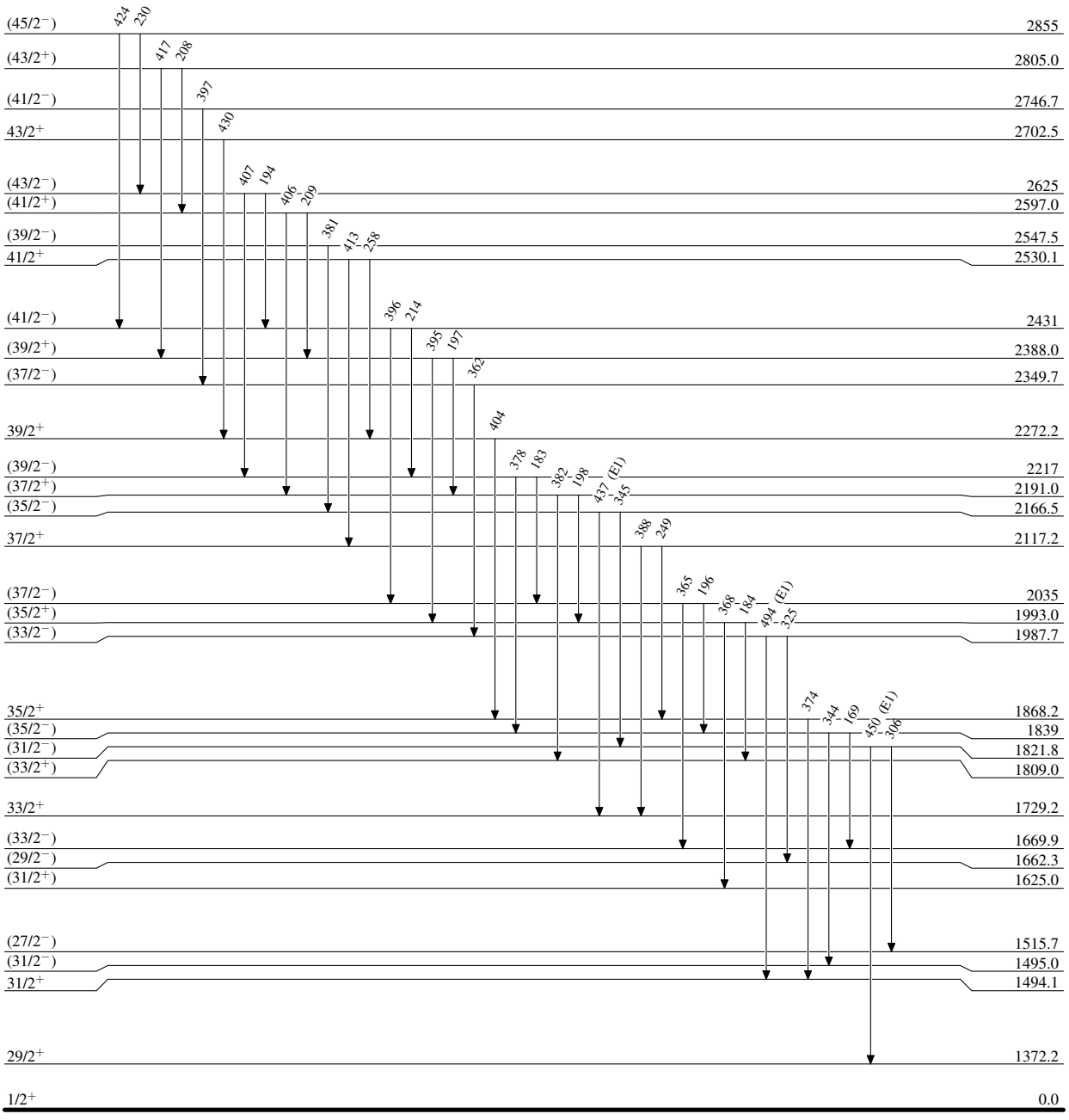


$^{237}_{92}U_{145}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



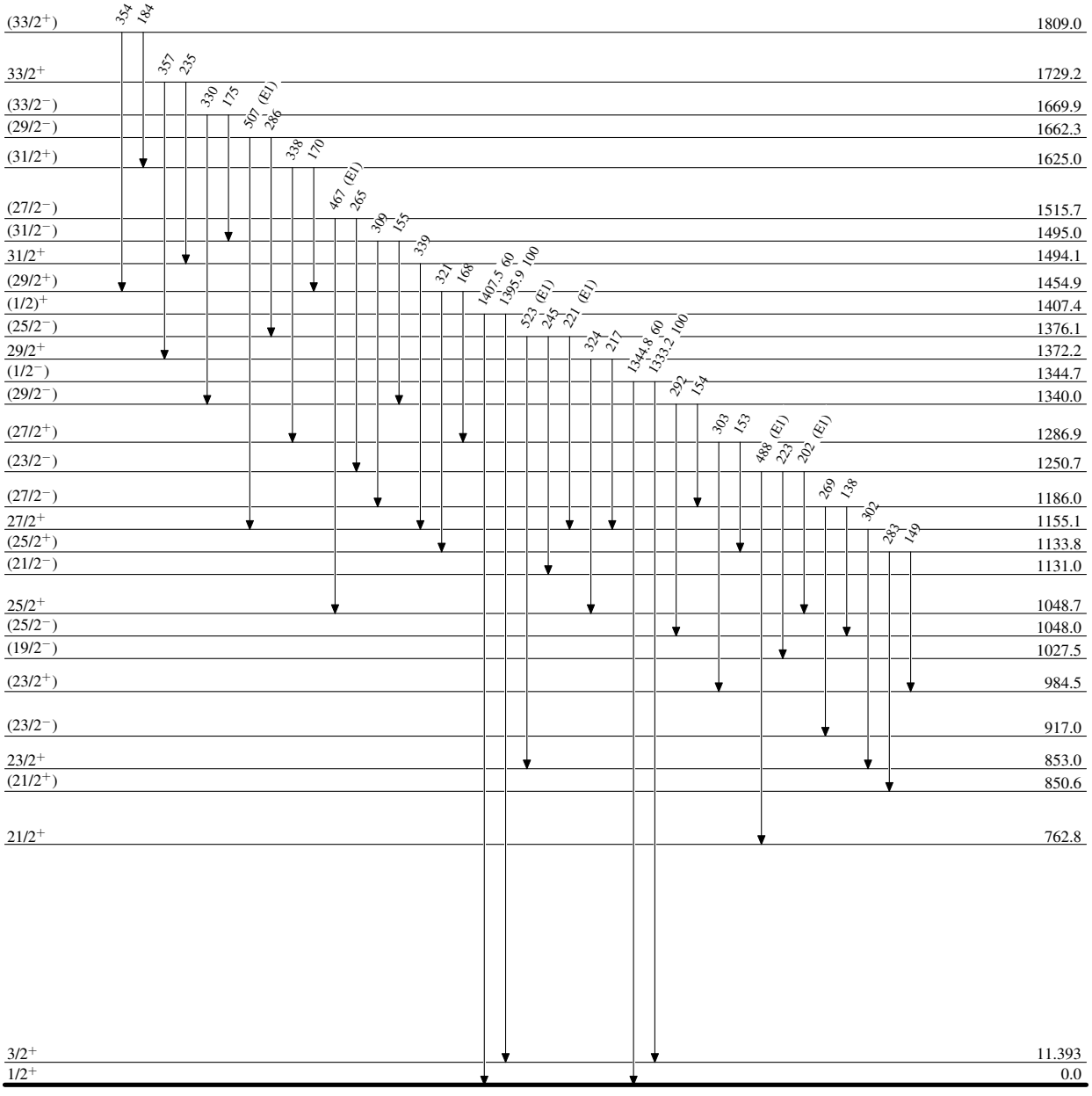
6.752 d *2*

$^{237}_{92}U_{145}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



$^{237}_{92}U_{145}$

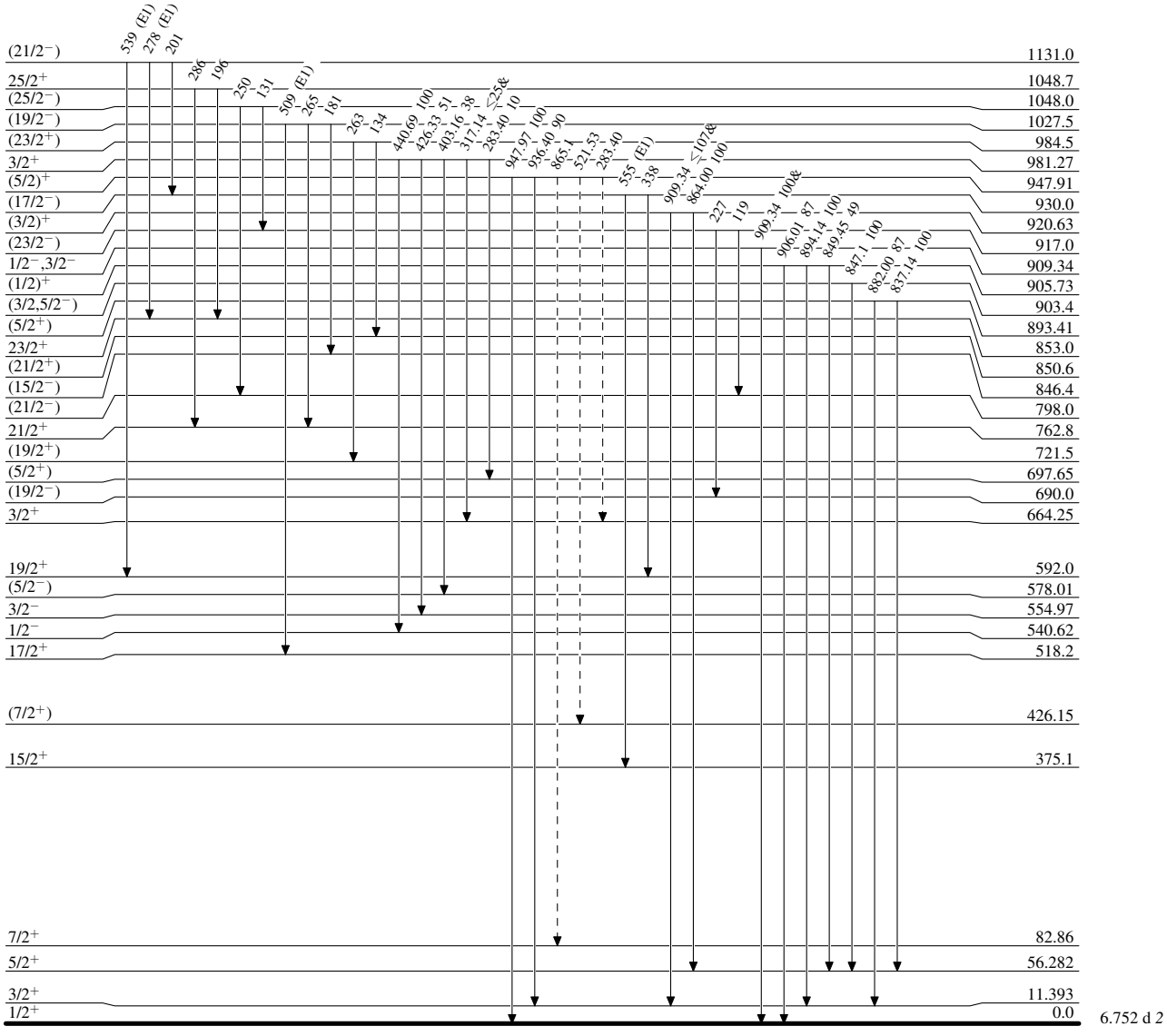
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

– – – – – – ► γ Decay (Uncertain)

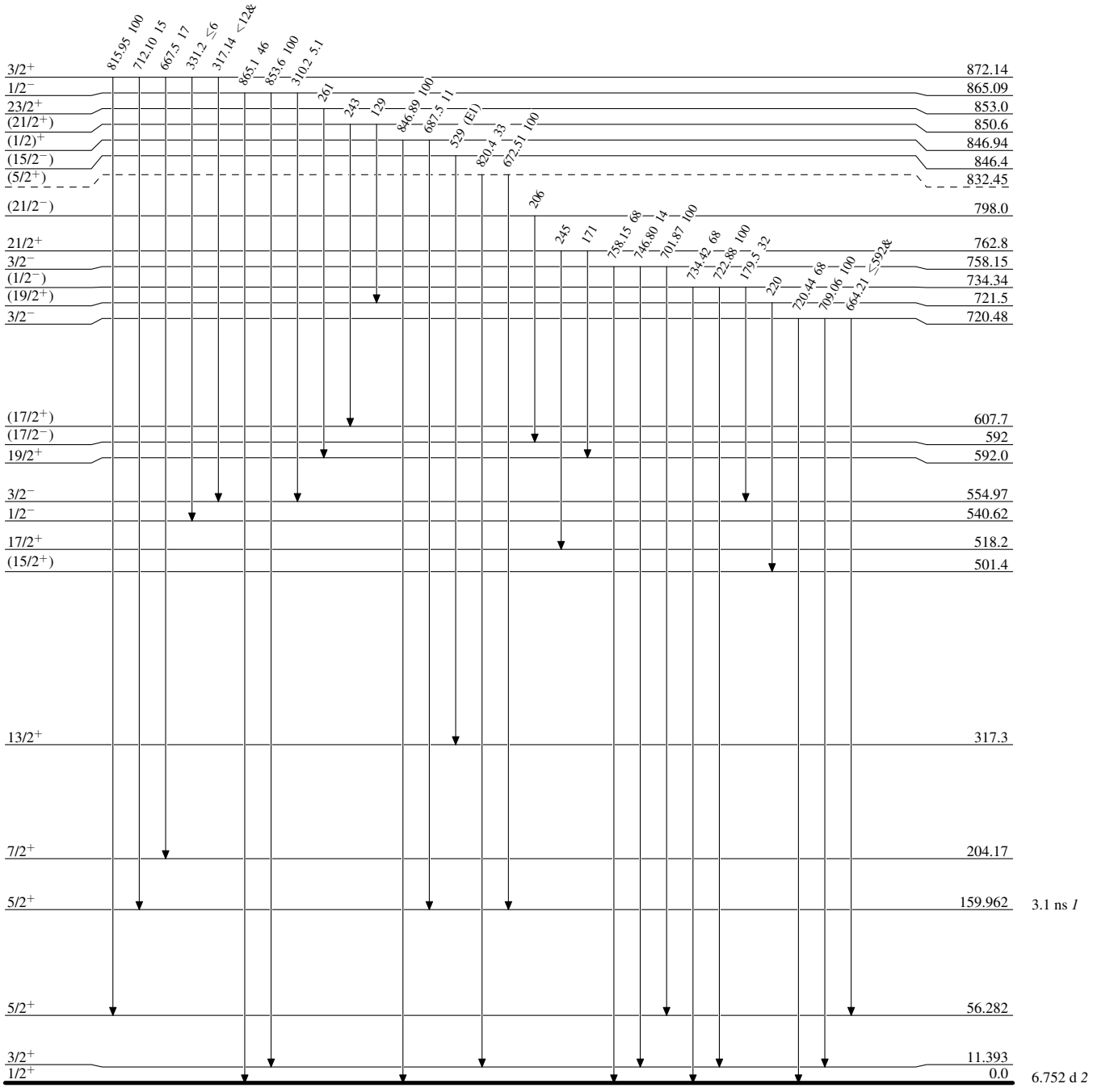


$^{237}_{92}U_{145}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

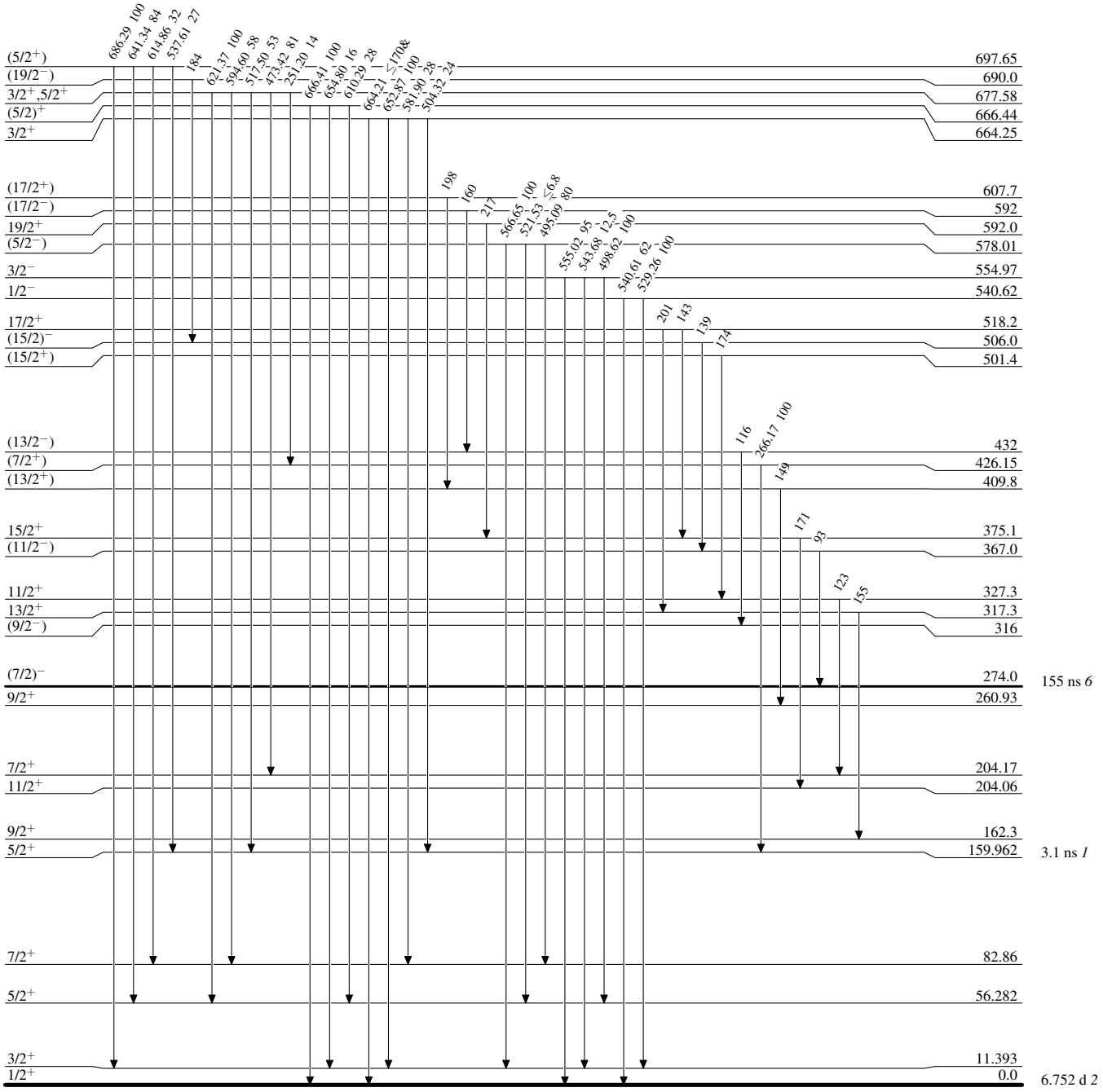


$^{237}_{92}U_{145}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given



$^{237}_{92}U_{145}$

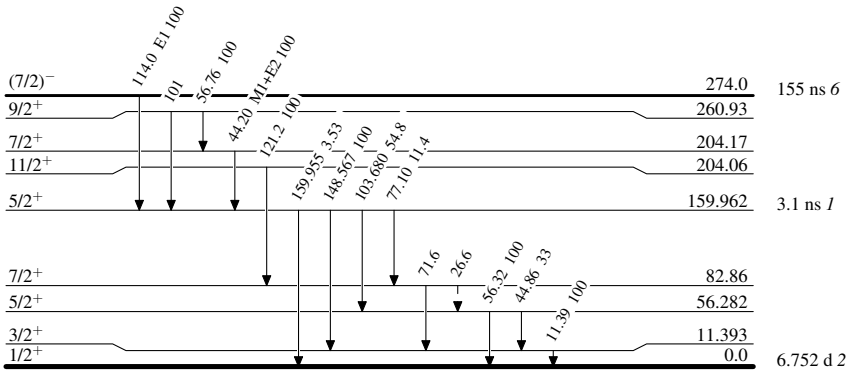
Adopted Levels, Gammas

Legend

Level Scheme (continued)

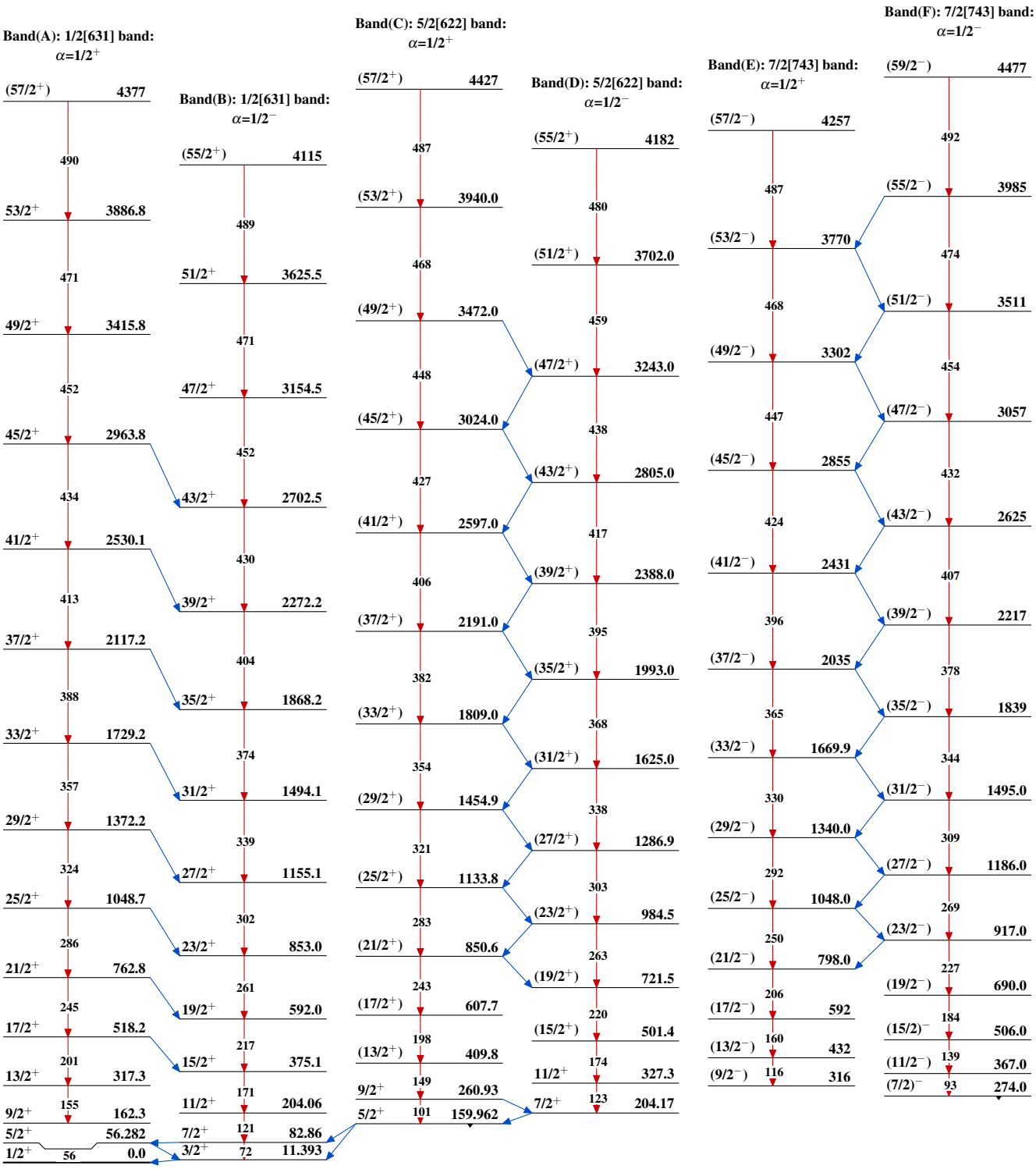
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

– – – – – – ► γ Decay (Uncertain)



$^{237}_{92}U_{145}$

Adopted Levels, Gammas



$^{237}_{92}U_{145}$

Adopted Levels, Gammas (continued)

Band(G): 7/2[624] band?

(13/2$^+$) 632

(11/2$^+$) 551

(9/2$^+$) 482

(7/2$^+$) 426.15

Band(H): K$^\pi$=1/2$^-$

(5/2$^-$) 578.01

3/2$^-$ 554.97

1/2$^-$ 540.62

Band(I): 3/2[631] band

(11/2$^+$) 848

(9/2$^+$) 798

(5/2$^+$) 697.65

3/2$^+$ 664.25

Band(J): K$^\pi$=1/2$^-$ band
Assignment of the levels to a band and its possible character of octupole vibration on the 1/2[631] g.s. band were suggested in 1979Vo05 on the basis of reduced transition rates of gammas to the g.s. band and the level energies

3/2$^-$ 758.15

(1/2$^-$) 734.34

Band(K): 5/2[633] band

(13/2$^+$) 1140

(11/2$^+$) 1040

(9/2$^+$) 946

(5/2$^+$) 832.45

Band(L): K$^\pi$=1/2$^+$
Possibly K=1/2,1/2[620]+ γ vibration on 5/2[622] band

(5/2$^+$) 893.41

3/2$^+$ 872.14

(1/2)$^+$ 846.94

Adopted Levels, Gammas (continued)

Band(N): $K^{\pi}=1/2^{+}$ band? Assignment as β vibration on 1/2[631] band was suggested in 1979Vo05

$(5/2)^{+}$ 947.91

$(3/2)^{+}$ 920.63

Band(M): 1/2[501] band

$(5/2^{-})$ 911

$(1/2)^{+}$ 905.73

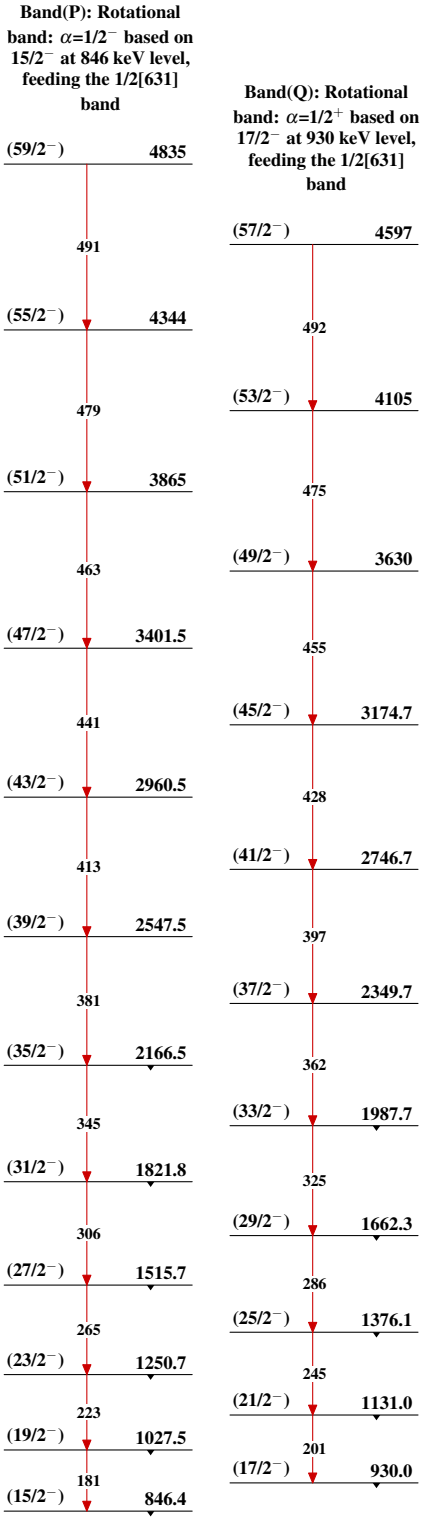
$1/2^{-}$ 865.09

Band(O): 5/2[752] band

$(15/2^{-})$ 1259

$^{237}_{92}U_{145}$

Adopted Levels, Gammas (continued)



$^{237}_{92}U_{145}$