^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh, E. Browne	NDS 109, 2439 (2008)	31-Jul-2008

Includes ^{238}U(α,F) from 1997Er09.

2001Ga05, 2001Th16, 2000Pa40 (also 2001Kr05): E=25 MeV. Measured Eγ, Iγ, $\gamma\gamma$ using six Ge CLUSTERS, each cluster with four Ge detectors of the EUROBALL array; ce data; Gamma- and ce-spectroscopy in the superdeformed minimum of ^{240}Pu.

1972Sp06: E=25 MeV, transitions in second minimum studied with iron- free spectrometer in coincidence with delayed fission fragments; transitions in the g.s. band studied in ce singles and γ-ce coincidence.

1997Er09: ^{238}U(α,F) E=20.0-31.2 MeV. Measured fission $T_{1/2}$. Deduced second potential (superdeformed) well depth.

Other: 1973Be10.

Data for excited superdeformed bands are from 2001Ga05, 2001Th16 and 2000Pa40 (all from the same laboratory). In a few cases where corresponding values differ somewhat between these three papers, those from 2001Ga05 (being the latest paper) are adopted here. Some levels are listed only in 2001Th16. Data for the g.s. SD band are from 1972Sp06.

^{240}Pu Levels

Lifetime estimates for some of the bandheads are listed by 2001Ga05 and 2001Th16, these are based on systematics, not on lifetime measurements.

E(level)[†]	J$^\pi$[‡]	$T_{1/2}$	E(level)[†]	J$^\pi$[‡]
0.0[c]	0$^+$		918.8+x[f] 3	5$^-$
42.824[c] 8	2$^+$		920.7+x[e] 12	6$^-$
141.684[c] 16	4$^+$		936.4+x?[j]	1$^-$
294.31[c] 3	6$^+$		952.5+x?[j]	2$^-$
497.51[c] 21	8$^+$		960.7+x[f] 2	6$^-$
747.8[c] 3	(10$^+$)		966.5+x[e] 13	7$^-$
1041.8[c] 4	(12$^+$)		970.6+x?[j]	3$^-$
1375.6[c] 6	(14$^+$)		986.8+x[i] 13	8$^+$
x[#d]	0$^+$	3.6[@] ns 2	998.3+x[f] 7	7$^-$
20.1+x[d]	2$^+$		1012.2+x?[j]	4$^-$
66.8+x[d]	4$^+$		1019+x?[e]	8$^-$
139.9+x[d]	6$^+$		1044.0+x?[j]	5$^-$
239.2+x[d]	8$^+$		1054.9+x[f] 5	8$^-$
364.5+x?[&d]	10$^+$		1078+x?[e]	9$^-$
516.9+x?[ad]	12$^+$		1104+x?[f]	9$^-$
554.7+x[h]	1$^-$		1104.2+x?[i]	10$^+$
589.7+x[h]	3$^-$		1109.0+x?[j]	6$^-$
769.9+x[i] 10	0$^+$		1161.5+x?[j]	7$^-$
785.1+x[i] 11	2$^+$		1172+x?[f]	10$^-$
806.2+x[e] 1	2$^-$		1230.4+x?[j]	8$^-$
825.0+x[i] 11	4$^+$		1232+x?[f]	11$^-$
825.6+x[e] 2	3$^-$		1246.5+x?[k]	1$^-$
836.0+x[f] 5	1$^-$		1261.0+x?[k]	2$^-$
846.8+x[f] 3	2$^-$		1287.0+x?[k]	3$^-$
851.1+x[e] 4	4$^-$		1300.9+x?[j]	9$^-$
866.0+x[f] 10	3$^-$		1322.0+x?[k]	4$^-$
882.8+x[e] 6	5$^-$		1344.5+x?[g]	1$^-$
891.2+x[f] 3	4$^-$		1360.9+x[g] 2	2$^-$
892.4+x[i] 12	6$^+$		1366.5+x?[k]	6$^-$

Continued on next page (footnotes at end of table)

^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

^{240}Pu Levels (continued)

E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]	E(level)[†]	Jπ[‡]
1382.9+x?[j]	10⁻	1465.7+x[g] *6*	5⁻	1641.5+x?[k]	9⁻	1835.0+x?[k]	11⁻
1386.6+x[g] *3*	3⁻	1485.5+x?[k]	7⁻	1654.7+x?[bg]	8⁻	1910.0+x?[g]	11⁻
1421.0+x?[k]	6⁻	1518.7+x[g] *13*	6⁻	1732+x?[g]	9⁻	2011.0+x?[g]	12⁻
1421.4+x[g] *6*	4⁻	1559.0+x?[k]	8⁻	1733.5+x?[k]	10⁻		
1461.8+x?[j]	11⁻	1580.5+x[g] *14*	7⁻	1816+x?[g]	10⁻		

[†] For SD bands values are from 2001Ga05 when available; otherwise from 2001Th16. For the normal g.s. band, values are from Eγ's.

[‡] From 'Adopted Levels' for g.s. band. From 2001Ga05 for SD bands. In 'Adopted Levels', all assignments for SD band levels are given in parentheses due to lack of strong supporting arguments.

[#] x=2250 *200*, deduced from the level density of $K^{\pi}=0^{+}$ bandheads in ^{239}Pu(d,pF) (2001Hu12,2001Th16). Other: 2800 *200* (estimate by 1971Br39,1970Bu02,1973Na03).

[@] From 'Adopted Levels'.

[&] From extrapolation of moment of inertia plot for the band (2001Ga05).

[a] From 2001Th16.

[b] From 2001Th16; 1651+x in 2001Ga05.

[c] Band(A): g.s. band. A=7.156 keV, B=−3.55 eV.

[d] Band(B): SD-1 Band (2000Pa40,2001Ga05,2001Th16). Ground-state band in the second minimum.

[e] Band(C): SD-2 Band, $K^{\pi}=2^{-}$ (2000Pa40,2001Ga05,2001Th16). Population intensity=41%.

[f] Band(D): SD-3 Band, $K^{\pi}=1^{-}$ band (2000Pa40,2001Ga05,2001Th16). Population intensity=15%.

[g] Band(E): SD-4 Band, $K^{\pi}=1^{-}$ band (2000Pa40,2001Ga05,2001Th16). Population intensity=20%.

[h] Band(F): SD-5 Band, $K^{\pi}=0^{-}$ octupole band (2000Pa40,2001Ga05,2001Th16). Population intensity=3%.

[i] Band(G): SD-6 band, $K^{\pi}=0^{+}$ β band (2001Ga05,2001Th16). Population intensity=1.7%.

[j] Band(H): SD-7 band, $K^{\pi}=1^{-}$ band (2001Th16) (?) Population intensity≈1%. Tentative assignment.

[k] Band(I): SD-8 band, $K^{\pi}=1^{-}$ band (2001Th16) (?) Population intensity≈6%. Tentative assignment.

^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

$\gamma(^{240}Pu)$

Other electron lines, assigned as E0, are seen at 280.3 (1.7%), 289.7 (2.3%) and 296.0 (1.0%), which correspond to transition energies near 411 keV (2001Ga05).
These transitions probably define other $K^{\pi}=1^{-}$ bands. In 2001Th16, there are tentative transitions of energies: 410.5, 414.2 and 420 with dominant E0 component.

E_{γ} [†]	I_{γ} [cd]	E_i(level)	J_i^{π}	E_f	J_f^{π}	Mult. [b]	α [f]	$I_{(\gamma+ce)}$	Comments
(19.4)		825.6+x	3^-	806.2+x	2^-				
(20.1)		20.1+x	2^+	x	0^+	[E2]	2.3×10^4 *3*		α(L)=1.31×10^4 *18*; α(M)=7.5×10^3 *10*; α(N+..)=2.6×10^3 *4* α(N)=2.0×10^3 *3*; α(O)=4.8×10^2 *7*; α(P)=74 *10*; α(Q)=0.108 *13* Additional information 1.
(25.5)		851.1+x	4^-	825.6+x	3^-				
31.7		882.8+x	5^-	851.1+x	4^-	(E2)	3.9×10^3 *4*		α(L)=2.86×10^3 *24*; α(M)=8.0×10^2 *7*; α(N+..)=277 *23* α(N)=218 *18*; α(O)=51 *5*; α(P)=8.0 *7*; α(Q)=0.0146 *11* Additional information 3. %I(ce(K))≈15.
(37.9)		920.7+x	6^-	882.8+x	5^-				
42.824[‡] *8*		42.824	2^+	0.0	0^+	[E2]	906		α(L)=658 *10*; α(M)=183 *3*; α(N+..)=64.1 *9* α(N)=50.4 *7*; α(O)=11.84 *17*; α(P)=1.85 *3*; α(Q)=0.00390 *6*
44.8		851.1+x	4^-	806.2+x	2^-	(E2)	7.3×10^2 *5*		α(L)=5.3×10^2 *3*; α(M)=147 *9*; α(N+..)=51 *3* α(N)=40.5 *24*; α(O)=9.5 *6*; α(P)=1.49 *9*; α(Q)=0.00321 *17* Additional information 2. %I(ce(K))≈15.
(45.8[&])		966.5+x	7^-	920.7+x	6^-				
46.72[@] *9*		66.8+x	4^+	20.1+x	2^+	(E2)	593 *10*	0.67×10^{-4} *11*	ce(L)/(γ+ce)=0.725 *9*; ce(M)/(γ+ce)=0.202 *5*; ce(N+)/(γ+ce)=0.0707 *17* ce(N)/(γ+ce)=0.0556 *13*; ce(O)/(γ+ce)=0.0131 *3*; ce(P)/(γ+ce)=0.00204 *5*; ce(Q)/(γ+ce)=4.49×10^{-6} *11* %I(ce(K))=67 (2001Ga05).
57.2		882.8+x	5^-	825.6+x	3^-	(E2)	223 *11*		α(L)=162 *8*; α(M)=45.3 *21*; α(N+..)=15.8 *8* α(N)=12.4 *6*; α(O)=2.93 *14*; α(P)=0.460 *21*; α(Q)=0.00112 *5* Additional information 4. %I(ce(K))≈20.
(69.6)		920.7+x	6^-	851.1+x	4^-				
73.12[@] *12*		139.9+x	6^+	66.8+x	4^+	(E2)	68.9	0.44×10^{-4} *6*	ce(L)/(γ+ce)=0.715 *9*; ce(M)/(γ+ce)=0.200 *4*; ce(N+)/(γ+ce)=0.0700 *16* ce(N)/(γ+ce)=0.0550 *12*; ce(O)/(γ+ce)=0.0129 *3*; ce(P)/(γ+ce)=0.00205 *5*; ce(Q)/(γ+ce)=5.71×10^{-6} *13* %I(ce(K))=44 (2001Ga05).
(83.7[&])		966.5+x	7^-	882.8+x	5^-				
98[&h]	<2	1344.5+x?	1^-	1246.5+x?	1^-				
98.860[‡] *13*	0.039	141.684	4^+	42.824	2^+	E2	16.65	0.70	ce(L)/(γ+ce)=0.685 *7*; ce(M)/(γ+ce)=0.192 *4*;

$^{240}_{94}Pu_{146}$-3

^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

$\gamma(^{240}Pu)$ (continued)

E_γ [†]	I_γ [cd]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [b]	α [f]	$I_{(\gamma+ce)}$	Comments
									ce(N+)/(γ+ce)=0.0671 *13* ce(N)/(γ+ce)=0.0527 *10*; ce(O)/(γ+ce)=0.01242 *24*; ce(P)/(γ+ce)=0.00198 *4*; ce(Q)/(γ+ce)=6.92×10^{-6} *14*
99.35[@] *13*		239.2+x	8$^+$	139.9+x	6$^+$	(E2)	16.27	0.24×10^{-4} *3*	ce(L)/(γ+ce)=0.684 *8*; ce(M)/(γ+ce)=0.191 *4*; ce(N+)/(γ+ce)=0.0670 *14* ce(N)/(γ+ce)=0.0526 *11*; ce(O)/(γ+ce)=0.0124 *3*; ce(P)/(γ+ce)=0.00197 *5*; ce(Q)/(γ+ce)=6.95×10^{-6} *15* %I(ce(K))=24 (2001Ga05).
100.4[&h]	<2	936.4+x?	1$^-$	836.0+x	1$^-$				
126[@h]		364.5+x?	10$^+$	239.2+x	8$^+$			<0.11×10^{-5}	
152.63[‡] *2*	0.132	294.31	6$^+$	141.684	4$^+$	E2	2.49	0.47[e]	ce(K)/(γ+ce)=0.0562 *10*; ce(L)/(γ+ce)=0.477 *5*; ce(M)/(γ+ce)=0.1333 *21*; ce(N+)/(γ+ce)=0.0467 *8* ce(N)/(γ+ce)=0.0366 *7*; ce(O)/(γ+ce)=0.00865 *15*; ce(P)/(γ+ce)=0.001398 *24*; ce(Q)/(γ+ce)=7.92×10^{-6} *14*
203.2[#] *2*	0.159	497.51	8$^+$	294.31	6$^+$	E2	0.805	0.29[e]	ce(K)/(γ+ce)=0.0814 *12*; ce(L)/(γ+ce)=0.265 *4*; ce(M)/(γ+ce)=0.0736 *11*; ce(N+)/(γ+ce)=0.0258 *4* ce(N)/(γ+ce)=0.0202 *4*; ce(O)/(γ+ce)=0.00479 *8*; ce(P)/(γ+ce)=0.000784 *13*; ce(Q)/(γ+ce)=6.64×10^{-6} *11* E_γ: 203.3 *3* (1972Sp06).
216.5 *5*	0.7	806.2+x	2$^-$	589.7+x	3$^-$				
250.3[#] *2*	0.050	747.8	(10$^+$)	497.51	8$^+$	E2	0.382	0.07[e]	ce(K)/(γ+ce)=0.0766 *11*; ce(L)/(γ+ce)=0.1456 *19*; ce(M)/(γ+ce)=0.0402 *6*; ce(N+)/(γ+ce)=0.01409 *21* ce(N)/(γ+ce)=0.01103 *17*; ce(O)/(γ+ce)=0.00262 *4*; ce(P)/(γ+ce)=0.000434 *7*; ce(Q)/(γ+ce)=5.01×10^{-6} *8* E_γ: 253.8 *6* (1972Sp06).
251.5 *2*	1.3	806.2+x	2$^-$	554.7+x	1$^-$				
294.0[#] *2*		1041.8	(12$^+$)	747.8	(10$^+$)				
333.8[#] *4*		1375.6	(14$^+$)	1041.8	(12$^+$)				
403[&h]	0.05	1322.0+x?	4$^-$	918.8+x	5$^-$				
406.4[&h]	0.1	1366.5+x?	6$^-$	960.7+x	6$^-$				
408.1[&h]		1344.5+x?	1$^-$	936.4+x?	1$^-$	(E0)			%I(ce(K))<0.3 for 408.1+408.4.
408.4[&h]		1360.9+x	2$^-$	952.5+x?	2$^-$	(E0)			%I(ce(K))<0.3 for 408.1+408.4.
409.2[&h]		1421.4+x	4$^-$	1012.2+x?	4$^-$	(E0)			%I(ce(K))=0.2.
409.7[&h]		1518.7+x	6$^-$	1109.0+x?	6$^-$	(E0)			%I(ce(K))=0.2. Additional information 6.
410.5[&h]		1246.5+x?	1$^-$	836.0+x	1$^-$	(E0)			%I(ce(K))=1.2.
414.2[&h]		1261.0+x?	2$^-$	846.8+x	2$^-$	(E0)			%I(ce(K))=0.8.
415.7[&h]		1386.6+x	3$^-$	970.6+x?	3$^-$	(E0)			I(ce(K))=0.2.
418.6[&h]		1580.5+x	7$^-$	1161.5+x?	7$^-$	(E0)			Additional information 7. %I(ce(K))=0.2.

$^{240}_{94}Pu_{146}$-4

^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

$\gamma(^{240}Pu)$ (continued)

E_γ †	I_γ cd	E_i(level)	J_i^π	E_f	J_f^π	Mult. b	Comments
420 &h		1287.0+x?	3^-	866.0+x	3^-	(E0)	%I(ce(K))=1.0.
425.5 &h		1261.0+x?	2^-	836.0+x	1^-		%I(ce(K))=0.4.
440.3 &h	0.1	1287.0+x?	3^-	846.8+x	2^-		
454.8 &h	0.2	1322.0+x?	4^-	866.0+x	3^-		
508.4	0.5	1344.5+x?	1^-	836.0+x	1^-	(E0)	%I(ce(K))<0.05 (2001Ga05).
514.8 a *15*	0.8	1360.9+x	2^-	846.8+x	2^-	(E0)	%I(ce(K))=0.3 (2001Ga05). I_γ: from 2001Th16.
520.4 a *14*	<0.8	1386.6+x	3^-	866.0+x	3^-	(E0)	%I(ce(K))=0.4.
525	0.5	1360.9+x	2^-	836.0+x	1^-		
529.0 a *1*	2	1421.4+x	4^-	891.2+x	4^-	(E0)	%I(ce(K))=0.4.
534.6	0.2	554.7+x	1^-	20.1+x	2^+		
535.2 *2*	1.2 *3*	1360.9+x	2^-	825.6+x	3^-		
535.5 *3*	1.1 *3*	1386.6+x	3^-	851.1+x	4^-		
538 *1*	<1.5	1344.5+x?	1^-	806.2+x	2^-		I_γ: 538γ and 538.6γ are unresolved. Iγ=1.5 *2* for 538.6 from 1344.5- and 1465.7.
538.6 *2*	<1.5	1421.4+x	4^-	882.8+x	5^-		I_γ: 1.5 *2* for 538.6+538.
543.6 a *12*		1465.7+x	5^-	918.8+x	5^-	(E0)	%I(ce(K))=0.3. I_γ: from 2001Th16. E_γ: poor fit in the level scheme. Level-energy difference=546.9 *7*. 2001Th16 give 545.3. Additional information 5.
545 *1*	0.7	1465.7+x	5^-	920.7+x	6^-		
554.3 *4*	<2.7	1518.7+x	6^-	966.5+x	7^-		I_γ: 2.7 *3* for 554.3+554.7+554.8.
554.7	<1.5	554.7+x	1^-	x	0^+		I_γ: 2.7 *3* for 554.3+554.7+554.8.
554.8 a *2*	2.7 *3*	1360.9+x	2^-	806.2+x	2^-	(E0)	I_γ: 2.7 *3* for 554.3+554.7+554.8. %I(ce(K))<0.1.
556.5 a *1*	2	1518.7+x	6^-	960.7+x	6^-	(E0)	%I(ce(K))=0.3.
561.0 a *2*	1.8 *3*	1386.6+x	3^-	825.6+x	3^-	(E0)	%I(ce(K))=0.1.
569.6	>0.7	589.7+x	3^-	20.1+x	2^+		
570.3 a *4*	3.5 *5*	1421.4+x	4^-	851.1+x	4^-	(E0)	%I(ce(K))=0.2.
581.8 a *12*		1580.5+x	7^-	998.3+x	7^-	(E0)	%I(ce(K))=0.2.
582.9 a *2*	1.1 *3*	1465.7+x	5^-	882.8+x	5^-	(E0)	%I(ce(K))<0.1.
595.1 ah *18*		1654.7+x?	8^-			(E0)	
598.0 a *5*	0.8	1518.7+x	6^-	920.7+x	6^-	(E0)	
600.0 &h		1654.7+x?	8^-	1054.9+x	8^-	(E0)	%I(ce(K))=0.4.
614.0 a *5*	0.5	1580.5+x	7^-	966.5+x	7^-	(E0)	%I(ce(K))<0.07.
628.3 a *13*		1732+x?	9^-	1104+x?	9^-	(E0)	%I(ce(K))=0.4.
636 &h	0.5	1654.7+x?	8^-	1019+x?	8^-		
644.9 a *14*		1816+x?	10^-	1172+x?	10^-	(E0)	%I(ce(K))=0.2.
655 &h	0.5	1732+x?	9^-	1078+x?	9^-		
678.0 &h		1910.0+x?	11^-	1232+x?	11^-	(E0)	E_γ: from e-mail reply from P.G. Thirolf (Nov 4, 2003); 672.0 in 2001Th16 is a misprint. %I(ce(K))=0.1.

$^{240}_{94}Pu_{146}$-5

^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

$\gamma(^{240}Pu)$ (continued)

E_γ †	I_γ cd	E_i(level)	J_i^π	E_f	J_f^π	Mult. b	α f	Comments
714.7 &h 3	0.2	1232+x?	11^-	516.9+x?	12^+			
739.6 a 14		1104.2+x?	10^+	364.5+x?	10^+	(E0)		%I(ce(K))=0.12.
739.8 &h 3	0.3	1104+x?	9^-	364.5+x?	10^+			
747.6 a 13		986.8+x	8^+	239.2+x	8^+	(E0)		%I(ce(K))=0.19.
752.5 a 12		892.4+x	6^+	139.9+x	6^+	(E0)		%I(ce(K))=0.20.
758.2 a 11		825.0+x	4^+	66.8+x	4^+	(E0)		%I(ce(K))=0.36.
758.9 2	<1.6	825.6+x	3^-	66.8+x	4^+			I_γ: 1.6 3 for 758.9 doublet.
758.9 2	<1.6	998.3+x	7^-	239.2+x	8^+			I_γ: 1.6 3 for 758.9 doublet.
765.0 a 11		785.1+x	2^+	20.1+x	2^+	(E0)		%I(ce(K))=0.49.
769.9 a 10		769.9+x	0^+	x	0^+	(E0)		%I(ce(K))=0.33.
778.9 3	1.2 3	918.8+x	5^-	139.9+x	6^+			
786.1 a 1	36.6 9	806.2+x	2^-	20.1+x	2^+	E1	0.00618	α(K)exp=0.0046 17 (2001Ga05) α(K)=0.00502 7; α(L)=0.000883 13; α(M)=0.000211 3; α(N+..)=7.40×10^{-5} 11 α(N)=5.71×10^{-5} 8; α(O)=1.411×10^{-5} 20; α(P)=2.63×10^{-6} 4; α(Q)=1.616×10^{-7} 23 %I(ce(K))=0.20 (2001Ga05). I_γ: intensity of this line is ten times larger than any other transition In the second minimum.
799 1	0.9 2	866.0+x	3^-	66.8+x	4^+			
805.4 2	2.3 3	825.6+x	3^-	20.1+x	2^+			
815.7 3	1.7 3	1054.9+x	8^-	239.2+x	8^+			
816 1	1.7 3	836.0+x	1^-	20.1+x	2^+			
820.8 2	1.8 3	960.7+x	6^-	139.9+x	6^+			
824.4 3	2.6 4	891.2+x	4^-	66.8+x	4^+			
826.7 3	3.2 4	846.8+x	2^-	20.1+x	2^+			
836 1	0.5 3	836.0+x	1^-	x	0^+			
846 1	0.6 3	866.0+x	3^-	20.1+x	2^+			
852.0 5	0.5 2	918.8+x	5^-	66.8+x	4^+			
858.7 3	0.5 2	998.3+x	7^-	139.9+x	6^+			
904.1 &h	<0.15	970.6+x?	3^-	66.8+x	4^+			
904.1 &h	<0.15	1044.0+x?	5^-	139.9+x	6^+			
922.3 &h	0.05	1161.5+x?	7^-	239.2+x	8^+			
932.4 &h	0.05	952.5+x?	2^-	20.1+x	2^+			
936.4 &h	<0.2	936.4+x?	1^-	x	0^+			
936.4 &h	<0.2	1300.9+x?	9^-	364.5+x?	10^+			
944.9 &h	<0.2	1461.8+x?	11^-	516.9+x?	12^+			
945.4 &h	<0.2	1012.2+x?	4^-	66.8+x	4^+			
969.1 &h	0.2	1109.0+x?	6^-	139.9+x	6^+			
991.2 &h	0.2	1230.4+x?	8^-	239.2+x	8^+			

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^{238}U(α,2nγ) 2001Ga05,2000Pa40,1972Sp06 (continued)

$\gamma(^{240}Pu)$ (continued)

E_γ †	I_γ cd	E_i(level)	J_i^π	E_f	J_f^π	Comments
1018.4 &h	0.2	1382.9+x?	10^-	364.5+x?	10^+	
1220.0 &h	0.2	1287.0+x?	3^-	66.8+x	4^+	
1226.5 g &h	<0.5 g	1246.5+x?	1^-	20.1+x	2^+	
1226.5 g &h	<0.5 g	1366.5+x?	6^-	139.9+x	6^+	
1241.0 &h	0.1	1261.0+x?	2^-	20.1+x	2^+	
1246.5 g &h	<0.7 g	1246.5+x?	1^-	x	0^+	
1246.5 g &h	<0.7 g	1485.5+x?	7^-	239.2+x	8^+	
1255 &h	0.3	1322.0+x?	4^-	66.8+x	4^+	
1276 &h	0.2	1641.5+x?	9^-	364.5+x?	10^+	
1281 &h	0.5	1421.0+x?	6^-	139.9+x	6^+	
1318 &h	0.2	1835.0+x?	11^-	516.9+x?	12^+	
1319.9	0.46	1386.6+x	3^-	66.8+x	4^+	
1320 &h	0.2	1559.0+x?	8^-	239.2+x	8^+	
1324.5 g &h	<0.24 g	1344.5+x?	1^-	20.1+x	2^+	
1324.5 g &	<0.24 g	1465.7+x	5^-	139.9+x	6^+	
1341	<0.6	1360.9+x	2^-	20.1+x	2^+	
1341.3 &h	<0.6	1580.5+x	7^-	239.2+x	8^+	
1355	0.8	1421.4+x	4^-	66.8+x	4^+	
1369 &h	0.15	1732+x?	9^-	364.5+x?	10^+	
1369 &h	0.4	1733.5+x?	10^-	364.5+x?	10^+	E_γ: from e-mail reply from P.G. Thirolf (Nov 4, 2003); 1356 in 2001Th16 is a misprint.
1379.5	0.14	1518.7+x	6^-	139.9+x	6^+	
1393 &h	0.1	1910.0+x?	11^-	516.9+x?	12^+	
1414.3 &h	0.2	1654.7+x?	8^-	239.2+x	8^+	
1454.0 &h	0.2	1816+x?	10^-	364.5+x?	10^+	
1494.0 &h	0.05	2011.0+x?	12^-	516.9+x?	12^+	

† From 2001Ga05 for transitions In the second minimum, unless otherwise stated.
‡ From 'adopted gammas'.
# From 1983Ha31.
@ From 1972Sp06.
& Tentative transition from 2001Th16 only.
a Transition seen in ce data (2001Ga05). Absolute K-shell intensity, if available, is given under comments.
b Based on α(L2), α(L3), α(M2), α(M3) data of 1972Sp06 for γ's of second minimum. The ground-state band multipolarities are taken from 1983Ha31. The E0 assignment is from ce data of 2001Ga05 and 2001Th16. Except for the 769.9 (0^+ to 0^+) transition, all other transitions are likely to have M1+E2 components;

$^{240}_{94}Pu_{146}$-7

$\gamma(^{240}Pu)$ (continued)

the evaluators have placed all these assignments in parentheses since conversion coefficients are not available.

[c] For SD bands, intensities are per 100 fissions of the isomer (2001Ga05,2001Th16). For transitions in SD bands where dominant decay seems to be through E0, absolute K-shell intensities (2001Ga05,2001Th16) are given under comments. The transition intensities in these cases will be ≈1.2 times the K-shell intensity and undetected photon intensity for ΔJ=1 transitions. Normalization is based on the number of delayed fission events.

[d] Additional information 8.

[e] Normalized to 0.70 for 98.86γ transition in the g.s. band. The ratio of I(γ+ce)′s in g.s. to I(γ+ce)′s in second minimum is approximate and based on cross sections (see, for example, 1973Na03).

[f] 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.

[g] Multiply placed with undivided intensity.

[h] Placement of transition in the level scheme is uncertain.

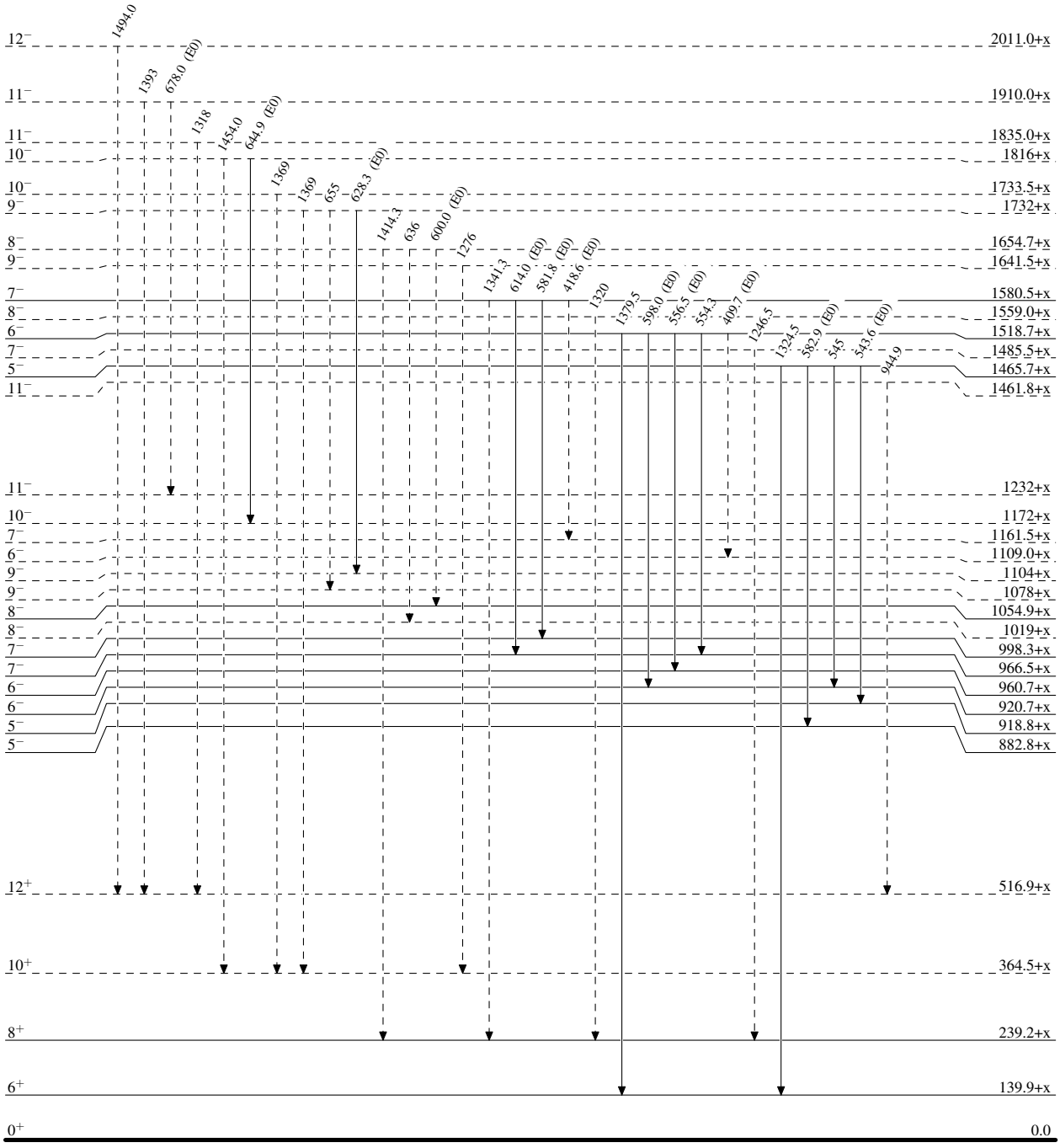
$^{238}U(\alpha,2n\gamma)$ **2001Ga05,2000Pa40,1972Sp06**

Level Scheme

Intensities: Relative $I_{(\gamma+ce)}$

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)



$^{240}_{94}Pu_{146}$

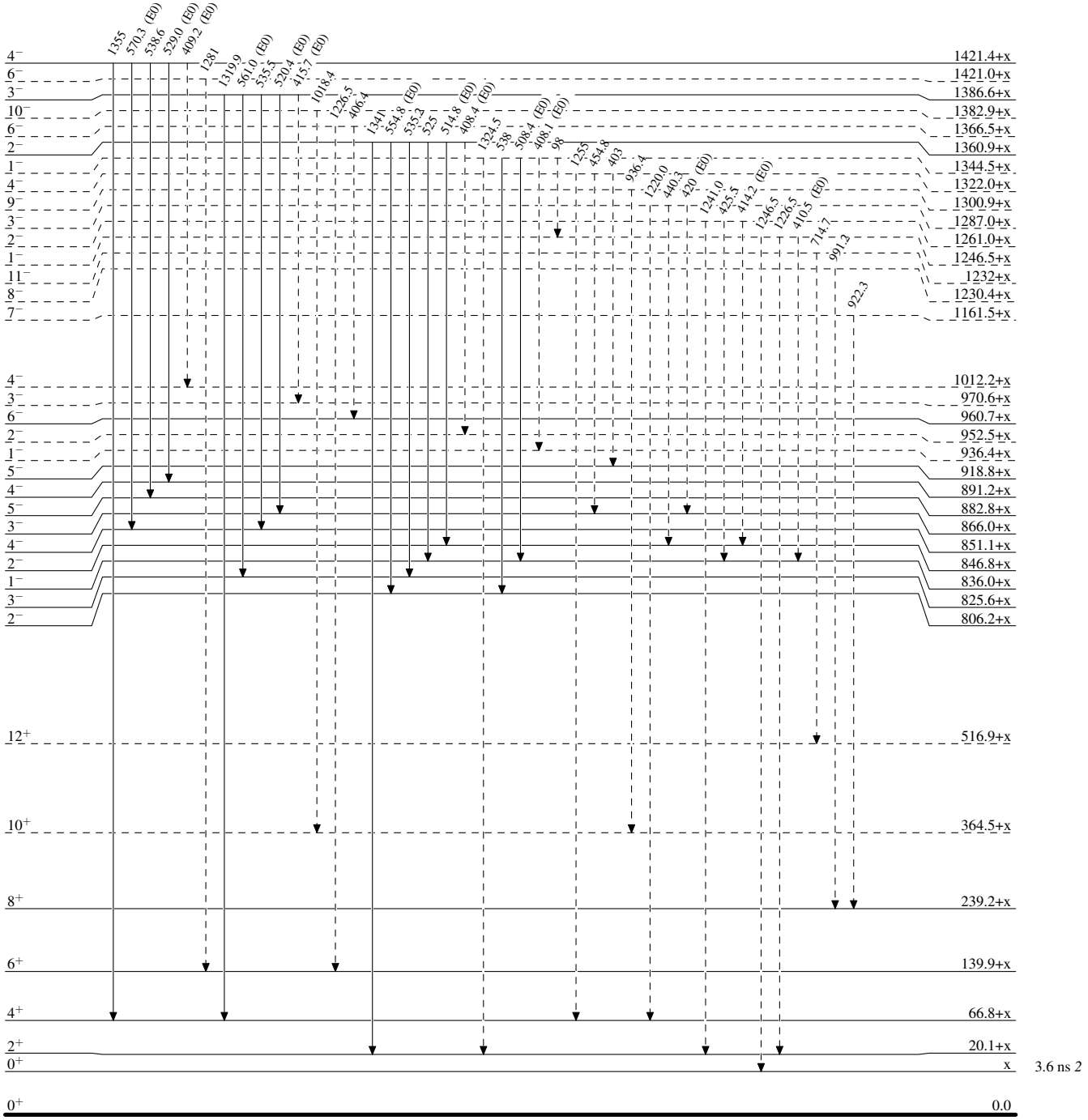
^{238}U(α,2nγ) **2001Ga05,2000Pa40,1972Sp06**

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)

Level Scheme (continued)

Intensities: Relative $I_{(\gamma+ce)}$



$^{240}_{94}Pu_{146}$

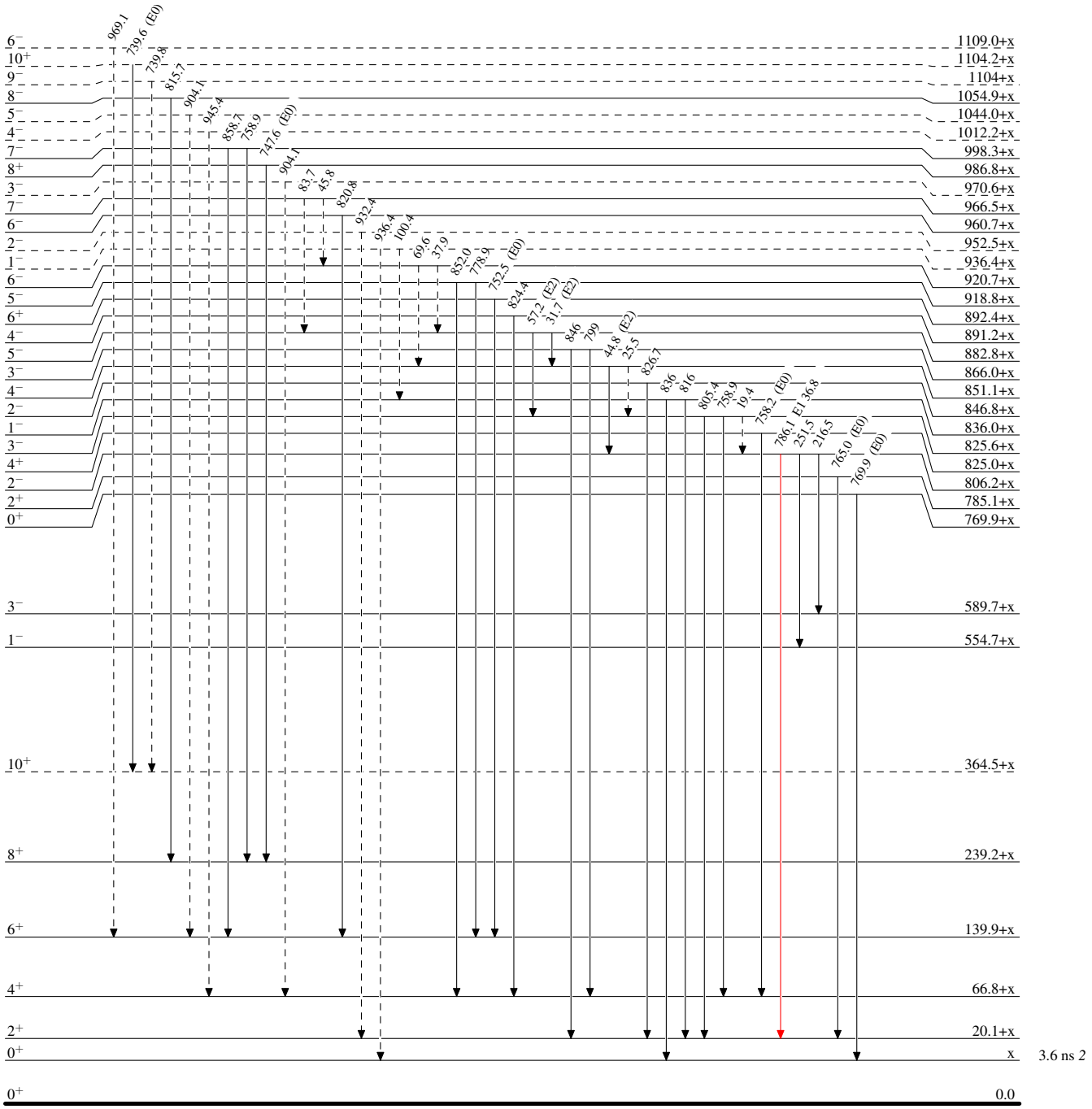
^{238}U(α,2nγ) **2001Ga05,2000Pa40,1972Sp06**

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)

Level Scheme (continued)

Intensities: Relative $I_{(\gamma+ce)}$



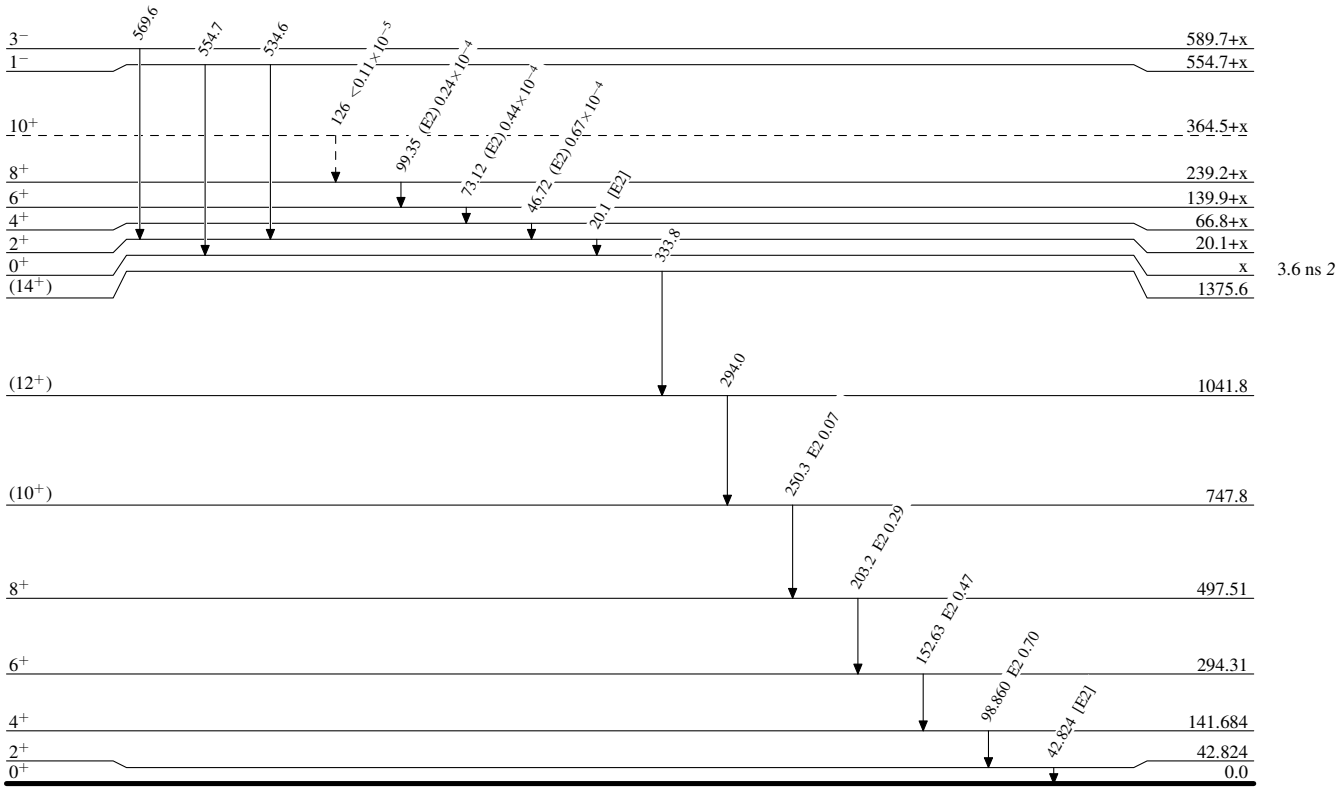
$^{240}_{94}Pu_{146}$

$^{238}U(\alpha,2n\gamma)$ 2001Ga05,2000Pa40,1972Sp06

Level Scheme (continued)

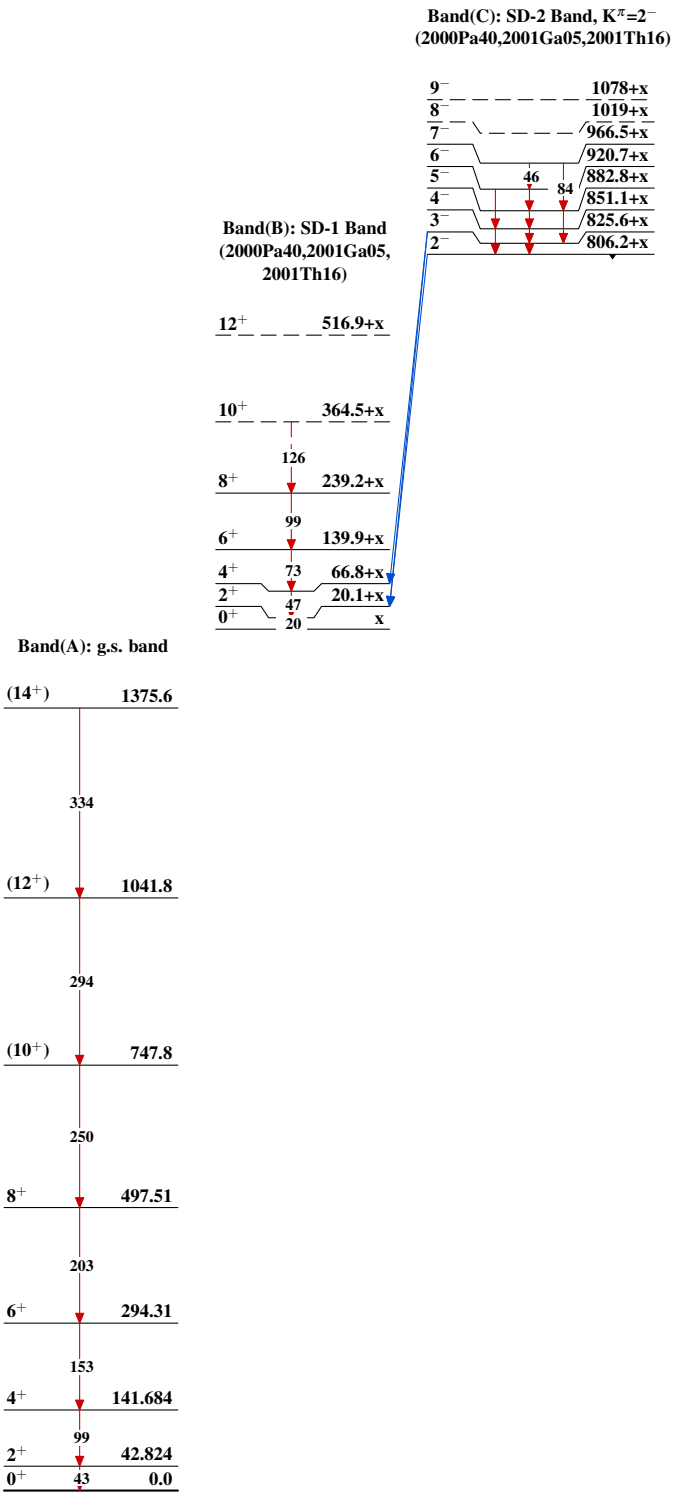
Intensities: Relative $I_{(\gamma+ce)}$

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)



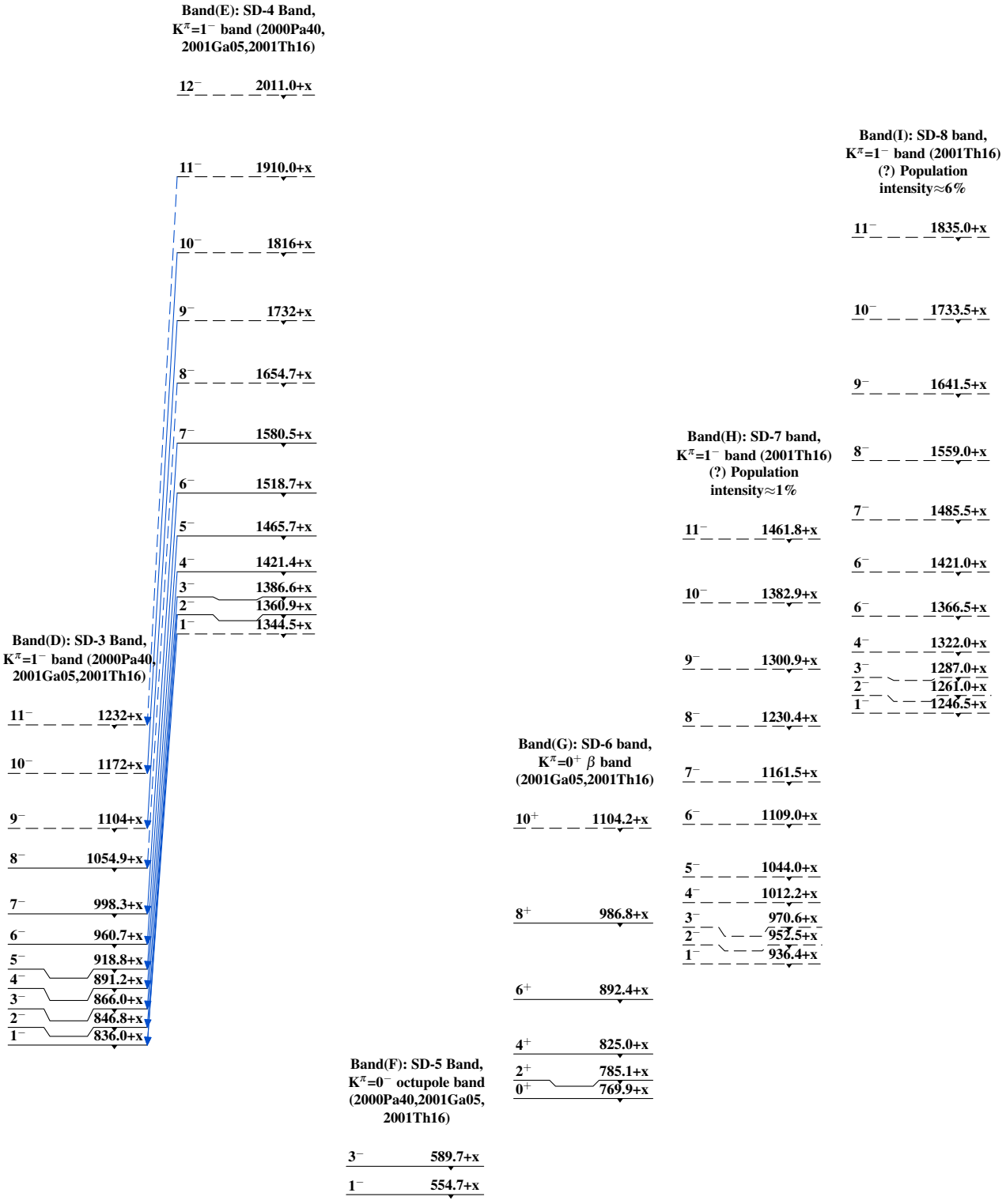
$^{240}_{94}Pu_{146}$

$^{238}U(\alpha,2n\gamma)$ 2001Ga05,2000Pa40,1972Sp06



$^{240}_{94}Pu_{146}$

$^{238}U(\alpha,2n\gamma)$ 2001Ga05,2000Pa40,1972Sp06 (continued)



$^{240}_{94}Pu_{146}$