Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	E. Browne, J. K. Tuli	NDS 122, 293 (2014)	30-Jun-2013

Q(β^-)=1261.5 *16*; S(n)=4806.38 *17*; S(p)=7609 *16*; Q(α)=4131 *13* 2012Wa38

Additional information 1.

2013Fr03: Discovery of ^{239}U.

Other measurements, calculations, and compilations.

^{238}U(n,γ).

2013De19: ^{238}U(n,γ), E<20 MeV. Analyzed data.

2013He11: ^{238}U(n,γ), E<20 MeV. Deduced σ.

2012Br11: ^{238}U(n,γ), E=0 *30*30 MeV. Calculated neutron yields.

2012Le17: ^{238}U(n,γ), E<20 MeV. Deduced σ.

2012Na16: ^{238}U(n,γ), E=3.7 MeV. Measured Eγ, Iγ. Deduced σ.

2012Pr13: ^{238}U(n,γ), E=Thermal. σ compilation.

2012Tu03: ^{238}U(n,γ), E=0.01 *50*50 MeV. Deduced σ.

2011Go05: ^{238}U(n,γ), E≤20 MeV. Deduced σ.

2011Go28: ^{238}U(n,γ), E=0.001 *30*30 MeV. Deduced σ.

2011Ro44: ^{238}U(n,γ), E=0.1 *20*20 MeV. Deduced σ.

2011Ul01: ^{238}U(n,γ), E=10 eV *100*00 keV. Deduced σ.

2010Ad13: ^{238}U(n,γ), E=th − 1 GeV. Measured Eγ, Iγ. Deduced σ.

2010Co02: ^{238}U(n,γ), E=0.001 *1* 1 MeV. Measured Eγ, Iγ. Deduced σ.

2009Ch04: ^{238}U(n,γ), E<1.0 MeV. Deduced σ.

2009De04: ^{238}U(n,γ), 0 *20*20 keV. Deduced σ.

2009Go05: ^{238}U(n,γ), 0.01 *30*30 MeV. Deduced Fission σ.

2008Ha01: ^{238}U(n,γ), E=0.003 *11*11 MeV. Deduced σ.

2008Mu23: ^{238}U(n,γ), E<1 MeV. Analyzed σ.

2008Re07: ^{238}U(n,γ), E=low. Measured Eγ, Iγ.

2007Bo19: ^{238}U(n,γ), 0 *20*20 keV. Deduced σ.

2004Ko23: ^{238}U(n,γ), E=reactor. Measured Eγ, Iγ.

2004St02: ^{238}U(n,γ), 0 *20*20 keV. Deduced σ.

Nuclear Structure.

2011Ad15: Calculated single-particle states.

2009Mi28: Calculated fission barrier; level energies.

2006Sh19: Rotational bands.

2006Fr21: Level densities.

2005Pa73: Single-particle states.

2004Fr11: Fission fragment yields.

2004Sa55: Calculated masses.

2002Be89: Calculated level densities.

2011He12: Compilation.

Radioactivity.

2012Ro34: Theory.

2012Sa31: ^{239}U(^{20}O) cluster decay.

2004Fr11: β^- decay. Evaluated data.

Adopted Levels, Gammas (continued)

^{239}U Levels

All levels populated in (n,γ) reactions (from thermal or resonance neutron capture states with $J^\pi=1/2^+$) have spins 1/2, 3/2, or 5/2. Band assignments presented here have been based on the energy systematics of Nilsson orbital configurations, and on the systematics of rotational band parameters (1978Bo12,1972Bo16,1984Ch05). J^π assignments to levels in the second potential well of the shape isomeric ground state are supported by tentative γ-ray multipolarities (1998Ob01,1995Ob01).

Chemical shift for the 6.67-eV n-resonance was measured, $\Delta\langle r^2\rangle/\langle r^2\rangle=5\%$ relative to ^{239}U g.s. was deduced, possibly caused by lack of deformation at 4.8 MeV (neutron binding energy) (1981Se14).

Cross Reference (XREF) Flags

A	^{238}U(n,γ) E=thermal	D	^{238}U(n,γ) E=res
B	^{238}U(n,γ) E=res: av	E	^{239}Pa β^- decay
C	^{238}U(d,p)		

E(level)†	Jπ#	$T_{1/2}$	XREF	Comments
0@	5/2+	23.45 min *2*	ABC E	%β^-=100 Jπ: from (n,γ) average resonance. $T_{1/2}$: weighted average of: 23.54 min *5* (1943Mi10), 23.5 min *7* (1947Fe05), 23.40 min *5* (1969Hu21), 23.44 min *2* (1989Ab05).
42.534@ *7*	7/2+		A C	Jπ: 42.5γ E2(+M1) to 5/2+.
98.631@ *16*	9/2+		A CD	Jπ: L=4 in (d,p).
133.7991& *10*	1/2+	0.78 μs *4*	ABC E	Jπ: 133.8γ E2 to 5/2+. $T_{1/2}$: from (d,pγ) (1975Ya03).
145.767& *6*	3/2+		ABC E	Jπ: (n,γ) average resonance.
169.089?a *10*	(7/2+)		A	Jπ: possible 169.1γ γ to 5/2+.
193.985& *5*	5/2+		AB E	Jπ: 60.2γ E2 to 1/2+, (n,γ) average resonance.
222.25& *3*	(7/2+)		A E	Jπ: 562.0γ (E1) from 5/2−.
226.3a *15*	(9/2+)		C	Jπ: from cross-section signature in (d,p).
292.5872g *20*	(7/2−)		A	Jπ: 292.2γ to 5/2+, 193.9γ to 9/2+. Systematics of Nilsson orbital configurations (1972El21).
301.8a *20*	(11/2+)		C	Jπ: from cross-section signature in (d,p).
307.8& *15*	(9/2+)		C	Jπ: from cross-section signature in (d,p).
372.7g *20*	(11/2−)		C	Jπ: from cross-section signature in (d,p).
498.6g *15*	(15/2−)		C	Jπ: from cross-section signature in (d,p).
539.283h *9*	5/2−		AB	Jπ: 539.3γ E1 to 5/2+, 496.7γ E1 to 7/2+; (n,γ) average resonance.
687.854b *5*	(1/2)+		ABC	Jπ: 1/2+ or 3/2+ from 554.0γ M1 to 1/2+; band parameter syst suggests 1/2+ (see for example ^{249}Cm,^{251}Cf).
694.7 *5*	5/2		B	Jπ: from (n,γ) average resonance. 1984Ch05 suggest configuration=5/2[633].
702.5 *15*	(9/2+)		C	Jπ: from cross-section signature in (d,p). 1978Er03 suggest configuration=7/2[613].
715.835b *5*	3/2+		ABC E	Jπ: 521.8γ M1(+E2) to 5/2+, 582.0γ M1(+E2) to 1/2+.
726.108d *10*	(3/2)+		AB	Jπ: 580.3γ M1+E2 to 3/2+, 592.3γ M1+E2 to 1/2+, band syst suggests 3/2+.
734.65b *3*	(5/2+)		ABC	Jπ: from (n,γ) average resonance.
739.380c *6*	1/2−		ABC	Jπ: 605.5γ E1 to 1/2+; γ-ray polarization in (n,γ).
746.054c *4*	3/2−		ABC	Jπ: 612.2γ E1 to 1/2+, 552.1γ E1 to 5/2+.
757.151d *22*	(5/2)+		ABC	Jπ: 563.1γ M1+E2 to 5/2+; (n,γ) average resonance.
784.273c *14*	5/2−		ABC E	Jπ: 638.5γ E1 to 3/2+; (n,γ) average resonance.
795.9c *15*	(7/2−)		C	Jπ: from cross-section signature in (d,p).
815.155i *6*	1/2−		ABC E	Jπ: from cross-section signature in (d,p); γ-ray polarization in (n,γ).
823.708i *8*	3/2−		ABC	Jπ: 629.7γ E1 to 5/2+, 690.0γ E1 to 1/2+.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{239}U Levels (continued)

E(level)[†]	Jπ[#]	XREF	Comments
838.3 *15*		C	1978Er03 suggest 11/2$^-$ member of 1/2[750] rotational band.
853.23[f] *4*	(3/2)$^+$	ABC	Jπ: 853.2γ M1+E2 to 5/2$^+$; (n,γ) average resonance.
858.81[i] *10*	5/2$^-$	B	Jπ: from (n,γ) average resonance.
874.0[d] *15*	(9/2$^+$)	C	Jπ: from cross-section signature in (d,p).
888.1[f] *3*	5/2$^+$	ABC	Jπ: from (n,γ) average resonance.
893.30 *10*	5/2$^+$	AB	Jπ: 893.3γ M1+E2 to 5/2$^+$; (n,γ) average resonance.
897.9 *15*		C	
932.90[e] *5*	(1/2)$^-$	ABC	Jπ: 787.2γ (E1) to 3/2$^+$; (n,γ) average resonance.
944.8[f] *20*	(7/2$^+$)	C	Jπ: from cross-section signature in (d,p).
961.88[e] *14*	(3/2)$^-$	ABC	Jπ: 768.0γ (E1) to 5/2$^+$, 827.9γ (E1) to 1/2$^+$; (n,γ) average resonance.
965.638[j] *19*	3/2$^+$	AB	Jπ: 831.8γ M1+E2 to 1/2$^+$.
982.9[e] *10*	5/2$^-$	BC	Jπ: from (n,γ) average resonance.
988.20[j] *6*	(5/2)$^+$	AB	Jπ: 794.2γ M1+E2 to 3/2$^+$, 842.4γ M1+E2 to 5/2$^+$.
990.495 *19*	3/2$^+$,5/2$^+$	AB D	Jπ: 990.2γ M1+E2 to 5/2$^+$; (n,γ) average resonance.
996.1[f] *15*	(9/2$^+$)	C	Jπ: from cross-section signature in (d,p).
1005.7 *5*	1/2$^+$,3/2$^+$,5/2$^+$	AB	Jπ: from (n,γ) average resonance.
1018.6 *10*	5/2$^-$	B	Jπ: from (n,γ) average resonance. 1984Ch05 suggest configuration=1/2[631]×2$^-$.
1062.48[k] *6*	5/2$^+$	AB	Jπ: 1062.5γ E0+M1+E2 to 5/2$^+$; (n,γ) average resonance.
1066.81 *12*	1/2,3/2	ABC	Jπ: 1/2$^-$,3/2$^-$ from (n,γ) average resonance; 3/2$^+$,5/2$^+$,7/2$^+$ from 1066.8γ M1+E2 to 5/2$^+$.
1115.0 *15*		C	
1146.74 *23*	5/2	B	Jπ: from (n,γ) average resonance.
1149.7 *3*		ABC	
1152.80 *4*	3/2$^+$	AB	Jπ: 1007.0γ E0+M1+E2 to 3/2$^+$.
1155.052[l] *22*	1/2$^+$	AB	Jπ: 1021.3γ E0+M1 to 1/2$^+$.
1167.02[l] *3*	3/2$^+$	AB	Jπ: 1021.3γ E0+M1 to 3/2$^+$; (n,γ) average resonance.
1194.63[m] *5*	(1/2)$^-$	ABC	Jπ: 478.8γ (E1) to 3/2$^+$; (n,γ) average resonance.
1201.02[l] *6*	5/2$^+$	AB	Jπ: 1007.0γ E0+M1+E2 to 5/2$^+$; (n,γ) average resonance.
1206.0 *10*	(5/2)	B	Jπ: from (n,γ) average resonance.
1223.31[m] *3*	(3/2$^-$)	AB	Jπ: (1/2$^+$,3/2$^+$) from 1089.6γ (M1) to 1/2$^+$; 1/2$^-$,3/2$^-$ from (n,γ) average resonance.
1225.5 *10*	1/2$^-$	B	Jπ: 1/2$^-$,3/2$^-$ from (n,γ) average resonance. 1984Ch05 suggest configuration=5/2[622]×2$^-$.
1232.0 *7*		ABC	
1235.2 *5*		AB	
1237.7 *7*	1/2$^+$,3/2$^+$	ABC	Jπ: from (n,γ) average resonance.
1241.96 *6*	1/2$^-$,3/2$^-$	ABC	Jπ: 554.1γ E1 to 3/2$^+$; (n,γ) average resonance.
1260.3 *3*	(1/2,3/2)	ABC	Jπ: from (n,γ) average resonance.
1265.3 *8*		A	
1270.6 *5*	(1/2,3/2)	ABC	Jπ: from (n,γ) average resonance.
1276.83 *21*	(1/2,3/2)	AB	Jπ: from (n,γ) average resonance.
1295.2 *10*	1/2,3/2,5/2	B	Jπ: from (n,γ) average resonance.
1306.22 *3*	1/2$^-$,3/2$^-$	AB	Jπ: 590.4γ E1 to 3/2$^+$; (n,γ) average resonance. π=+.
1318.2 *3*		AB	
1320.5 *7*		AB	
1324.6 *3*	(1/2$^-$,3/2$^-$)	AB	Jπ: from (n,γ) average resonance.
1338.3 *10*	(1/2$^+$,3/2$^+$,5/2$^+$)	BC	Jπ: from (n,γ) average resonance.
1360.97 *3*	(1/2$^-$,3/2$^-$)	ABC	Jπ: from (n,γ) average resonance.
1368.03 *21*		A	
1383.5 *4*		A	
1399.5 *8*		A	
1404.53 *21*		A	
1416.9 *6*		A	
1436.83 *21*		A C	XREF: C(1430).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{239}U Levels (continued)

E(level)[†]	J$^{\pi}$[#]	$T_{1/2}$	XREF	Comments
1445.83 *21*			A	
1462.5 *3*			A	
1479.5 *5*			A C	XREF: C(1473).
1481.53 *21*			A	
1493.6 *5*	1/2,3/2		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1494.9 *6*	1/2,3/2		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1504.5 *3*			A	
1509.9 *3*	(1/2$^-$,3/2$^-$)		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1512.9 *15*			A C	XREF: C(1515).
1520.33 *21*	1/2$^-$,3/2$^-$		A C	XREF: C(1524). J$^{\pi}$: from γ-ray polarization in (n,γ).
1573.2 *5*	1/2,3/2$^+$		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1586.3 *5*	3/2		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1609.2 *5*	1/2$^+$,3/2$^+$		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1614.7 *5*	3/2,(1/2)		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1631.2 *5*	1/2,3/2		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1684.7 *5*	1/2,3/2		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1692.2 *5*	3/2,(1/2)		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
0.0+x[‡]	(5/2$^+$)	>0.25 μs	D	$T_{1/2}$: from delayed $\gamma\gamma$ coin (1994Ob01). J$^{\pi}$: 708.2γ to 3/2$^+$, 5/2$^+$.
1717.0 *5*	3/2,(1/2)		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
1807.9 *5*	(3/2)		A	J$^{\pi}$: from γ-ray polarization in (n,γ).
174.0+x[‡]			D	
477.8+x[‡]	(3/2$^-$)		D	
1083.4+x[‡]	(1/2$^+$,5/2$^+$)		D	
1626.9+x[‡]	(1/2$^-$,3/2$^-$)		D	
1630.6+x[‡]	(3/2$^-$)		D	
1767.5+x[‡]	(1/2$^-$,3/2$^-$)		D	
1776.5+x?[‡]			D	
1808.2+x?[‡]			D	
3107.0+x[‡]	(1/2$^+$)		D	

[†] From least squares adjustment in (n,γ) thermal, unless otherwise specified.
[‡] x=1699 keV, from (n,γ) E=res experiment (2008ObZZ). See also 1998Ob01. Levels are in the second potential well.
[#] From rotational structure. Other supporting arguments, such as γ-ray multipolarities and reduced primary γ-ray intensities from (n,γ) resonance average reactions, are given with the individual levels.
[@] Band(A): 5/2[622] Rotational parameter A=6.1 keV.
[&] Band(B): 1/2[631] Rotational parameter A=6.8 keV, decoupling constant a=−0.41.
[a] Band(C): 7/2[624] Rotational parameter A=6.9 keV.
[b] Band(D): 1/2[620] Rotational parameter A=6.5 keV, decoupling constant a=+0.42.
[c] Band(E): 1/2[761]? Rotational parameter A=4.9 keV, decoupling constant a=−0.55.
[d] Band(F): 3/2[631]? Rotational parameter A=6.2 keV.
[e] Band(G): 1/2[501] Rotational parameter A=6.9 keV, decoupling constant a=+0.39.
[f] Band(H): 3/2[622] Rotational parameter A=6.8 keV.
[g] Band(I): 7/2[743] Rotational parameter A=4.0 keV.
[h] Band(J): 5/2[622]×0$^-$ Octupole vibration.
[i] Band(K): 1/2[631]×0$^-$ Rotational parameter A=4.9 keV, decoupling constant a=−0.42. Octupole vibration.
[j] Band(L): 3/2[631]−2$^+$? Rotational parameter A=4.5 keV. Gamma vibration.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{239}U Levels (continued)

[k] Band(M): 5/2[622]×0^+ ? Beta vibration.
[l] Band(N): 1/2[631]×0^+ Rotational parameter A=5.4 keV, decoupling constant a=−0.26. Beta vibration.
[m] Band(O): 1/2[750] ? Rotational parameter A=6.0 keV, decoupling constant a=+0.59.

Adopted Levels, Gammas (continued)

$\gamma(^{239}U)$

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
42.534	$7/2^+$	42.540 *8*	100	0	$5/2^+$	E2(+M1)		
133.7991	$1/2^+$	133.799 *1*	100	0	$5/2^+$	E2	3.72	B(E2)(W.u.)=0.040 *3*
145.767	$3/2^+$	11.978 *CA*	100	133.7991	$1/2^+$			
169.089?	$(7/2^+)$	169.089[a] *10*	100	0	$5/2^+$			
193.985	$5/2^+$	48.230 *17*		145.767	$3/2^+$	[E2+M1]		
		60.185 *10*		133.7991	$1/2^+$	E2	148	
292.5872	$(7/2^-)$	193.956 *15*	12 *6*	98.631	$9/2^+$			
		250.062[a] *7*	100 *40*	42.534	$7/2^+$			
		292.587 *2*	47 *18*	0	$5/2^+$			
539.283	$5/2^-$	496.753 *11*	34 *8*	42.534	$7/2^+$	E1	0.01367	
		539.278 *11*	100 *20*	0	$5/2^+$	E1	0.01163	
687.854	$(1/2)^+$	542.085 *12*	28 *7*	145.767	$3/2^+$			
		554.054 *8*	100 *24*	133.7991	$1/2^+$	M1	0.189	
		687.853 *8*	33 *10*	0	$5/2^+$	(E2)		
715.835	$3/2^+$	521.849 *7*	100 *4*	193.985	$5/2^+$	M1(+E2)		
		582.034 *8*	22 *5*	133.7991	$1/2^+$	M1(+E2)		
		673.307 *12*	14 *6*	42.534	$7/2^+$			
		715.832 *9*	30 *8*	0	$5/2^+$	(E2)		Mult.: E2,E1 from α, $\Delta\pi$=No from level scheme.
726.108	$(3/2)^+$	580.340 *13*	96 *26*	145.767	$3/2^+$	M1+E2		
		592.309 *13*	1.0×10^2 *3*	133.7991	$1/2^+$	M1+E2		
734.65	$(5/2^+)$	588.88 *3*	100	145.767	$3/2^+$			
739.380	$1/2^-$	593.612 *5*	100 *22*	145.767	$3/2^+$	E1	0.00966	
		605.581 *9*	49 *11*	133.7991	$1/2^+$	E1	0.00930	
746.054	$3/2^-$	552.069 *6*	90 *2*	193.985	$5/2^+$	E1	0.01111	
		600.284 *10*	13 *4*	145.767	$3/2^+$	E1	0.00946	
		612.253 *5*	100 *22*	133.7991	$1/2^+$	[E1]	0.00911	
757.151	$(5/2)^+$	563.17 *3*	1.0×10^2 *3*	193.985	$5/2^+$	M1+E2		
		611.38 *3*	1.0×10^2 *3*	145.767	$3/2^+$			
784.273	$5/2^-$	562.027 *22*	78 *24*	222.25	$(7/2^+)$	[E1]	0.01073	
		638.505 *12*	100 *29*	145.767	$3/2^+$	E1	0.00842	
815.155	$1/2^-$	127.301 *5*	83 *17*	687.854	$(1/2)^+$			
		669.385 *13*	33 *17*	145.767	$3/2^+$			
		681.355 *9*	1.0×10^2 *3*	133.7991	$1/2^+$	E1[‡]		
823.708	$3/2^-$	629.722 *9*	1.0×10^2 *3*	193.985	$5/2^+$	E1	0.00864	
		689.907 *11*	59 *13*	133.7991	$1/2^+$	E1	0.00728	
853.23	$(3/2)^+$	853.23 *4*	100	0	$5/2^+$	M1+E2		
893.30	$5/2^+$	893.30 *10*	100	0	$5/2^+$	M1+E2		
932.90	$(1/2)^-$	787.15 *7*	25 *8*	145.767	$3/2^+$	(E1)[‡]		
		799.12 *7*	100 *25*	133.7991	$1/2^+$			
961.88	$(3/2)^-$	767.86 *21*	83 *25*	193.985	$5/2^+$	(E1)[‡]		
		828.04 *21*	100 *25*	133.7991	$1/2^+$	(E1)[‡]		

$^{239}_{92}U_{147}$-6

Adopted Levels, Gammas (continued)

γ(^{239}U) (continued)

E_i(level)	J_i^π	E_γ[†]	I_γ[†]	E_f	J_f^π	Mult.[†]	α[@]	Comments
965.638	3/2+	819.868 *21*	19 *8*	145.767	3/2+			
		831.837 *19*	1.0×10^2 *3*	133.7991	1/2+	M1+E2		
988.20	(5/2)+	794.21 *8*	83 *25*	193.985	5/2+	M1+E2		
		842.42 *8*	100 *25*	145.767	3/2+	M1+E2		
990.495	3/2+,5/2+	451.213 *23*	1.0×10^2 *4*	539.283	5/2−			
		990.49 *3*	1.0×10^2 *4*	0	5/2+	M1+E2		
1062.48	5/2+	1062.48 *6*	100	0	5/2+	E0+M1+E2		
1066.81	1/2,3/2	1066.82 *12*	100	0	5/2+	M1+E2		
1149.7		1149.8 *3*	100	0	5/2+			
1152.80	3/2+	1007.03[&] *6*	79[&] *20*	145.767	3/2+	E0+M1+E2		
		1110.27 *6*	1.0×10^2 *4*	42.534	7/2+			
		1152.80 *6*	1.0×10^2 *4*	0	5/2+			
1155.052	1/2+	961.06 *4*	39 *10*	193.985	5/2+			
		1021.25[&] *4*	79[&] *20*	133.7991	1/2+	E0+M1		
		1155.05 *4*	1.0×10^2 *4*	0	5/2+			
1167.02	3/2+	972.83 *25*		193.985	5/2+			
		1021.25[&] *4*	40[&] *10*	145.767	3/2+	E0+M1+E2		
		1167.01 *4*	1.0×10^2 *3*	0	5/2+			
1194.63	(1/2)−	478.79 *8*	75 *25*	715.835	3/2+	(E1)[‡]		
		1048.85 *8*	75 *25*	145.767	3/2+			
		1060.82 *8*	100 *25*	133.7991	1/2+			
1201.02	5/2+	1007.03[&] *6*	100[&]	193.985	5/2+	E0+M1+E2		
1223.31	(3/2−)	535.45 *5*	76 *16*	687.854	(1/2)+	(E1)		Mult.: measured E1 or E2. Decay scheme requires E1.
		1029.32 *5*	1.0×10^2 *3*	193.985	5/2+	(E1)		Mult.: measured E1 or E2. Decay scheme requires E1.
		1089.50 *5*	38 *11*	133.7991	1/2+	(E1)		Mult.: measured (M1). Decay scheme requires E1.
1241.96	1/2−,3/2−	554.10 *8*	100	687.854	(1/2)+	E1	0.01108	
1306.22	1/2−,3/2−	590.39 *3*	100	715.835	3/2+	E1	0.00977	
1360.97	(1/2−,3/2−)	537.26 *3*	100	823.708	3/2−			
0.0+x	(5/2+)	708.2[#]		990.495	3/2+,5/2+			
		1600.3[#]		98.631	9/2+			
477.8+x	(3/2−)	477.8[#] *4*	100	0.0+x	(5/2+)			
1083.4+x	(1/2+,5/2+)	605.6[#] *5*	100	477.8+x	(3/2−)			
1630.6+x	(3/2−)	549.8[#] *11*	100	1083.4+x	(1/2+,5/2+)			
1776.5+x?		1298.8[#a] *10*	100	477.8+x	(3/2−)			
3107.0+x	(1/2+)	1298.8[#a] *10*	17 *4*	1808.2+x?				
		1339.5[#a] *10*	15 *2*	1767.5+x	(1/2−,3/2−)			
		1476.4[#] *11*	17 *2*	1630.6+x	(3/2−)			
		1480.1[#a] *11*	33 *4*	1626.9+x	(1/2−,3/2−)			

$^{239}_{92}U_{147}$-7

Adopted Levels, Gammas (continued)

$\gamma(^{239}U)$ (continued)

E_i(level)	E_γ[†]	I_γ[†]	E_f	J_f^π
3107.0+x	2933.0[#] *21*	100 *20*	174.0+x	
	3107.0[#] *23*		0.0+x	$(5/2^+)$

[†] From (n,γ) E=thermal.
[‡] E1 or E2. Decay scheme requires E1.
[#] γ rays de-excite levels in the second potential well.
[@] 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.
[&] Multiply placed with intensity suitably divided.
[a] Placement of transition in the level scheme is uncertain.

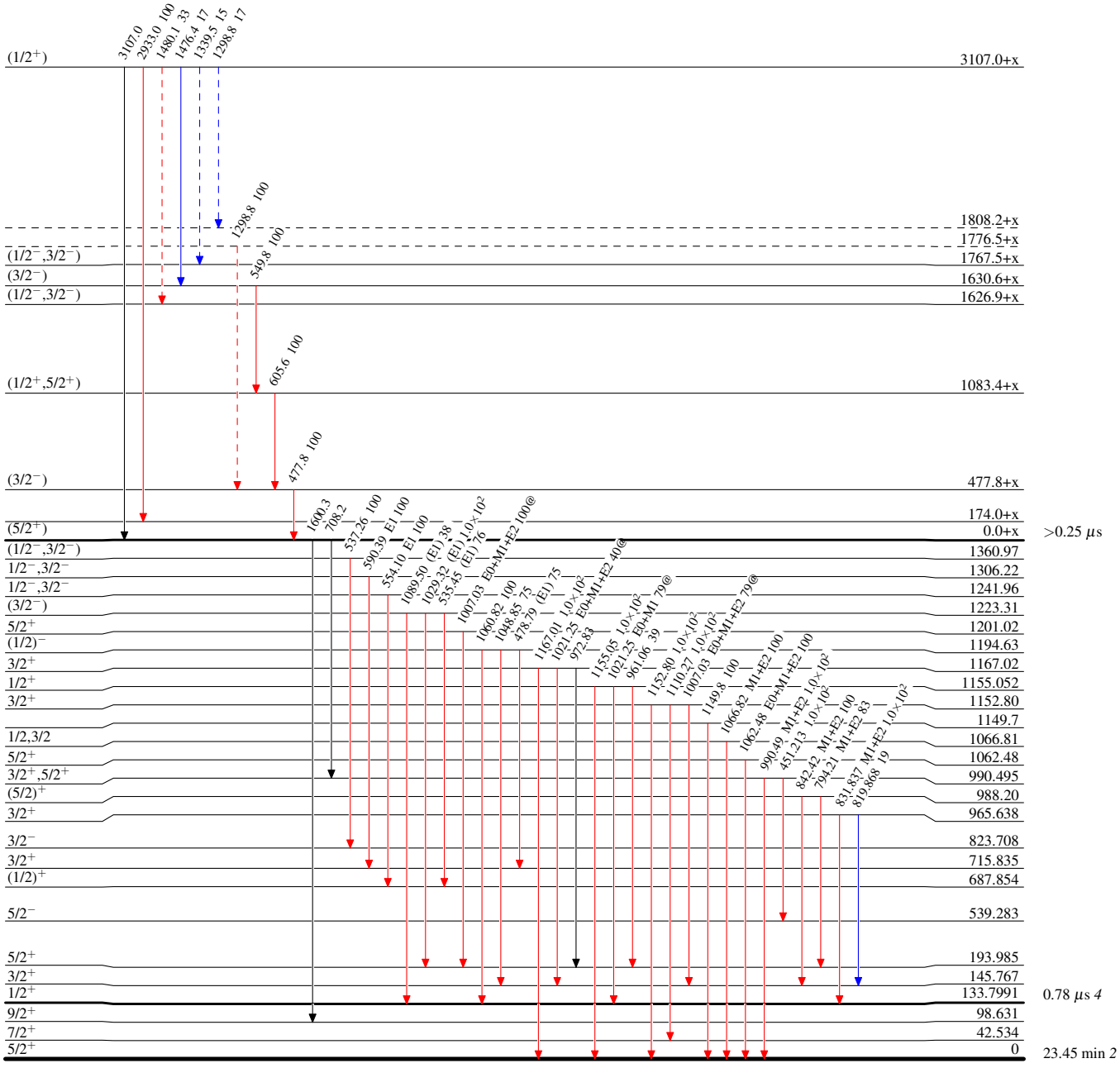
$^{239}_{92}U_{147}$-8

Adopted Levels, Gammas

Level Scheme

Intensities: Type not specified
@ Multiply placed: intensity suitably divided

Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)

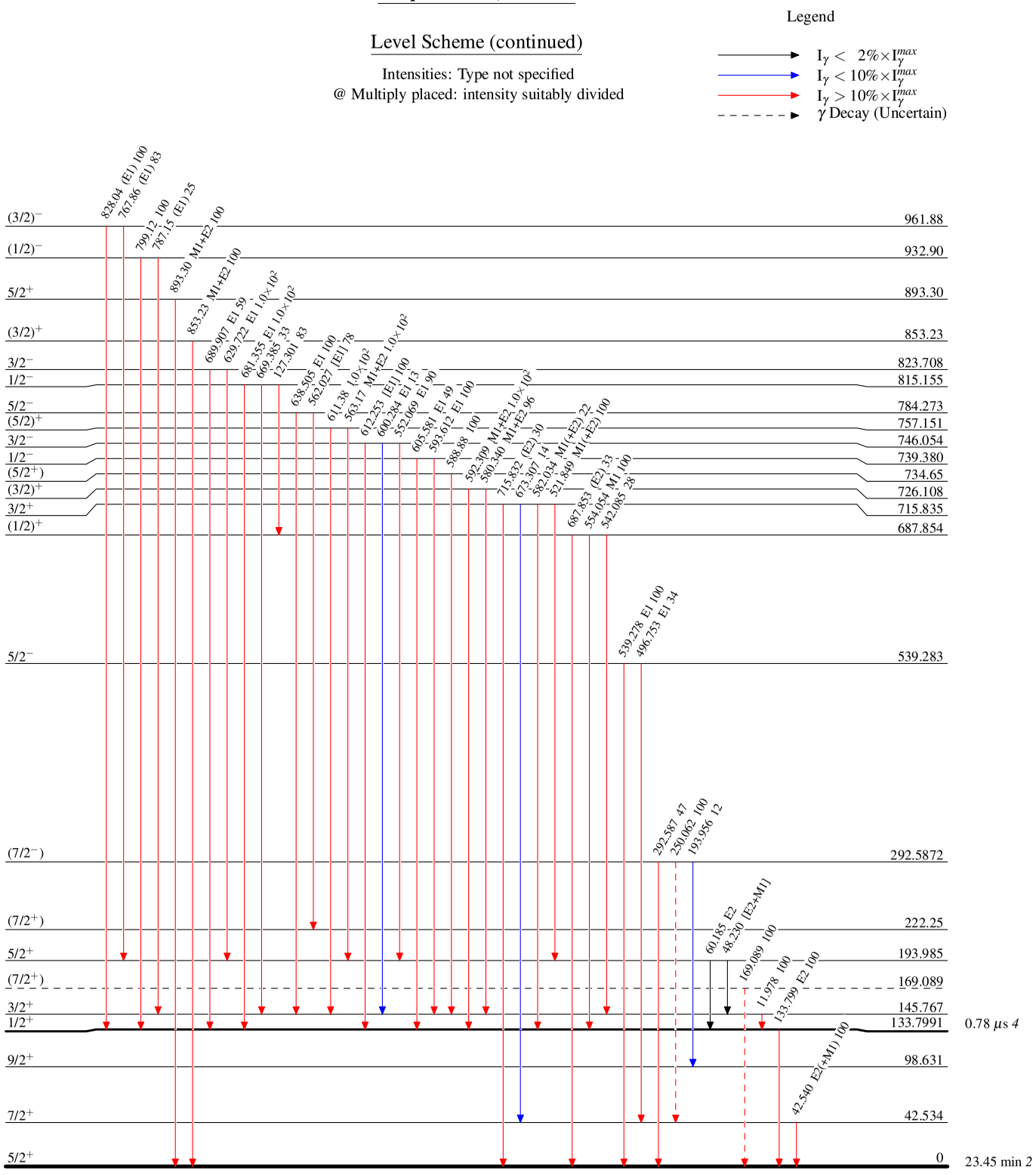


$^{239}_{92}U_{147}$

Adopted Levels, Gammas

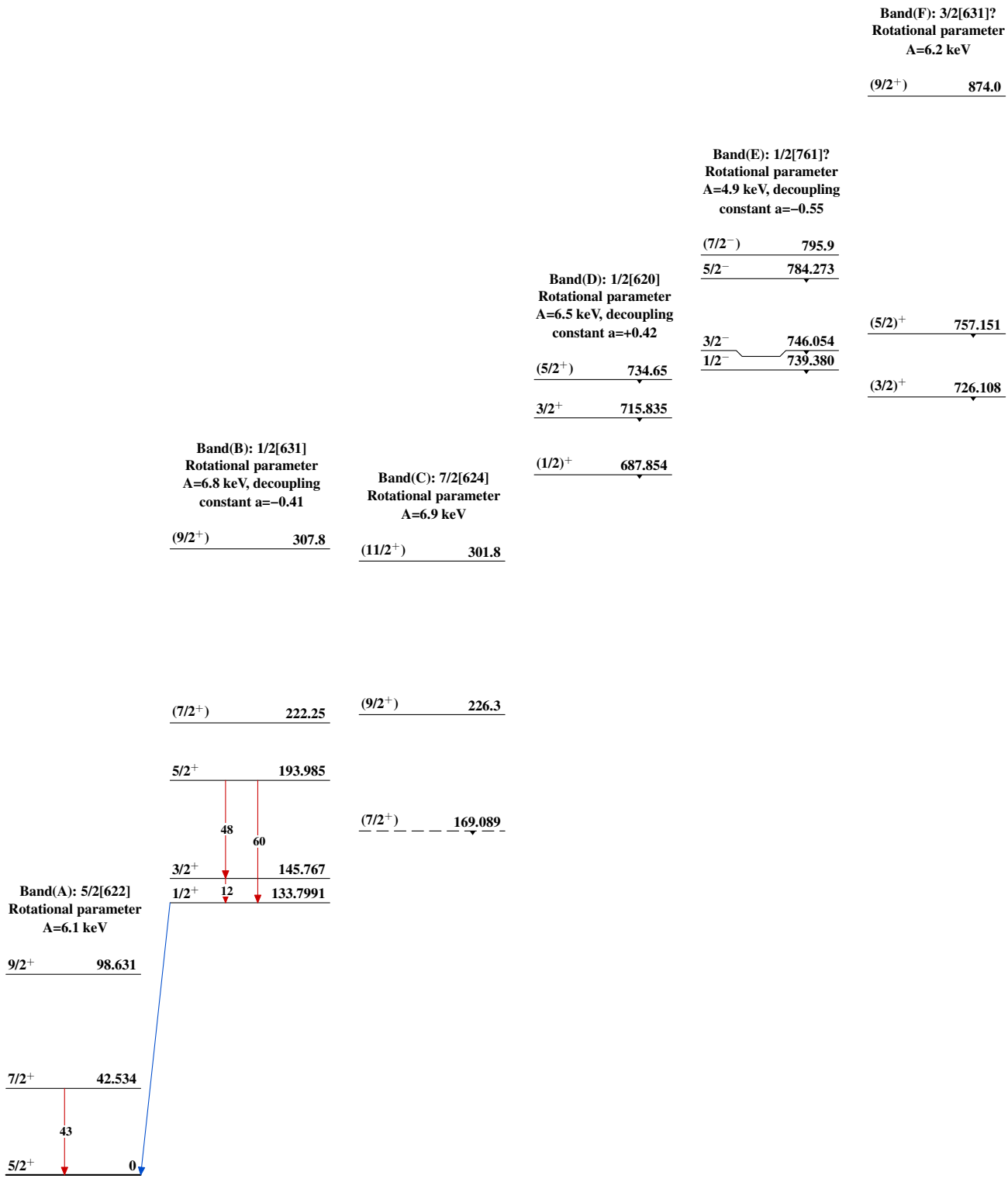
Level Scheme (continued)

Intensities: Type not specified
@ Multiply placed: intensity suitably divided



$^{239}_{92}U_{147}$

Adopted Levels, Gammas



Adopted Levels, Gammas (continued)

Band(G): 1/2[501]
Rotational parameter A=6.9 keV, decoupling constant a=+0.39

5/2$^-$	982.9
(3/2)$^-$	961.88
(1/2)$^-$	932.90

Band(H): 3/2[622]
Rotational parameter A=6.8 keV

(9/2$^+$)	996.1
(7/2$^+$)	944.8
5/2$^+$	888.1
(3/2)$^+$	853.23

Band(I): 7/2[743]
Rotational parameter A=4.0 keV

(15/2$^-$)	498.6
(11/2$^-$)	372.7
(7/2$^-$)	292.5872

Band(J): 5/2[622]×0$^-$
Octupole vibration

5/2$^-$	539.283

Band(K): 1/2[631]×0$^-$
Rotational parameter A=4.9 keV, decoupling constant a=–0.42

5/2$^-$	858.81
3/2$^-$	823.708
1/2$^-$	815.155

Band(L): 3/2[631]–2$^+$?
Rotational parameter A=4.5 keV

(5/2)$^+$	988.20
3/2$^+$	965.638

$^{239}_{92}U_{147}$

Adopted Levels, Gammas (continued)

Band(O): 1/2[750] ?
Rotational parameter A=6.0 keV, decoupling constant a=+0.59

$(3/2^-)$ 1223.31

Band(N): 1/2[631]×0^+
Rotational parameter A=5.4 keV, decoupling constant a=−0.26

$5/2^+$ 1201.02

$(1/2)^-$ 1194.63

$3/2^+$ 1167.02

$1/2^+$ 1155.052

Band(M): 5/2[622]×0^+ ?
Beta vibration

$5/2^+$ 1062.48

$^{239}_{92}U_{147}$