Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Alexandru Negret, Balraj Singh	NDS 124, 1 (2015)	30-Nov-2014

Q(β^-)=−8836 *7*; S(n)=12866 *7*; S(p)=7416 *19*; Q(α)=−4384 *7* 2012Wa38
S(2n)=22691 *7*, S(2p)=11897 *4* (2012Wa38).
^{86}Zr first identified by 1951Hy24. Later work by 1964Aw02.
Additional information 1.

^{86}Zr Levels

See 2000Ga57 for analysis of high-spin states.
Static magnetic moments are from transient-field method used by 1995Mo02 and 1999Te02 in in-beam reactions. For yrast states 2^+ to 16^+, g factors have also been measured by 2001Zh44 but with large uncertainties.

Cross Reference (XREF) Flags

A	^{86}Nb ε decay (88 s)	E	^{58}Ni(^{31}P,3pγ):SD
B	^{87}Mo εp decay (13.4 s)	F	^{58}Ni(^{32}S,4pγ)
C	^{12}C(^{77}Se,3nγ),^{60}Ni(^{30}Si,2p2nγ)	G	^{84}Sr(α,2nγ),^{86}Sr(^{3}He,3nγ)
D	^{60}Ni(^{29}Si,2pnγ),^{76}Se(^{12}C,2nγ)		

E(level)	J$^{\pi}$[†]	T$_{1/2}$[‡]	XREF	Comments
0.0[&]	0^+	16.5 h *1*	ABCD FG	%ε+%β^+=100 T$_{1/2}$: from 1964Aw02. Other: 17 h *2* (1951Hy24).
751.75[&] *3*	2^+	7.5 ps *14*	ABCD FG	μ=+1.0 *10* (2001Zh44) J$^{\pi}$: E2 γ to 0^+. T$_{1/2}$: average of 7.8 ps *19* (RDM in ^{58}Ni(^{32}S,4pγ), 1998Ka19); and 7.3 ps *14* (RDM in ^{73}Ge(^{16}O,3nγ), 1978Av02). μ: IMPAD method (2001Zh44).
1421.77 *5*	(2^+)		A G	J$^{\pi}$: γ rays to 0^+ and 2^+; syst of even-even nuclides.
1666.57[&] *6*	4^+	5.4 ps *24*	ABCD FG	μ=+2.0 *20* (2001Zh44) J$^{\pi}$: ΔJ=2, E2 γ to 2^+. T$_{1/2}$: from RDM (1998Ka19). Other: 6.0 ps *27* (1978Av02). μ: IMPAD method (2001Zh44).
2041.90 *9*	$(0^+$ to $4^+)$		A G	J$^{\pi}$: γ to 2^+.
2343.74 *7*	$(4^+,3^-)$		A G	J$^{\pi}$: γ rays to (2^+) and 4^+; γ from (5^-). J$^{\pi}$=4^+ is preferred by 2000DoZV from some evidence of feeding of this level from 3030 of J$^{\pi}$=$5^+,6^+$.
2566.1? *3*			G	J$^{\pi}$: γ to (2^+).
2669.88[&] *7*	6^+	8.5 ps *34*	ABCD FG	μ=+0.6 *42* (2001Zh44) J$^{\pi}$: ΔJ=2, E2 γ to 4^+. T$_{1/2}$: from RDM (1998Ka19). Other: 8 ps *4* (1978Av02). μ: IMPAD method (2001Zh44).
2704.9? *10*			G	
2705.62[c] *7*	(5^-)	6.7 ps *12*	A CD FG	J$^{\pi}$: ΔJ=1, (E1) γ to 4^+. T$_{1/2}$: from RDM (1978Av02). Other: 14 ps *7* (1998Ka19, effective half-life). g=+0.46 *21* (1995Mo02, average value for 2705.6, 3424.0 and 4430 levels, transient-field method).
3016.87 *7*	(5^-)	<15[@] ps	A D FG	J$^{\pi}$: γ to (5^-), γ from (7^-).
3029.49 *11*			A	
3029.64 *7*	$(5^+,6^+)$		A D G	J$^{\pi}$: γ rays to 4^+ and 6^+; $\gamma(\theta)$.
3254.38 *8*	$(4^+,5,6^+)$		A	J$^{\pi}$: γ rays to 4^+ and 6^+.

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{86}Zr Levels (continued)

E(level)	J^{π}[†]	$T_{1/2}$[‡]	XREF	Comments
3271.97[d] *8*	(6⁻)		CD FG	J^{π}: ΔJ=1 γ to (5⁻).
3298.44[&] *8*	8⁺	46 ps *6*	A CD FG	μ=+2.2 *37* (1999Te02,2014StZZ) μ: recoil distance transient-field method (1999Te02). Others: −0.2 *26* (1999Te02), −0.24 *72* (1995We03, IMPAD method), −8 *5* (1995Mo02, transient-field), −8.8 *56* (2001Zh44, IMPAD method). J^{π}: ΔJ=2, E2 γ to 6⁺. $T_{1/2}$: from RDM (1998Ka19). Others: 62 ps *7* (1985Wa10), 62 ps *6* (1978Av02). 1998Ka19 point out that the omission of the data points beyond 2 mm distance gives $T_{1/2}$≈65 ps. Alignment in $\nu g_{9/2}$ quasiparticles is inferred (1995Mo02).
3417.65 *10*	(4⁺,5,6⁺)		A	J^{π}: γ rays to 4⁺ and 6⁺.
3423.32[c] *8*	(7⁻)	6.8 ps *15*	CD FG	g=+0.46 *21* (1995Mo02, average value for 2705.6, 3424.0 and 4430 levels, transient-field method). J^{π}: ΔJ=2, (E2) γ to (5⁻). $T_{1/2}$: average of 5.3 ps *21* (1998Ka19) and 8.3 ps *14* (1985Wa10).
3532.64[a] *8*	8⁺	3.3 ps *7*	CD FG	μ=+15 *12* (1999Te02,2014StZZ) μ: recoil distance transient-field method (1999Te02). Other: g=+1.06 *22* (1995Mo02, average value for 3532.6 and 4419.0 levels, transient-field). J^{π}: ΔJ=0, M1(+E2) to 8⁺. $T_{1/2}$: from RDM (1998Ka19). Other:<3 ps (1985Wa10).
3646.36 *8*	(7⁻)	<7[@] ps	D FG	J^{π}: ΔJ=0, dipole γ to (7⁻).
3792.59 *9*	(7)		D G	J^{π}: ΔJ=1 γ to 8⁺, possible γ to 6⁺.
4133.68[d] *12*	(8⁻)		CD FG	J^{π}: ΔJ=1 γ to (7⁻); γ to (6⁻).
4326.12[&] *9*	10⁺	2.1[@] ps *4*	CD FG	μ=−7 *11* (1999Te02,2014StZZ) μ: recoil distance transient-field method (1999Te02). Others: −13 *9* (2001Zh44, IMPAD), −5 *10* (1995Mo02, transient-field). J^{π}: ΔJ=2 E2 γ to 8⁺. $T_{1/2}$: other: 2.2 ps *7* (1998Ka19).
4418.56[a] *9*	10⁺	9[@] ps *3*	CD FG	g=+1.06 *22* (1995Mo02, average value for 3532.6 and 4419.0 levels, transient-field). J^{π}: ΔJ=2, E2 γ to 8⁺. $T_{1/2}$: other: 7.6 ps *28* (1998Ka19,effective half-life).
4429.35[c] *10*	(9⁻)	7.6[@] ps *14*	CD FG	g=+0.46 *21* (1995Mo02, average value for 2705.6, 3424.0 and 4430 levels, transient-field method). J^{π}: ΔJ=2, E2 γ to (7⁻). $T_{1/2}$: other: 7.6 ps *28* (1998Ka19,effective half-life).
4637	(9⁻)		F	J^{π}: γ rays to (7⁻) and (9⁻).
4697	(9⁻)		F	J^{π}: γ transitions from (11⁻) and to (9⁻).
5067[d]	(10⁻)		C F	J^{π}: γ to (8⁻).
5233.55[b] *13*	(11⁻)	12[@] ps *6*	D FG	J^{π}: ΔJ=1 γ to 10⁺; γ to (9⁻).
5388.70[c] *11*	(11⁻)	2.8[@] ps *7*	CD FG	J^{π}: E2 γ to (9⁻).
5396.40[&] *9*	(12⁺)	2.6[@] ps *6*	CD FG	μ=−20 *9* (1999Te02,2014StZZ) μ: recoil distance transient-field method (1999Te02). Others: −4 *10* (1995Mo02, transient-field), −3.6 *72* (2001Zh44, IMPAD). J^{π}: ΔJ=2, (E2) γ to 10⁺. $T_{1/2}$: other: 3.5 ps *14* (1998Ka19,effective half-life).
5524.3[a] *8*	(12⁺)	0.34[#] ps *+10−7*	C F	μ=+6.6 *16* (1995Mo02,2014StZZ) μ: transient-field method (1995Mo02). J^{π}: γ to 10⁺.
5646.5 *4*			D G	J^{π}: γ to 10⁺.
5974.74[d] *15*	(12⁻)	<1.5[@] ps	CD FG	J^{π}: ΔJ=1 γ to (11⁻).
6232.28[b] *16*	(13⁻)	4.2[@] ps *7*	D F	J^{π}: ΔJ=2, E2 γ to (11⁻).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{86}Zr Levels (continued)

E(level)	J$^\pi$†	T$_{1/2}$‡	XREF	Comments
6286	(13$^+$)	0.55 ps +12−13	F	J$^\pi$: γ to (12$^+$).
6321.08& 10	(14$^+$)	5.2@ ps 6	CD FG	μ=+30 8 (1999Te02,2014StZZ) μ: recoil distance transient-field method (1999Te02). Others: +26 8 (1995Mo02, transient field), +28 6 (1998Ju10, recoil distance transient-field), +11 13 (2001Zh44, IMPAD). J$^\pi$: ΔJ=2, E2 γ to (12$^+$).
6339.9c 4	(13$^-$)		CD F	J$^\pi$: ΔJ=(2) γ to (11$^-$).
6462	(13$^-$)		F	J$^\pi$: γ to (12$^-$).
6752.4a 13	(14$^+$)	0.31# ps 6	C F	J$^\pi$: γ rays to (12$^+$) and (14$^+$).
6794	(14$^+$)		F	J$^\pi$: γ to (13$^+$).
7015.33 14	(15$^+$)	0.40# ps 8	CD F	T$_{1/2}$: others:<0.7 ps (1985Wa10), 0.55 +14−2 ps (1991Ch40). J$^\pi$: ΔJ=1, (M1+E2) γ to (14$^+$).
7061	(14$^-$)		F	J$^\pi$: γ to (13$^-$).
7345b	(15$^-$)		F	J$^\pi$: (Q) transition to (13$^-$), γ ray to (14$^-$).
7396.46& 24	(16$^+$)	0.33# ps +6−4	CD F	μ=+14 14 (2001Zh44) J$^\pi$: ΔJ=1, (M1+E2) γ to (15$^+$); γ to (14$^+$). T$_{1/2}$: others:<1.0 ps (1985Wa10), 0.59 ps +14−2 (1991Ch40). μ: IMPAD method.
7470c	(15$^-$)	0.64# ps +17−12	F	
7640	(15$^-$)	1.23# ps +19−12	F	
7954	(16$^+$)	0.53# ps +15−9	F	
8145a	(16$^+$)	0.19# ps +8−5	F	
8212e	(16$^-$)	0.22# ps +5−4	F	
8248.7 7	(17$^+$)	0.194# ps 21	C F	T$_{1/2}$: other: 0.15 +10−2 ps (1991Ch40).
8575b	(17$^-$)	0.67# ps +6−5	F	
8650.0& 8	(18$^+$)	0.201# ps 14	C F	T$_{1/2}$: other: 0.23 +5−2 ps (1991Ch40).
8671c	(17$^-$)		F	
9373e	(18$^-$)	0.33# ps +11−8	F	
9533	(18$^-$)	0.34# ps +17−9	F	
9653a	(18$^+$)	0.37# ps +9−8	F	
9880b	(19$^-$)	0.17# ps +4−3	F	
9891.9 9	(19$^+$)	0.229# ps +28−21	C F	T$_{1/2}$: other: 0.07 +8−2 ps (1991Ch40).
10142.9& 11	(20$^+$)	0.132# ps 14	C F	T$_{1/2}$: other: 0.28 +8−3 ps (1991Ch40).
10207	(19$^-$)	0.33# ps +7−5	F	
10795e	(20$^-$)	0.15# ps 5	F	
10918	(20$^+$)	0.10# ps +6−5	F	
11175	(20$^+$)	0.049 ps +35−28	F	T$_{1/2}$: from DSAM (2003Wi03).
11176	(20$^-$)	0.24# ps +17−12	F	
11232b	(21$^-$)	0.24# ps 4	F	
11756	(21$^-$)	0.11# ps +6−5	F	
12060.9& 15	(22$^+$)	0.062# ps +21−28	C F	T$_{1/2}$: other: 0.06 +7−3 ps (1991Ch40).
12359e	(22$^-$)	0.180# ps 21	F	
12606	(22$^+$)	0.12# ps 5	F	
12741b	(23$^-$)	0.17# ps 4	F	
14149.0& 18	(24$^+$)	0.055# ps 14	C F	T$_{1/2}$: other: 0.06 +8−4 ps (1991Ch40).
14164e	(24$^-$)		F	
14377b	(25$^-$)	0.27# ps +5−4	F	
16050&	(26$^+$)	0.028# ps +14−7	F	

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{86}Zr Levels (continued)

E(level)	J$^{\pi}$ †	$T_{1/2}$ ‡	XREF	Comments
16617[b]	(27$^-$)	0.083[#] ps *+35−21*	F	
18063[&]	(28$^+$)	0.049[#] ps *14*	F	
20532[&]	(30$^+$)	0.042[#] ps *14*	F	
x[f]	J1≈(23)		E	J$^{\pi}$: estimated spin from decay to normal states=21.7 *15* (1998Sa01).
1518+x[f]	J1+2		E	
3164+x[f]	J1+4		E	
4949+x[f]	J1+6		E	
6878+x[f]	J1+8		E	
8955+x[f]	J1+10		E	
11183+x[f]	J1+12		E	
13566+x[f]	J1+14		E	
16106+x[f]	J1+16		E	
18802+x[f]	J1+18		E	
y[g]	J2≈(22)		E	
1577+y[g]	J2+2		E	
3307+y[g]	J2+4		E	
5198+y[g]	J2+6		E	
7254+y[g]	J2+8		E	
9481+y[g]	J2+10		E	
11874+y[g]	J2+12		E	
14388+y[g]	J2+14		E	
16950+y[g]	J2+16		E	
19658+y?[g]	J2+18		E	
z[h]	J3≈(25)		E	
1866+z[h]	J3+2		E	
3825+z[h]	J3+4		E	
5887+z[h]	J3+6		E	
8042+z[h]	J3+8		E	
10286+z[h]	J3+10		E	
12629+z[h]	J3+12		E	
15058+z?[h]	J3+14		E	
u[i]	J4≈(23)		E	
1648+u[i]	J4+2		E	
3459+u[i]	J4+4		E	
5426+u[i]	J4+6		E	
7549+u[i]	J4+8		E	
9822+u[i]	J4+10		E	
12225+u[i]	J4+12		E	
14716+u[i]	J4+14		E	

† For high-spin states, the assignments are based on $\gamma(\theta)$ and $\gamma\gamma(\theta)$ data in in-beam reactions, γ-ray cascades based on $\gamma\gamma$ data with the general assumption that spins tend to increase with excitation energies, and decay modes.

‡ For excited states below 7 MeV, values are from recoil-distance method (RDM) used by 1998Ka19, 1985Wa10 and 1978Av02 in different in-beam γ-ray studies. Above 7 MeV, values are from Doppler-shift attenuation method (DSA) in ^{60}Ni(^{30}Si,2p2nγ) (1991Ch40). Exceptions are noted.

From DSAM in ^{58}Ni(^{32}S,4pγ) (2003Wi03).

Continued on next page (footnotes at end of table)

Adopted Levels, Gammas (continued)

^{86}Zr Levels (continued)

[@] From RDM in ^{60}Ni(^{29}Si,2pnγ) (1985Wa10).
[&] Band(A): γ-sequence based on ground state.
[a] Band(B): band based on 8^+. Alignment of $\pi g_{9/2}$ is indicated with slightly oblate or spheroid shape (1995Mo02).
[b] Band(C): band based on (11^-).
[c] Band(D): γ-sequence based on (5^-).
[d] Band(E): γ-sequence based on (6^-).
[e] Band(F): band based on (16^-).
[f] Band(G): (Triaxial) SD-1 band (1998Sa01). Q(intrinsic)=4.6 *+7−6* (1998Sa01). Percent population (relative to ^{86}Zr channel)=2.0 *2*.
[g] Band(H): (Triaxial) SD-2 band (1998Sa01). Q(intrinsic)=4.0 *3* (1998Sa01). Percent population (relative to ^{86}Zr channel)=0.6 *1*.
[h] Band(I): (Triaxial) SD-3 band (1998Sa01). Q(intrinsic)=5.4 *+22−11* (1998Sa01). Percent population (relative to ^{86}Zr channel)=0.5 *1*.
[i] Band(J): (Triaxial) SD-4 band (1998Sa01). Q(intrinsic)=3.8 *+6−5* (1998Sa01). Percent population (relative to ^{86}Zr channel)=0.24 *8*.

$\gamma(^{86}Zr)$

B(E2)(W.u.): uncertainties were calculated by the evaluator considering the $T_{1/2}$ uncertainties as upper and lower limits.

E_i(level)	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. ‡	δ	α #	Comments
751.75	2^+	751.74 *3*	100	0.0	0^+	E2			B(E2)(W.u.)=13.5 *+32−22*
1421.77	(2^+)	670.01 *4*	100 *5*	751.75	2^+				
		1421.66 *20*	15.1 *20*	0.0	0^+				
1666.57	4^+	914.81 *5*	100	751.75	2^+	E2			B(E2)(W.u.)=7 *+6−2*
2041.90	$(0^+$ to $4^+)$	620.11 *9*	100 *5*	1421.77	(2^+)				
		1290.3 *3*	27 *4*	751.75	2^+				
2343.74	$(4^+,3^-)$	677.20 *10*	40 *6*	1666.57	4^+				
		921.96 *6*	100 *8*	1421.77	(2^+)				
2566.1?		1144.3@ *3*	100	1421.77	(2^+)				
2669.88	6^+	1003.24 *5*	100	1666.57	4^+	E2			B(E2)(W.u.)=2.9 *+19−8*
2704.9?		663@ *1*	100	2041.90	$(0^+$ to $4^+)$				
2705.62	(5^-)	362@ *1*		2343.74	$(4^+,3^-)$				
		1039.04 *3*	100	1666.57	4^+	(E1)			B(E1)(W.u.)=4.6×10^{-5} *9*
3016.87	(5^-)	311.25 *3*	100	2705.62	(5^-)				
3029.49		987.57 *9*	100	2041.90	$(0^+$ to $4^+)$				
3029.64	$(5^+,6^+)$	359.72 *4*	18.5 *19*	2669.88	6^+				
		1363.13 *6*	100 *5*	1666.57	4^+				
3254.38	$(4^+,5,6^+)$	584.52 *6*	100 *3*	2669.88	6^+				
		1587.75 *10*	90 *6*	1666.57	4^+				
3271.97	(6^-)	566.35 *4*	100	2705.62	(5^-)	D+Q			
3298.44	8^+	628.55 *4*	100	2669.88	6^+	E2			B(E2)(W.u.)=5.6 *+8−6*
3417.65	$(4^+,5,6^+)$	388.13 *15*	83 *8*	3029.49					
		747.76 *9*	100 *9*	2669.88	6^+				
		1751.14 *20*	64 *5*	1666.57	4^+				
3423.32	(7^-)	717.70 *4*	100	2705.62	(5^-)	(E2)			B(E2)(W.u.)=19 *+5−4*
		754		2669.88	6^+				
3532.64	8^+	234.205 *15*	100.0 *19*	3298.44	8^+	M1(+E2)	<0.17	0.0211 *6*	α(K)=0.0186 *5*; α(L)=0.00212 *6*; α(M)=0.000369 *11*; α(N+..)=5.59×10^{-5} *15* α(N)=5.23×10^{-5} *15*; α(O)=3.63×10^{-6} *8* B(M1)(W.u.)>0.34; B(E2)(W.u.)<3.1×10^2 Mult.,δ: $\gamma(\theta)$ consistent with ΔJ=0, dipole. RUL(E2)=300 gives δ(E2/M1)<0.17.
		862.4 *3*	16 *4*	2669.88	6^+	[E2]			B(E2)(W.u.)=2.2 *+8−6*
3646.36	(7^-)	223.04 *3*	67 *6*	3423.32	(7^-)	D			Mult.: probable ΔJ=0, dipole.
		630	100 *7*	3016.87	(5^-)				
3792.59	(7)	259.943 *25*	100	3532.64	8^+	D+Q			
		1120@		2669.88	6^+				
4133.68	(8^-)	710.35 *9*	100	3423.32	(7^-)	D+Q			

$^{86}_{40}Zr_{46}$-6

γ(^{86}Zr) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	α#	Comments
4133.68	(8⁻)	861.7	<420	3271.97	(6⁻)			
4326.12	10⁺	1027.63 *3*	100	3298.44	8⁺	E2		B(E2)(W.u.)=10.4 *+25−17*
4418.56	10⁺	885.90 *4*	100.0 *20*	3532.64	8⁺	E2		B(E2)(W.u.)=4.5 *+23−11*
		1120.46 *8*	12.7 *4*	3298.44	8⁺	E2		B(E2)(W.u.)=0.18 *+9−4*
4429.35	(9⁻)	783	3.1 *21*	3646.36	(7⁻)	[E2]		B(E2)(W.u.)=0.34 *23*
		1006.02 *6*	100 *3*	3423.32	(7⁻)	(E2)		B(E2)(W.u.)=3.1 *+7−5*
4637	(9⁻)	207		4429.35	(9⁻)			
		990		3646.36	(7⁻)			
4697	(9⁻)	267	100	4429.35	(9⁻)			
5067	(10⁻)	933	100	4133.68	(8⁻)			
5233.55	(11⁻)	167		5067	(10⁻)			
		537		4697	(9⁻)			
		597		4637	(9⁻)			
		804		4429.35	(9⁻)			
		815.00 *10*		4418.56	10⁺	D		
		909		4326.12	10⁺			
5388.70	(11⁻)	959.34 *4*	100	4429.35	(9⁻)	E2		B(E2)(W.u.)=11 *+4−2*
5396.40	(12⁺)	977.96 *5*	38.2 *14*	4418.56	10⁺	(E2)		B(E2)(W.u.)=3.0 *+9−6*
		1070.19 *4*	100.0 *14*	4326.12	10⁺	(E2)		B(E2)(W.u.)=5.0 *+15−9*
5524.3	(12⁺)	1105	100 *5*	4418.56	10⁺	[E2]		B(E2)(W.u.)=23 *+6−5*
		1198	92 *5*	4326.12	10⁺	[E2]		B(E2)(W.u.)=14 *+4−3*
5646.5		1227.9 *3*	100	4418.56	10⁺			
5974.74	(12⁻)	741.18 *6*	100 *3*	5233.55	(11⁻)	D		
		908	32 *3*	5067	(10⁻)			
6232.28	(13⁻)	258	8.7 *21*	5974.74	(12⁻)			
		998.72 *9*	100 *3*	5233.55	(11⁻)	E2		B(E2)(W.u.)=5.5 *+11−8*
6286	(13⁺)	891	100	5396.40	(12⁺)			
6321.08	(14⁺)	797	22 *2*	5524.3	(12⁺)	[E2]		B(E2)(W.u.)=2.7 *+4−3*
		924.68 *4*	100 *3*	5396.40	(12⁺)	E2		B(E2)(W.u.)=5.9 *+8−6*
6339.9	(13⁻)	951.15 *30*	100	5388.70	(11⁻)	(Q)		
6462	(13⁻)	487		5974.74	(12⁻)			
6752.4	(14⁺)	432	19 *4*	6321.08	(14⁺)			
		1228	100 *6*	5524.3	(12⁺)	[E2]		B(E2)(W.u.)=23 *+5−4*
		1357	26 *5*	5396.40	(12⁺)	[E2]		B(E2)(W.u.)=3.6 *+10−8*
6794	(14⁺)	508		6286	(13⁺)			
		1400		5396.40	(12⁺)			
7015.33	(15⁺)	220	9.8 *22*	6794	(14⁺)			
		694.25 *10*	100 *3*	6321.08	(14⁺)	(M1+E2)		
7061	(14⁻)	828		6232.28	(13⁻)			
7345	(15⁻)	284		7061	(14⁻)			
		1112		6232.28	(13⁻)	(Q)		
7396.46	(16⁺)	381.15 *20*	100 *4*	7015.33	(15⁺)	(M1+E2)	0.0079 *19*	α=0.0079 *19*; α(K)=0.0070 *16*; α(L)=0.00081 *21*; α(M)=0.00014 *4*; α(N+..)=2.1×10^{-5} *6* α(N)=2.0×10^{-5} *5*; α(O)=1.3×10^{-6} *3*

$^{86}_{40}Zr_{46}$-7

γ(^{86}Zr) (continued)

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.‡	Comments
7396.46	(16+)	1075	43 *3*	6321.08	(14+)	[E2]	B(E2)(W.u.)=8.2 +*12*−*13*
7470	(15−)	1008	100 *5*	6462	(13−)	[E2]	B(E2)(W.u.)=22 *5*
		1131	52 *4*	6339.9	(13−)	[E2]	B(E2)(W.u.)=6.3 +*15*−*14*
		1237	21 *4*	6232.28	(13−)	[E2]	B(E2)(W.u.)=1.6 +*5*−*4*
7640	(15−)	1301	100	6339.9	(13−)	[E2]	B(E2)(W.u.)=5.5 +*6*−*7*
7954	(16+)	939	90 *6*	7015.33	(15+)		
		1159	19 *10*	6794	(14+)	[E2]	B(E2)(W.u.)=1.8 *10*
		1201	29 *7*	6752.4	(14+)	[E2]	B(E2)(W.u.)=2.3 *7*
		1634	100 *7*	6321.08	(14+)	[E2]	B(E2)(W.u.)=1.7 *4*
8145	(16+)	1392	100	6752.4	(14+)	[E2]	B(E2)(W.u.)=25 +*9*−*7*
8212	(16−)	573		7640	(15−)		
		742	100	7470	(15−)		
8248.7	(17+)	294	33 *4*	7954	(16+)		
		852	100 *6*	7396.46	(16+)	D	
		1233	71 *5*	7015.33	(15+)	[E2]	B(E2)(W.u.)=16 *2*
8575	(17−)	363	39 *3*	8212	(16−)		
		1231	100 *4*	7345	(15−)	E2	B(E2)(W.u.)=9.5 *8*
8650.0	(18+)	401	85 *2*	8248.7	(17+)	D	
		1254	100 *3*	7396.46	(16+)	[E2]	B(E2)(W.u.)=23.9 +*18*−*16*
8671	(17−)	1201		7470	(15−)		
9373	(18−)	797	100 *6*	8575	(17−)		
		1160	41 *5*	8212	(16−)	[E2]	B(E2)(W.u.)=11 *3*
9533	(18−)	862	100	8671	(17−)		
9653	(18+)	1508	100	8145	(16+)	[E2]	B(E2)(W.u.)=9 *3*
9880	(19−)	348	14 *10*	9533	(18−)		
		508	83 *5*	9373	(18−)		
		1209	40 *5*	8671	(17−)		
		1305	100 *3*	8575	(17−)	E2	B(E2)(W.u.)=14 *3*
9891.9	(19+)	1242	43 *3*	8650.0	(18+)		
		1643	100 *4*	8248.7	(17+)		
10142.9	(20+)	251	15 *2*	9891.9	(19+)	D	
		1493	100 *3*	8650.0	(18+)	(E2)	B(E2)(W.u.)=22 +*3*−*2*
10207	(19−)	834	100 *6*	9373	(18−)		
		1632	49 *5*	8575	(17−)		
10795	(20−)	588	100 *5*	10207	(19−)		
		915@		9880	(19−)		
		1422	92 *5*	9373	(18−)	[E2]	B(E2)(W.u.)=14 +*7*−*3*
10918	(20+)	776	47 *5*	10142.9	(20+)		
		2269	100 *6*	8650.0	(18+)		
11175	(20+)	2526	100	8650.0	(18+)		
11176	(20−)	1644	100	9533	(18−)		
11232	(21−)	437	100 *6*	10795	(20−)		
		1352	100 *6*	9880	(19−)	E2	B(E2)(W.u.)=11.6 +*23*−*17*

$^{86}_{40}Zr_{46}$-8

Adopted Levels, Gammas (continued)

γ(^{86}Zr) (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult. ‡	Comments
11756	(21⁻)	580	100 *6*	11176	(20⁻)		
		1875	100 *6*	9880	(19⁻)		
12060.9	(22⁺)	1917	100	10142.9	(20⁺)	E2	B(E2)(W.u.)=16 *+13−4*
12359	(22⁻)	603	85 *2*	11756	(21⁻)		
		1128@		11232	(21⁻)		
		1564	100 *3*	10795	(20⁻)	[E2]	B(E2)(W.u.)=1.23 *3*
12606	(22⁺)	1431	100 *8*	11175	(20⁺)		
		1688	79 *7*	10918	(20⁺)		
12741	(23⁻)	381	64 *4*	12359	(22⁻)		
		1509	100 *5*	11232	(21⁻)	E2	B(E2)(W.u.)=11 *+4−2*
14149.0	(24⁺)	1541	100 *5*	12606	(22⁺)		
		2088	75 *4*	12060.9	(22⁺)	E2	B(E2)(W.u.)=4.9 *+17−10*
14164	(24⁻)	1424		12741	(23⁻)		
		1806		12359	(22⁻)		
14377	(25⁻)	214	16 *2*	14164	(24⁻)		
		1634	100 *3*	12741	(23⁻)	E2	B(E2)(W.u.)=6.9 *+12−11*
16050	(26⁺)	1903	100	14149.0	(24⁺)	E2	B(E2)(W.u.)=36 *12*
16617	(27⁻)	2240	100	14377	(25⁻)	E2	B(E2)(W.u.)=5.4 *+18−16*
18063	(28⁺)	2013	100	16050	(26⁺)	E2	B(E2)(W.u.)=15 *+6−3*
20532	(30⁺)	2469	100	18063	(28⁺)	E2	B(E2)(W.u.)=6.5 *+33−16*
1518+x	J1+2	1518		x	J1≈(23)		
3164+x	J1+4	1646		1518+x	J1+2		
4949+x	J1+6	1785		3164+x	J1+4		
6878+x	J1+8	1929		4949+x	J1+6		
8955+x	J1+10	2077		6878+x	J1+8		
11183+x	J1+12	2228		8955+x	J1+10		
13566+x	J1+14	2383		11183+x	J1+12		
16106+x	J1+16	2540		13566+x	J1+14		
18802+x	J1+18	2696		16106+x	J1+16		
1577+y	J2+2	1577		y	J2≈(22)		
3307+y	J2+4	1730		1577+y	J2+2		
5198+y	J2+6	1891		3307+y	J2+4		
7254+y	J2+8	2056		5198+y	J2+6		
9481+y	J2+10	2227		7254+y	J2+8		
11874+y	J2+12	2393		9481+y	J2+10		
14388+y	J2+14	2514		11874+y	J2+12		
16950+y	J2+16	2562		14388+y	J2+14		
19658+y?	J2+18	2708@		16950+y	J2+16		
1866+z	J3+2	1866@		z	J3≈(25)		
3825+z	J3+4	1959		1866+z	J3+2		
5887+z	J3+6	2062		3825+z	J3+4		
8042+z	J3+8	2155		5887+z	J3+6		
10286+z	J3+10	2244		8042+z	J3+8		

Adopted Levels, Gammas (continued)

$\gamma(^{86}Zr)$ (continued)

E_i(level)	J^π_i	E_γ †	E_f	J^π_f
12629+z	J3+12	2343	10286+z	J3+10
15058+z?	J3+14	2429 @	12629+z	J3+12
1648+u	J4+2	1648	u	J4≈(23)
3459+u	J4+4	1811	1648+u	J4+2
5426+u	J4+6	1967	3459+u	J4+4
7549+u	J4+8	2123	5426+u	J4+6
9822+u	J4+10	2273	7549+u	J4+8
12225+u	J4+12	2403	9822+u	J4+10
14716+u	J4+14	2491	12225+u	J4+12

† Weighted averages from available gamma-ray studies.

‡ From $\gamma(\theta)$ data (1985Wa10,1977Ko05) and $\gamma\gamma(\theta)$(DCO) data (2000Do04) in in-beam reactions combined with limitations implied by RUL. Mult=Q is most likely E2 and mult=D+Q is M1+E2.

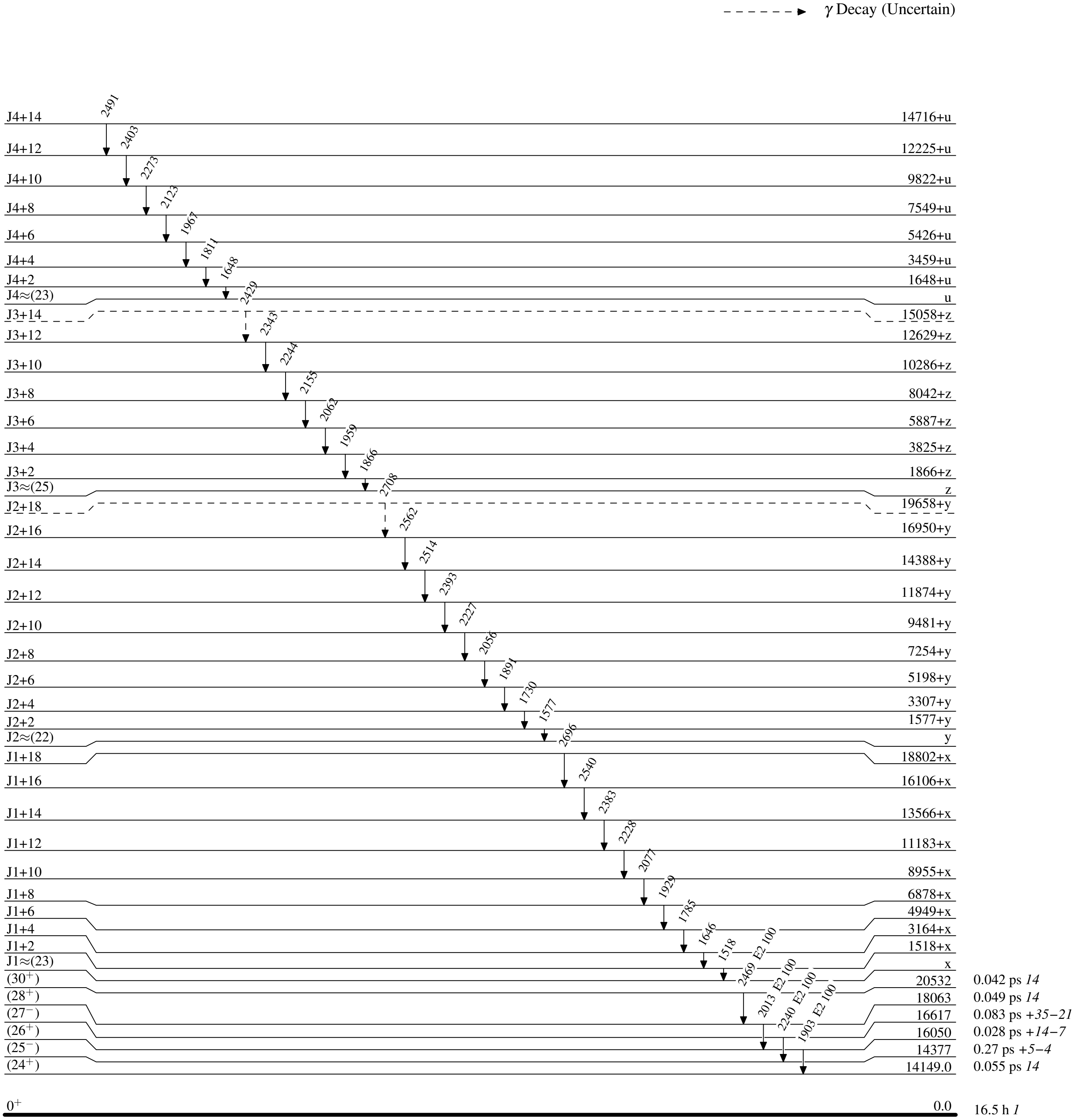
Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

@ Placement of transition in the level scheme is uncertain.

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level



$^{86}_{40}Zr_{46}$

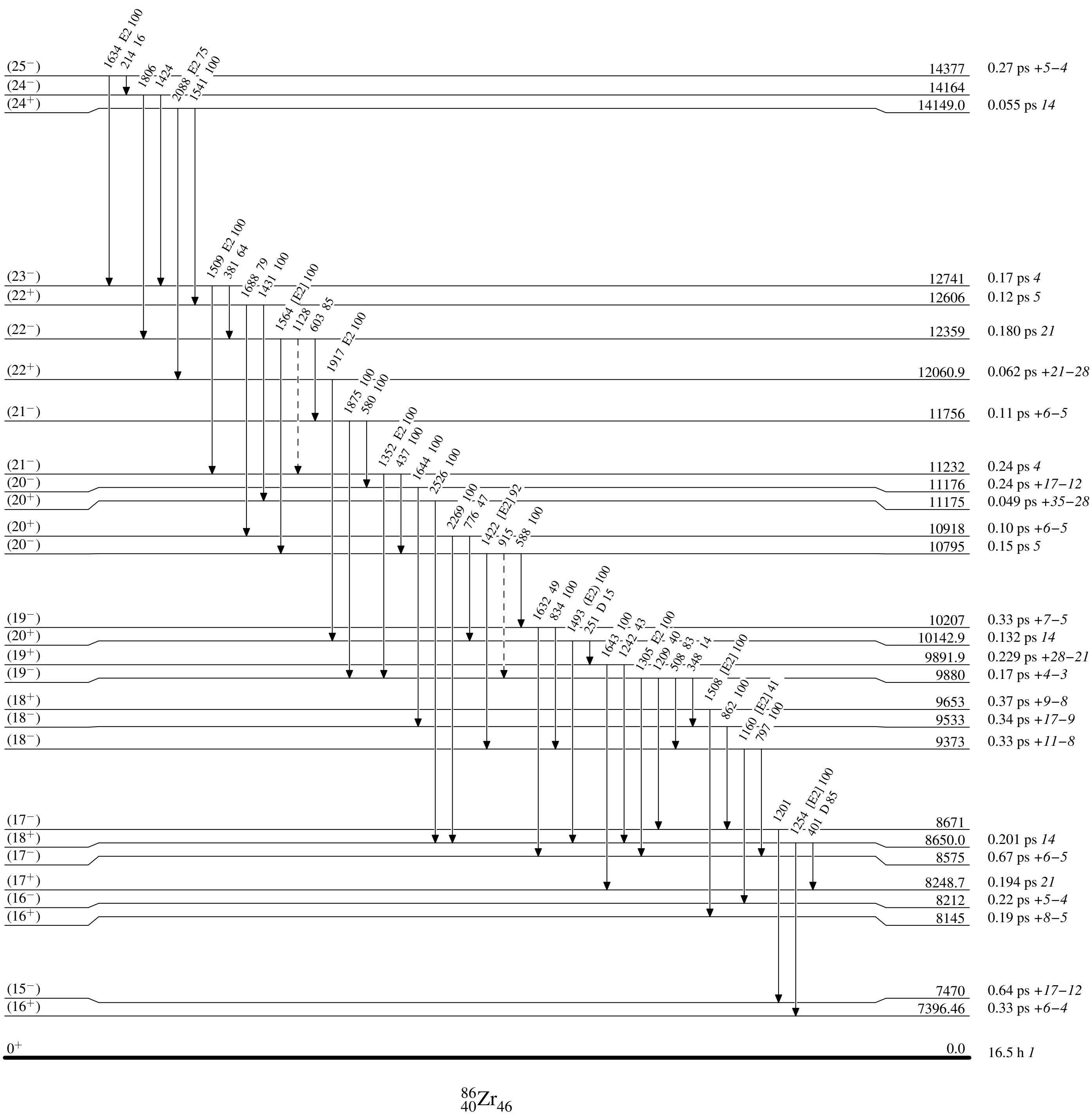
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

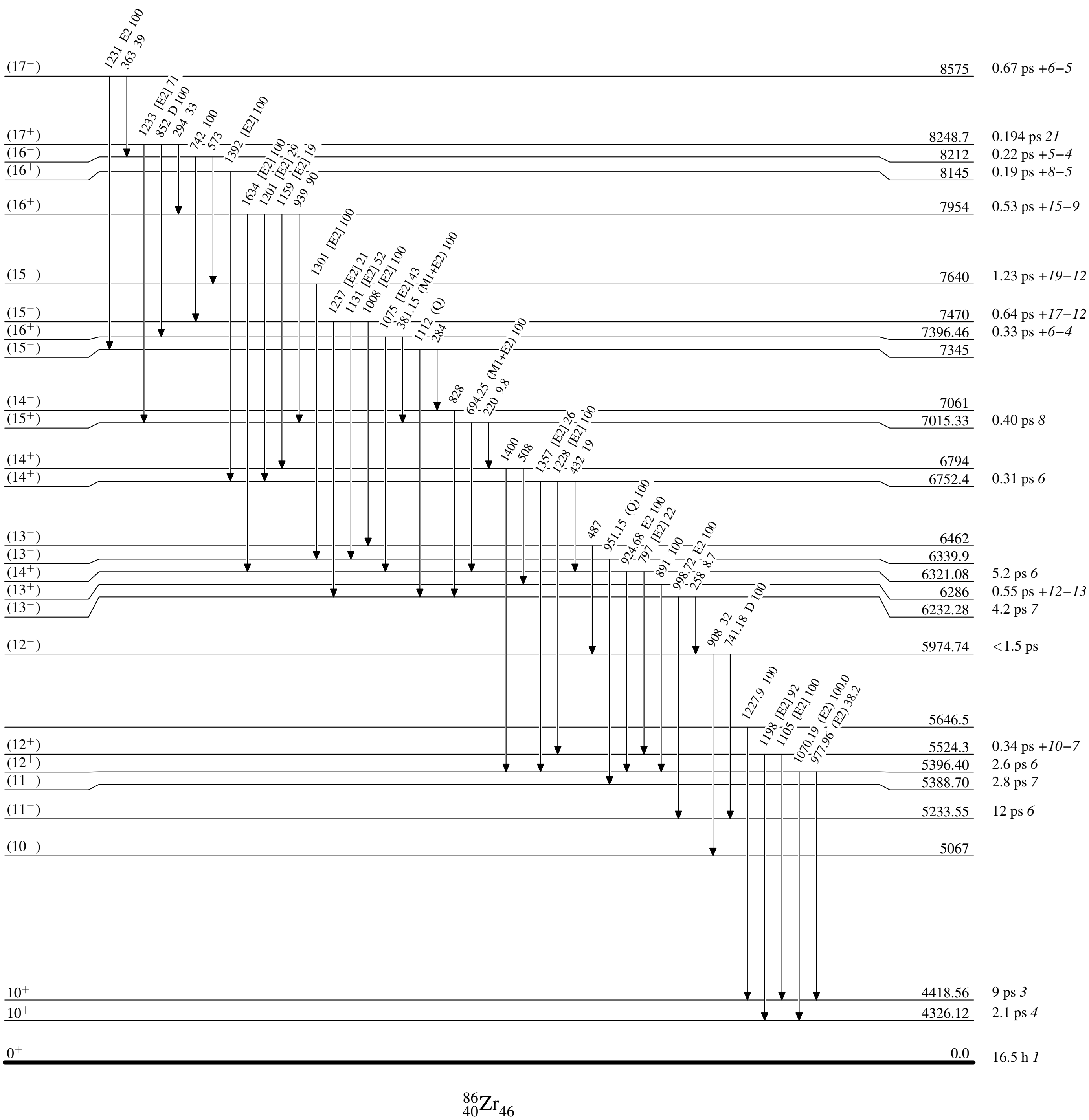
γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

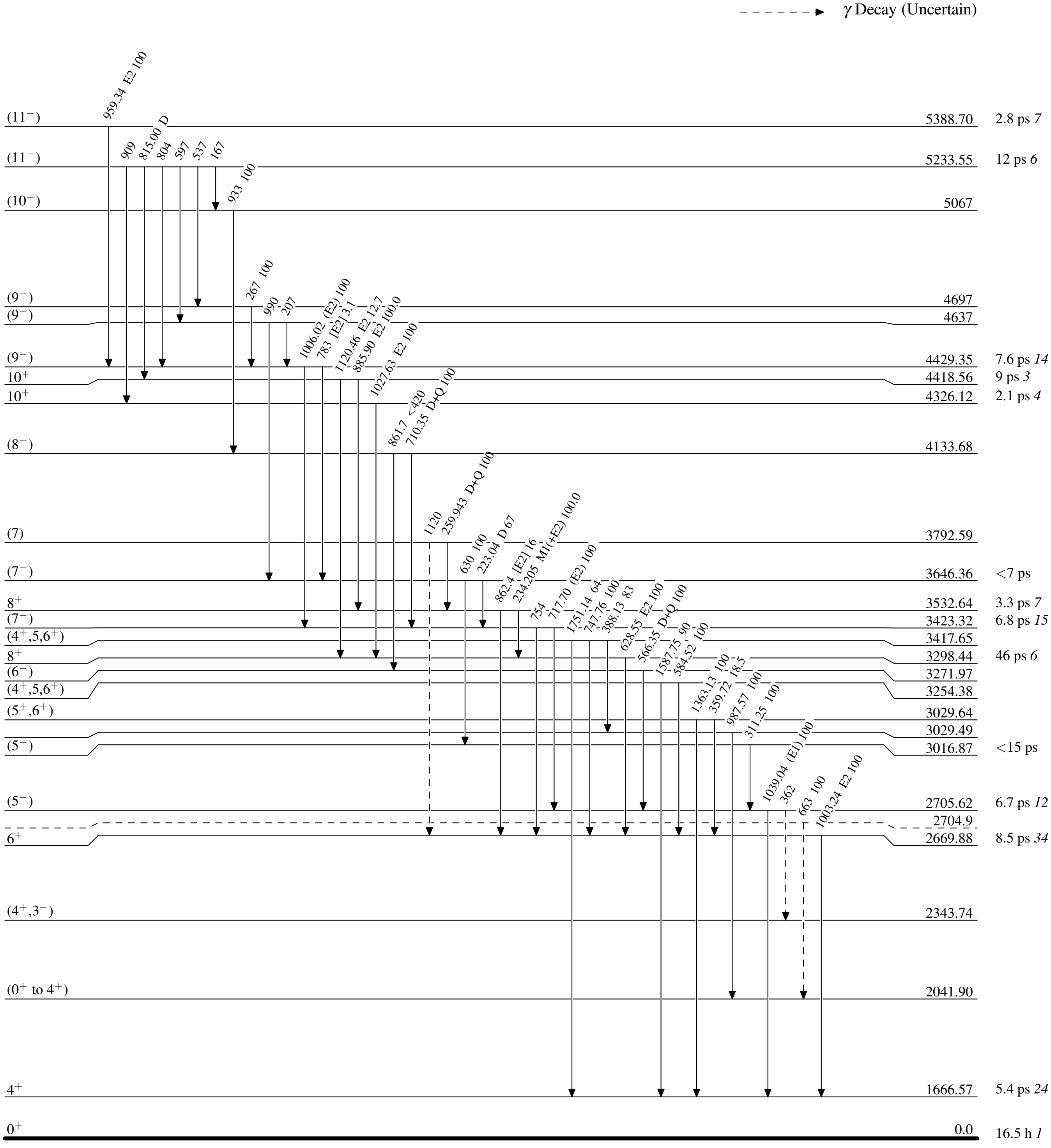


Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

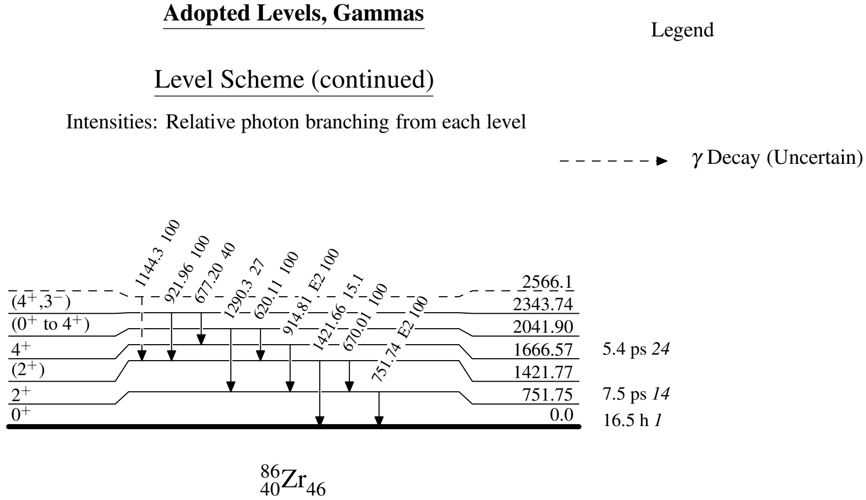


$^{86}_{40}Zr_{46}$

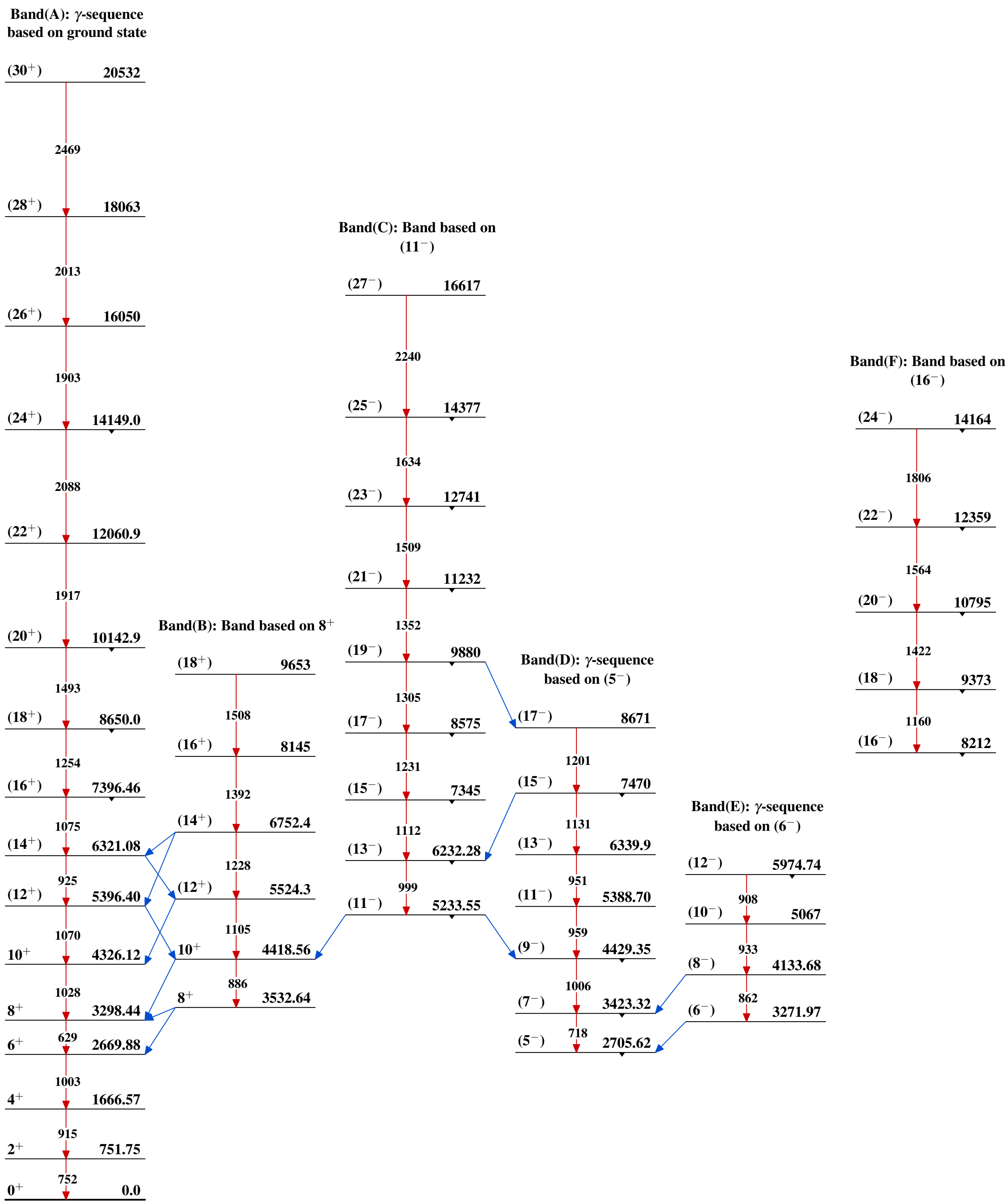
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

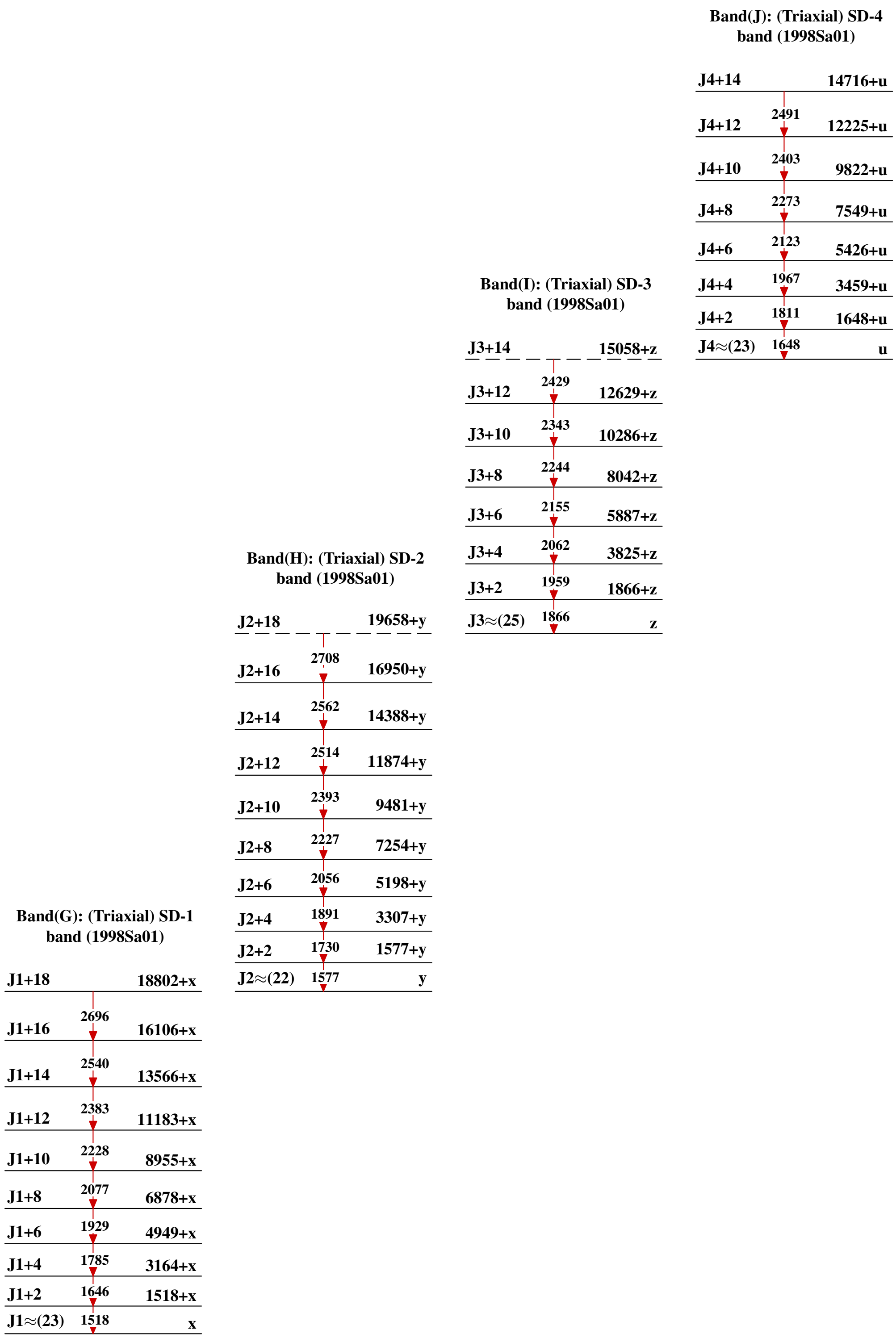


Adopted Levels, Gammas



$^{86}_{40}Zr_{46}$

Adopted Levels, Gammas (continued)



$^{86}_{40}Zr_{46}$