Adopted Levels, Gammas

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh and Jun Chen[#]	NDS 147, 1 (2018)	30-Nov-2017

Q(β^-)=−8540 *30*; S(n)=10626 *29*; S(p)=4320 *30*; Q(α)=3919 *17* 2017Wa10
S(2n)=18792 *18*, S(2p)=6570 *22*, Q(εp)=192 *22* (2017Wa10).
Identification and production of ^{164}Hf by 1981Br30 using ^{147}Sm(^{22}Ne,5n) reaction at E=110, 136 MeV.
Mass measurement: 2000Ra23.
2013Ma73, in their ^{94}Zr(^{74}Ge,4nγ) results, stated that eight normal-deformed bands had been extended to high spins, and that these data would be presented in a forthcoming paper. Based on NSR database search and current literature, no further publication from the authors of 2013Ma73 seems to have appeared as of November 30, 2017.
For theoretical nuclear structure calculations, consult NSR database, for about 40 references. These are listed in the ENSDF dataset as document records.
Additional information 1.

^{164}Hf Levels

Quasiparticle labels for neutrons:
A: (π=+,α=+1/2); $i_{13/2}$ orbital, ν5/2[642].
B: (π=+,α=−1/2); $i_{13/2}$ orbital, ν5/2[642].
C: (π=+,α=+1/2)$_2$; $i_{13/2}$ orbital, ν3/2[651].
E: (π=−,α=+1/2); $h_{9/2}$ orbital, ν3/2[521].
F: (π=−,α=−1/2); $h_{9/2}$ orbital, ν3/2[521].
Quasiparticle labels for protons:
A_p: (π=−,α=−1/2); $h_{11/2}$ orbital, π9/2[514].
B_p: (π=−,α=+1/2); $h_{11/2}$ orbital, π9/2[514].

Cross Reference (XREF) Flags

A	^{164}Ta ε decay (14.2 s)	D	^{120}Sn(^{48}Ti,4nγ)
B	^{168}W α decay (50.9 s)	E	^{148}Sm(^{20}Ne,4nγ)
C	^{94}Zr(^{74}Ge,4nγ)		

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	XREF	Comments
0[@]	0$^+$	111 s *8*	ABCDE	%ε+%β^+=100 $T_{1/2}$: from decay curve for 153γ (1989Hi04). Others: 168 s *12* (1981Br30,1989Br19, from γ-decay curve), 114 s *3* (1981LiZM, from decay curve for Lu K x-rays). Evaluators prefer value from 1989Hi04 as it was measured using characteristic γ ray from the decay of ^{164}Hf, in contrast to somewhat more precise value from 1981LiZM obtained from the decay curve for K x-rays, which can be subject to contamination. High value from 1989Br19 and 1981Br30 is clearly discrepant.
210.7[@] *3*	2$^+$	301 ps *29*	A CDE	μ=+0.66 *12* (1998We02) μ: transient-field technique in (^{128}Te,4nγ) (1998We02) for $T_{1/2}$(211 level)=344 ps *20*. $T_{1/2}$: from 2016Pr01 evaluation, based on RDDS method in ^{148}Sm(^{20}Ne,4nγ), where the two values of mean lifetime are: τ=497 ps *29* (1998We02) and 370 ps *30* (1989Mu13). J^π: E2 γ to 0$^+$.
587.1[@] *4*	4$^+$	13.0 ps +*26*−*22*	A CDE	J^π: ΔJ=2, E2 γ to 2$^+$.
620.2 *8*			A	J^π: ≤4 from γ to 2$^+$.
816.0 *4*	(2$^+$)		A	J^π: γ to 0$^+$, probable allowed ε feeding from (3$^+$).

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Adopted Levels, Gammas (continued)

^{164}Hf Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$[#]	XREF	Comments
1072.8 5	(2+,3,4+)		A E	Jπ: gammas to 2+ and 4+. Jπ=(3−) suggested in (^{20}Ne,4nγ).
1085.0[@] 5	6+	2.0 ps +26−4	CDE	Jπ: ΔJ=2, E2 γ to 4+.
1237.6 11			A	Jπ: 2+ to 6+ from γ to 4+.
1352.6 6	(2+,3,4+)		A	Jπ: gammas to 2+ and 4+.
1458.0 11			A	Jπ: ≤4 from γ to (2+).
1486.2 11			A	Jπ: ≤4 from γ to 2+.
1520.8[a] 5	(5−)		CDE	Jπ: ΔJ=1, dipole γ to 4+; band member.
1614.5 5	(4−)		A E	Jπ: ΔJ=(2) γ from (6−). Jπ=(4−,5−) suggested in (^{20}Ne,4nγ).
1668.7[@] 5	8+	<1.4 ps	CDE	
1675.7 9			A	Jπ: ≤4 from γ to 2+.
1836.1[a] 5	(7)−		CDE	Jπ: ΔJ=1, E1 γ to 6+; γ to (5−).
1946.9[b] 5	(6−)		CDE	Jπ: ΔJ=1, (M1+E2) γ to (5−); ΔJ=(0), dipole γ to 6+.
2244.8[a] 5	(9)−		CDE	
2301.7[b] 5	(8)−		CDE	Jπ: E1 γ to 8+; ΔJ=1, M1+E2 γ to (7)−.
2304.0[@] 6	10+		CDE	
2575.7[b] 5	(10−)		CDE	
2698.3[a] 6	(11)−	3.0 ps +16−10	CDE	
2870.9[&] 6	12+	5.2 ps +15−12	CDE	
2961.3[b] 6	(12−)		CDE	
2994.5[@] 7	(12+)		E	
3155.5[a] 6	(13)−	4.1 ps +12−10	CDE	
3209.7[&] 7	14+	14.8 ps +10−12	CDE	
3301.3[c] 11	(13−)		C	
3493.4[b] 7	(14−)		CDE	
3617.8[@] 8	(14+)		E	
3677.8[&] 8	16+	2.9 ps +10−7	CDE	
3700.4[a] 7	(15−)		CDE	
3944.3[c] 12	(15−)		C	
4128.8[b] 7	(16−)		CDE	
4262.0[&] 8	18+	2.1 ps +12−10	CDE	
4335.2[a] 8	(17−)		CDE	
4614.2[c] 12	(17−)		C	
4765.9[b] 8	(18−)		CDE	
4938.6[&] 9	20+		CDE	
5009.3[a] 8	(19−)		CDE	
5259.2[c] 10	(19−)		C	
5358.7[b] 8	(20−)		CDE	
5669.0[a] 9	(21−)		CDE	
5698.6[&] 9	22+		CDE	
5894.0[c] 10	(21−)		C	
5981.5[b] 9	(22−)		CDE	
6335.0[a] 9	(23−)		CDE	
6544.1[&] 10	24+		CDE	
6601.7[c] 11	(23−)		C	
6672.7[b] 9	(24−)		CDE	
7061.5[a] 10	(25−)		CDE	
7350.0[c] 14	(25−)		C	
7442.8[b] 10	(26−)		CDE	

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Adopted Levels, Gammas (continued)

^{164}Hf Levels (continued)

E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF	E(level)†	Jπ‡	XREF
7457.7[&] 10	26+	CDE	10411.4[&] 18	32+	C	13390.5[b] 22	(38−)	C
7872.9[a] 10	(27−)	CDE	10598.5[d] 13	(33−)	C	13467.5[d] 22	(39−)	C
8166.4[c] 15	(27−)	C	10754.0[a] 15	(33−)	C	13802.0[a] 23	(39−)	C
8291.7[b] 10	(28−)	CDE	11074.1[e] 14	(34−)	C	14027.1[e] 22	(40−)	C
8435.8[&] 11	28+	CDE	11257.5[b] 17	(34−)	C E	14540.5[d] 24	(41−)	C
8763.9[a] 10	(29−)	CDE	11428.4[&] 21	34+	C	14851.0[a] 25	(41−)	C
8989.7[d] 14	(29−)	C	11494.5[d] 17	(35−)	C	15106.1[e] 24	(42−)	C
9084.4[c] 18	(29−)	C	11784.0[a] 18	(35−)	C	15665[d] 3	(43−)	C
9215.2[b] 11	(30−)	CDE	12006.1[e] 17	(36−)	C	16232[e] 3	(44−)	C
9418.4[&] 15	30+	C E	12306.5[b] 20	(36−)	C	16830[d] 3	(45−)	C
9726.0[a] 11	(31−)	CDE	12450.5[d] 20	(37−)	C	17413[e] 3	(46−)	C
9770.1[d] 13	(31−)	C	12482.4[&] 23	36+	C	18643[e] 3	(48−)	C
10190.0[e] 11	(32−)	C E	12787.0[a] 21	(37−)	C			
10228.1[b] 14	(32−)	C	12992.1[e] 20	(38−)	C			

† From least-squares fit to Eγ data.

‡ For high-spin states (J>6), the assignments are based on ΔJ and multipolarities deduced from $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO) and γ(linear pol) in ^{120}Sn(^{48}Ti,4nγ) and $\gamma\gamma(\theta)$(DCO) in ^{148}Sm(^{20}Ne,4nγ) combined with γ-decay modes and band associations. Arguments for separate levels are generally not given since most of these are based on band structures.

For excited states, values are from recoil-distance Doppler shift (RDDS) method (1989Mu13) in ^{148}Sm(^{20}Ne,4nγ), unless otherwise stated.

@ Band(A): g.s. band. Average measured g factor=+0.23 *3* for the yrast band (1998We02, 2014StZZ).

& Band(a): AB band,α=0. This band is a continuation of g.s. band, with a possible band crossing at 10+. Interpreted (1987Bl06) as AB up to 28+ and ABA$_p$B$_p$ (alignment of a pair of AB protons) above 28+.

a Band(B): AE,α=1 band. Interpreted (1987Bl06) as AE up to 19− and ABCE (alignment of a pair of BC neutrons) above 19−.

b Band(b): AF,α=0 band. Bands AE and AF are signature partners. Interpreted (1987Bl06) as AF up to 16− and ABCF (alignment of a pair of BC neutrons) above 16−.

c Band(C): AG band.

d Band(D): TSD-1 band. Proposed configuration=4−qp involving high-j intruder $\pi i^2_{13/2}$.

e Band(E): TSD-2 band. Proposed configuration=4−qp involving high-j intruder $\pi i^2_{13/2}$.

$\gamma(^{164}Hf)$

E_i(level)	J^π_i	E_γ†	I_γ†	E_f	J^π_f	Mult.#	δ@	α&	Comments
210.7	2^+	210.7‡ 3	100	0	0^+	E2		0.242	α(K)=0.1447 21; α(L)=0.0740 12; α(M)=0.0181 3 α(N)=0.00422 7; α(O)=0.000556 9; α(P)=9.60×10^{-6} 14 B(E2)(W.u.)=68 7
587.1	4^+	376.3‡ 3	100	210.7	2^+	E2		0.0411	α(K)=0.0303 5; α(L)=0.00833 12; α(M)=0.00198 3 α(N)=0.000465 7; α(O)=6.46×10^{-5} 10; α(P)=2.24×10^{-6} 4 B(E2)(W.u.)=103 +21−17
620.2		409.5 7	100	210.7	2^+				
816.0	(2^+)	605.2 4	100 7	210.7	2^+				
		816.0 4	60 7	0	0^+				
1072.8	$(2^+,3,4^+)$	485 1	17 5	587.1	4^+				γ from ^{164}Ta decay only.
		862.0‡ 5	100 5	210.7	2^+				
1085.0	6^+	498.2 3	100	587.1	4^+	E2		0.0195	α(K)=0.01514 22; α(L)=0.00338 5; α(M)=0.000792 12 α(N)=0.000186 3; α(O)=2.66×10^{-5} 4; α(P)=1.158×10^{-6} 17 B(E2)(W.u.)=170 +42−96
1237.6		650.5 10	100	587.1	4^+				
1352.6	$(2^+,3,4^+)$	765 1	27 7	587.1	4^+				
		1142.0 5	100 6	210.7	2^+				
1458.0		642 1	100	816.0	(2^+)				
1486.2		1275.5 10	100	210.7	2^+				
1520.8	(5^-)	933.6 3	100	587.1	4^+	D			
1614.5	(4^-)	541.5‡ 5	100	1072.8	$(2^+,3,4^+)$				
1668.7	8^+	583.7 3	100	1085.0	6^+	E2		0.01325	α(K)=0.01049 15; α(L)=0.00213 3; α(M)=0.000494 7 α(N)=0.0001165 17; α(O)=1.687×10^{-5} 24; α(P)=8.11×10^{-7} 12 B(E2)(W.u.)>110 E_γ: unresolved from 584.2.
1675.7		1465.0 8	100	210.7	2^+				
1836.1	$(7)^-$	315.4 3	9.5 19	1520.8	(5^-)				
		750.9 3	100 10	1085.0	6^+	E1		3	
1946.9	(6^-)	332.3 3	75 8	1614.5	(4^-)	(Q)			
		425.7 3	100 10	1520.8	(5^-)	(M1+E2)	+0.41 +19−14		
		862.8 4	<97	1085.0	6^+	(D)			
2244.8	$(9)^-$	408.7 3	100.0 20	1836.1	$(7)^-$	E2		0.0328	α(K)=0.0245 4; α(L)=0.00632 9; α(M)=0.001496 22 α(N)=0.000351 5; α(O)=4.92×10^{-5} 7; α(P)=1.84×10^{-6} 3
		576.1 3	91.8 25	1668.7	8^+	E1			
2301.7	$(8)^-$	355.0 3	61 6	1946.9	(6^-)	Q			I_γ: from (^{20}Ne,4nγ). Iγ=95 9 in (^{48}Ti,4nγ).
		465.5 3	74 5	1836.1	$(7)^-$	M1+E2	+0.6 +5−2	0.049 10	α(K)=0.040 9; α(L)=0.0065 9; α(M)=0.00147 19 α(N)=0.00035 5; α(O)=5.3×10^{-5} 8; α(P)=3.3×10^{-6} 8
		632.8 5	100 9	1668.7	8^+	E1			

$^{164}_{72}Hf_{92}$-4

$\gamma(^{164}Hf)$ (continued)

E_i(level)	J^{π}_i	E_{γ}†	I_{γ}†	E_f	J^{π}_f	Mult.#	δ@	α&	Comments
2304.0	10^+	635.3 *3*	100	1668.7	8^+	E2		0.01086	
2575.7	(10^-)	273.9 *3*	97 *2*	2301.7	$(8)^-$	(E2)			
		331.0 *3*	100 *3*	2244.8	$(9)^-$	(M1+E2)	+0.33 *8*		
2698.3	$(11)^-$	394.4 *3*	15.3 *8*	2304.0	10^+	(E1)			B(E1)(W.u.)=1.6×10^{-4} *+7−6*
		453.5 *3*	100 *3*	2244.8	$(9)^-$	E2		0.0248	α(K)=0.0190 *3*; α(L)=0.00452 *7*; α(M)=0.001064 *15* α(N)=0.000250 *4*; α(O)=3.54×10^{-5} *5*; α(P)=1.439×10^{-6} *21* B(E2)(W.u.)=157 *+78−55*
2870.9	12^+	566.9 *3*	100	2304.0	10^+	E2		0.01421	α(K)=0.01121 *16*; α(L)=0.00231 *4*; α(M)=0.000538 *8* α(N)=0.0001267 *18*; α(O)=1.83×10^{-5} *3*; α(P)=8.65×10^{-7} *13* B(E2)(W.u.)=34 *+11−9*
2961.3	(12^-)	263.0 *3*	7.4 *15*	2698.3	$(11)^-$	(M1+E2)	+0.30 *19*		
		385.6 *3*	100 *10*	2575.7	(10^-)	(E2)			
2994.5	(12^+)	690.5 *10*	100	2304.0	10^+	(Q)			
3155.5	$(13)^-$	457.2 *3*	100	2698.3	$(11)^-$	E2		0.0243	α(K)=0.0186 *3*; α(L)=0.00440 *7*; α(M)=0.001037 *15* α(N)=0.000244 *4*; α(O)=3.45×10^{-5} *5*; α(P)=1.412×10^{-6} *20* B(E2)(W.u.)=126 *+41−28*
3209.7	14^+	215.2 *3*	1.5 *3*	2994.5	(12^+)	[E2]		0.225	B(E2)(W.u.)=19 *2* α(K)=0.1365 *20*; α(L)=0.0679 *11*; α(M)=0.0166 *3* α(N)=0.00387 *6*; α(O)=0.000511 *8*; α(P)=9.10×10^{-6} *14*
		338.8 *3*	100 *5*	2870.9	12^+	E2		0.0554	α(K)=0.0397 *6*; α(L)=0.01200 *18*; α(M)=0.00287 *5* α(N)=0.000672 *10*; α(O)=9.25×10^{-5} *14*; α(P)=2.90×10^{-6} *5* B(E2)(W.u.)=150 *+13−10*
3301.3	(13^-)	603		2698.3	$(11)^-$				
3493.4	(14^-)	532.1 *3*	100	2961.3	(12^-)	Q			
3617.8	(14^+)	623.3 *3*	100	2994.5	(12^+)	(Q)			E_{γ}: unresolved from 622.8.
3677.8	16^+	468.1 *3*	100	3209.7	14^+	E2		0.0229	α(K)=0.01757 *25*; α(L)=0.00409 *6*; α(M)=0.000962 *14* α(N)=0.000226 *4*; α(O)=3.21×10^{-5} *5*; α(P)=1.336×10^{-6} *19* B(E2)(W.u.)=159 *+50−41*
3700.4	(15^-)	544.9 *3*	100	3155.5	$(13)^-$	Q			
3944.3	(15^-)	643		3301.3	(13^-)				
4128.8	(16^-)	635.4 *3*	100	3493.4	(14^-)	Q			E_{γ}: from (^{48}Ti,4nγ). 636.7γ placed from 4131 level in (^{20}Ne,4nγ).
4262.0	18^+	584.2 *3*	100	3677.8	16^+	E2		0.01322	α(K)=0.01047 *15*; α(L)=0.00212 *3*; α(M)=0.000493 *7* α(N)=0.0001162 *17*; α(O)=1.683×10^{-5} *24*; α(P)=8.09×10^{-7} *12* B(E2)(W.u.)=73 *+67−26* E_{γ}: unresolved from 583.7.
4335.2	(17^-)	634.8 *3*	100	3700.4	(15^-)	Q			
4614.2	(17^-)	670		3944.3	(15^-)				
4765.9	(18^-)	637.1 *3*	100	4128.8	(16^-)	Q			E_{γ}: from (^{48}Ti,4nγ). 635.5γ placed from 4767 level in (^{20}Ne,4nγ).
4938.6	20^+	676.6 *3*	100	4262.0	18^+	E2		0.00941	
5009.3	(19^-)	674.0 *3*	100	4335.2	(17^-)	Q			
5259.2	(19^-)	645		4614.2	(17^-)				
		924		4335.2	(17^-)				
5358.7	(20^-)	592.8 *3*	100	4765.9	(18^-)	Q			

$^{164}_{72}Hf_{92}$-5

$\gamma(^{164}Hf)$ (continued)

E_i(level)	J^π_i	E_γ †	I_γ †	E_f	J^π_f	Mult.#	α&	Comments
5669.0	(21⁻)	659.7 *3*	100	5009.3	(19⁻)	(Q)		
5698.6	22⁺	760.0 *3*	100	4938.6	20⁺	E2	0.00727	
5894.0	(21⁻)	635		5259.2	(19⁻)			
		885		5009.3	(19⁻)			
5981.5	(22⁻)	622.8 *3*	100	5358.7	(20⁻)	Q		E_γ: unresolved from 623.3.
6335.0	(23⁻)	665.9 *3*	100	5669.0	(21⁻)	Q		
6544.1	24⁺	845.5 *3*	100	5698.6	22⁺	Q		
6601.7	(23⁻)	708		5894.0	(21⁻)			
		933		5669.0	(21⁻)			
6672.7	(24⁻)	691.2 *3*	100	5981.5	(22⁻)	Q		
7061.5	(25⁻)	726.5 *3*	100	6335.0	(23⁻)	Q		
7350.0	(25⁻)	749		6601.7	(23⁻)			
7442.8	(26⁻)	770.1 *3*	100	6672.7	(24⁻)	(Q)		
7457.7	26⁺	913.6 *3*	100	6544.1	24⁺	Q		
7872.9	(27⁻)	811.3 *3*	100	7061.5	(25⁻)	Q		
8166.4	(27⁻)	817		7350.0	(25⁻)			
8291.7	(28⁻)	848.9 *3*	100	7442.8	(26⁻)	(Q)		
8435.8	28⁺	978.1 *3*	100	7457.7	26⁺	(Q)		
8763.9	(29⁻)	891.0 *3*	100	7872.9	(27⁻)	Q		
8989.7	(29⁻)	824	100	8166.4	(27⁻)			
9084.4	(29⁻)	918		8166.4	(27⁻)			
9215.2	(30⁻)	923.5 *3*	100	8291.7	(28⁻)	(Q)		
9418.4	30⁺	982.6 *10*	100	8435.8	28⁺			
9726.0	(31⁻)	962.0 *3*	100	8763.9	(29⁻)	(Q)		
9770.1	(31⁻)	781		8989.7	(29⁻)			
		1006		8763.9	(29⁻)			
10190.0	(32⁻)	974.7 *3*	100	9215.2	(30⁻)	(Q)		
10228.1	(32⁻)	1013		9215.2	(30⁻)			
10411.4	32⁺	993		9418.4	30⁺			
10598.5	(33⁻)	829		9770.1	(31⁻)			
		872	100	9726.0	(31⁻)			
10754.0	(33⁻)	1028		9726.0	(31⁻)			
11074.1	(34⁻)	846		10228.1	(32⁻)			
		884		10190.0	(32⁻)			
11257.5	(34⁻)	1029.3 *10*	100	10228.1	(32⁻)			
11428.4	34⁺	1017		10411.4	32⁺			
11494.5	(35⁻)	896		10598.5	(33⁻)			
11784.0	(35⁻)	1030		10754.0	(33⁻)			
12006.1	(36⁻)	932	100	11074.1	(34⁻)			
12306.5	(36⁻)	1049		11257.5	(34⁻)			
12450.5	(37⁻)	956		11494.5	(35⁻)			
12482.4	36⁺	1054		11428.4	34⁺			
12787.0	(37⁻)	1003		11784.0	(35⁻)			

$^{164}_{72}Hf_{92}$-6

Adopted Levels, Gammas (continued)

$\gamma(^{164}\mathrm{Hf})$ (continued)

E_i(level)	J^π_i	E_γ †	E_f	J^π_f	E_i(level)	J^π_i	E_γ †	E_f	J^π_f	E_i(level)	J^π_i	E_γ †	E_f	J^π_f
12992.1	(38^-)	986	12006.1	(36^-)	14540.5	(41^-)	1073	13467.5	(39^-)	16830	(45^-)	1165	15665	(43^-)
13390.5	(38^-)	1084	12306.5	(36^-)	14851.0	(41^-)	1049	13802.0	(39^-)	17413	(46^-)	1181	16232	(44^-)
13467.5	(39^-)	1017	12450.5	(37^-)	15106.1	(42^-)	1079	14027.1	(40^-)	18643	(48^-)	1230	17413	(46^-)
13802.0	(39^-)	1015	12787.0	(37^-)	15665	(43^-)	1124	14540.5	(41^-)					
14027.1	(40^-)	1035	12992.1	(38^-)	16232	(44^-)	1126	15106.1	(42^-)					

† From weighted averages of data from ^{120}Sn(^{48}Ti,4nγ) and ^{148}Sm(^{20}Ne,4nγ), when a level is populated in multiple datasets. Exceptions are noted.

‡ Weighted average includes data from ^{164}Ta ε decay.

From $\gamma(\theta)$, $\gamma\gamma(\theta)$(DCO) and/or γ(lin pol) in ^{120}Sn(^{48}Ti,4nγ); $\gamma\gamma(\theta)$(DCO) in ^{148}Sm(^{20}Ne,4nγ); and RUL when level half-life is known. The in-band transitions listed with mult=Q are most likely E2.

@ From $\gamma\gamma(\theta)$(DCO) in ^{148}Sm(^{20}Ne,4nγ).

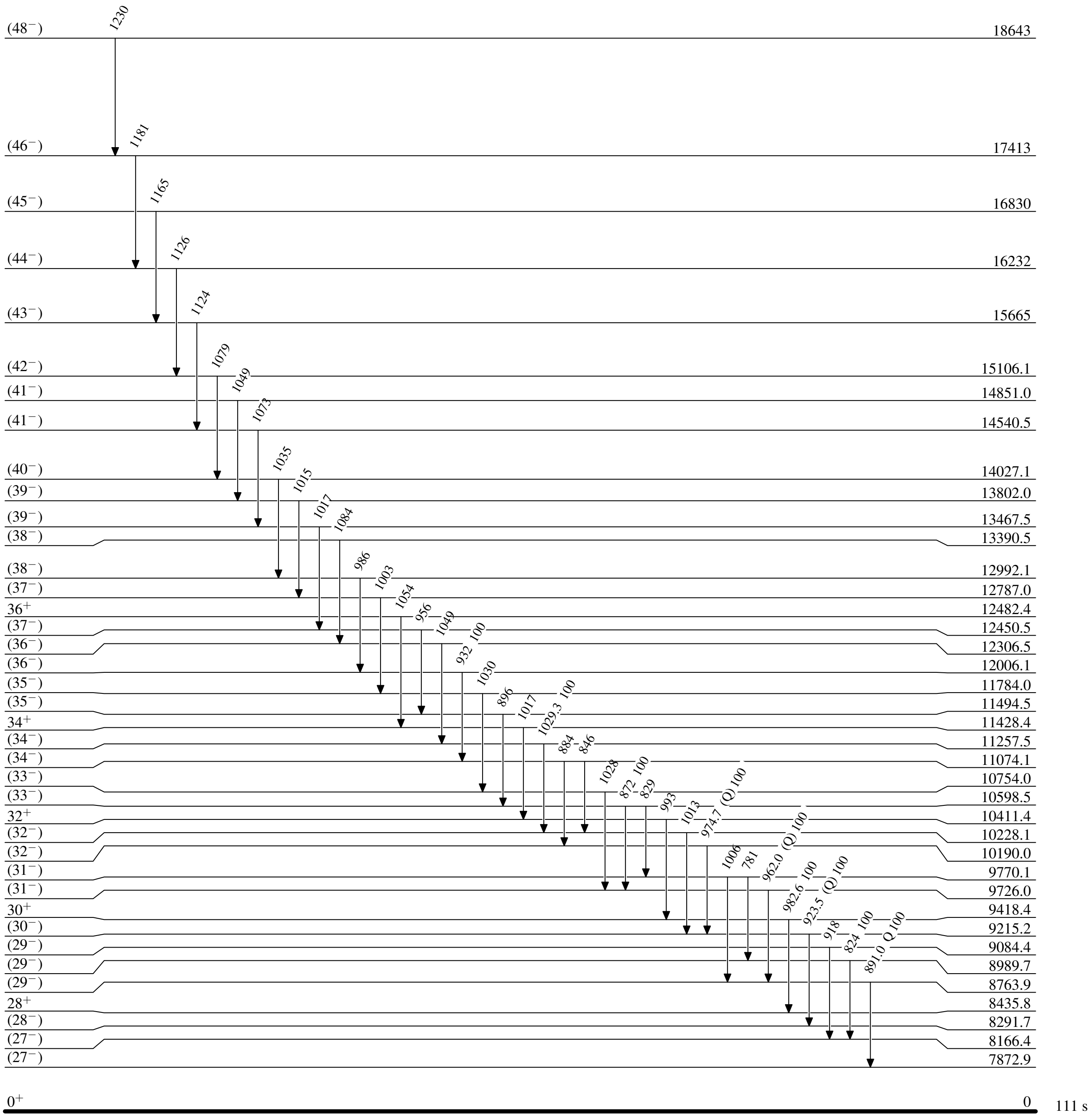
& Additional information 2.

$^{164}_{72}\mathrm{Hf}_{92}$-7

Adopted Levels, Gammas

Level Scheme

Intensities: Relative photon branching from each level

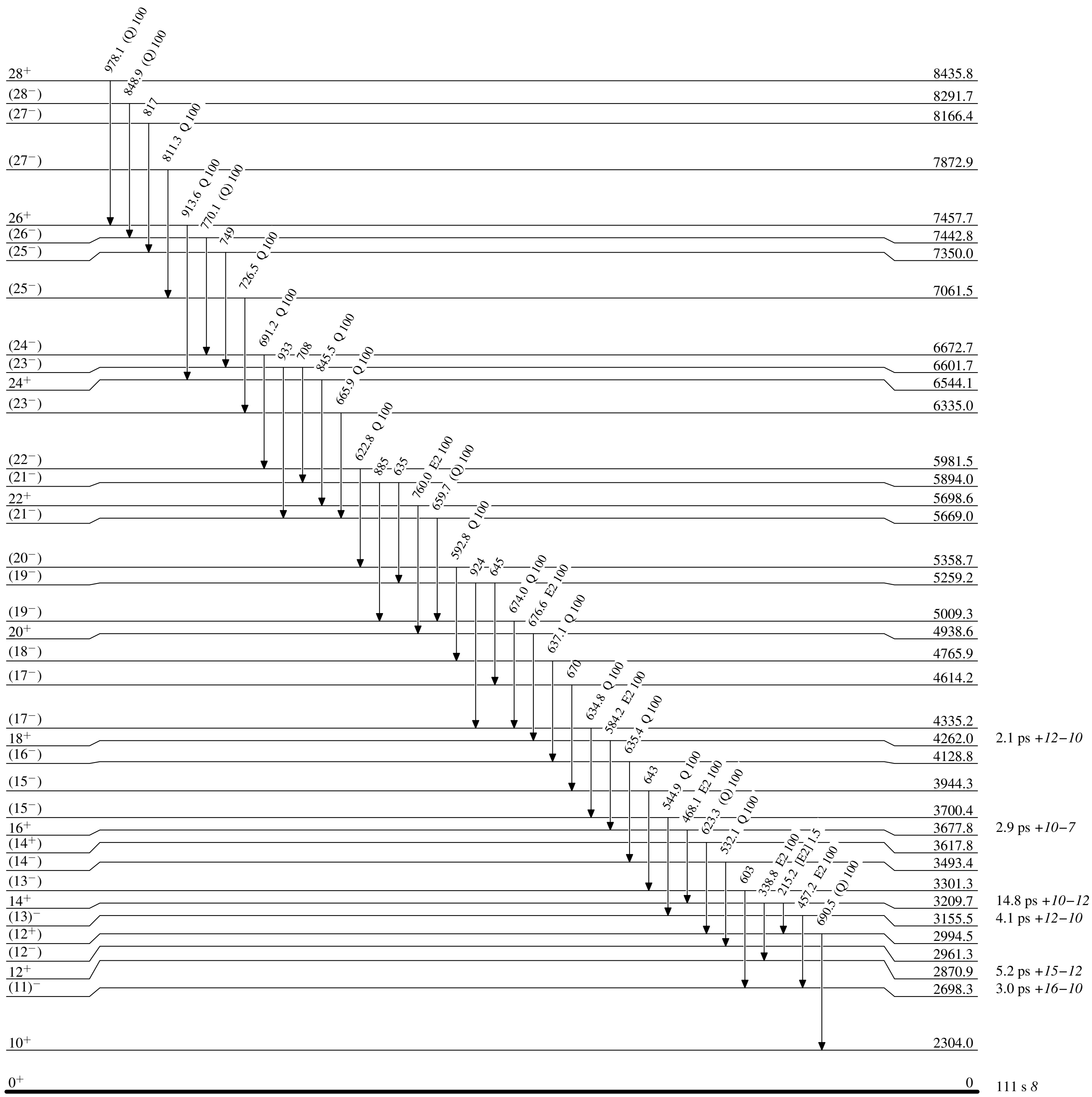


$^{164}_{72}Hf_{92}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

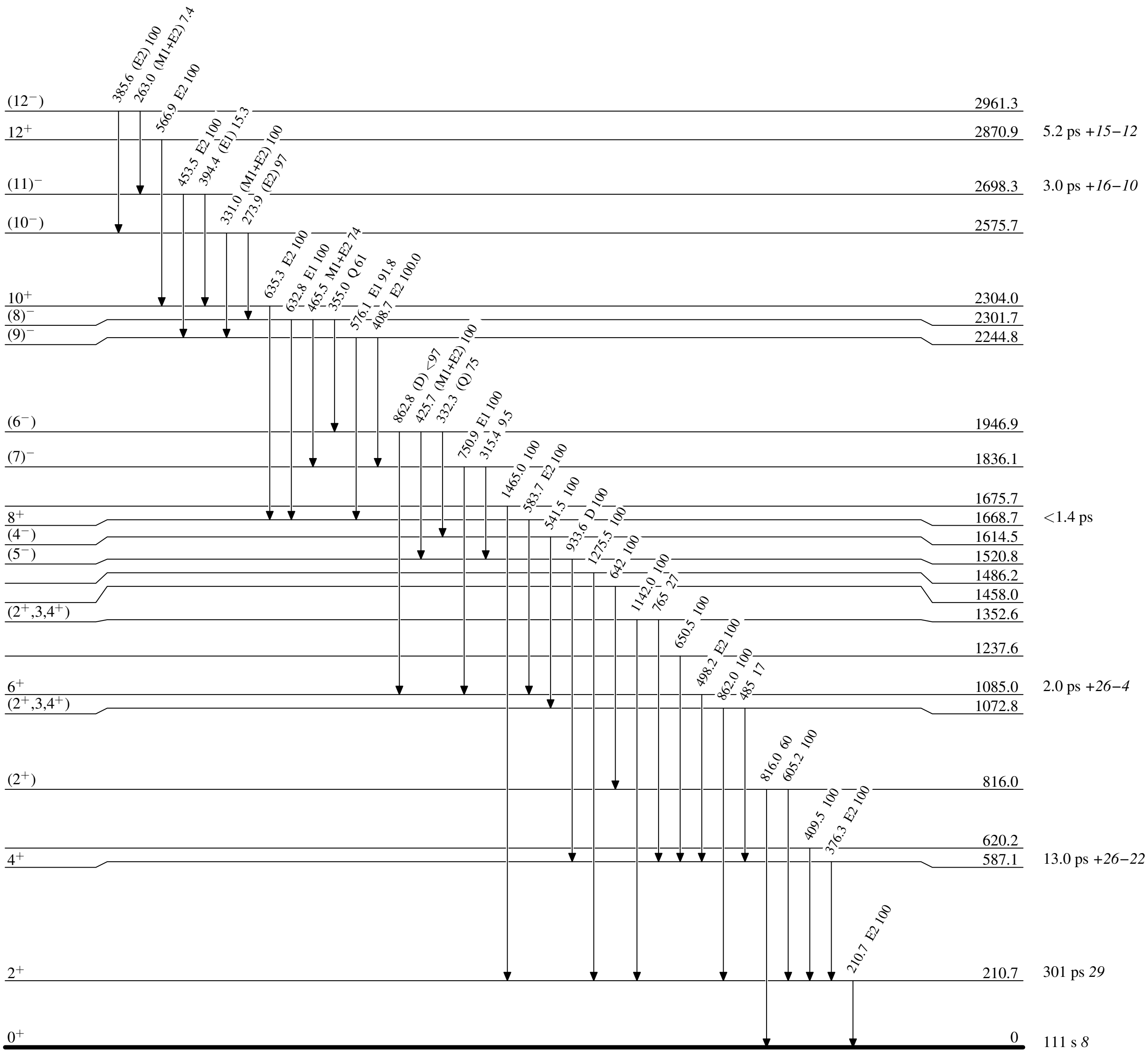


$^{164}_{72}Hf_{92}$

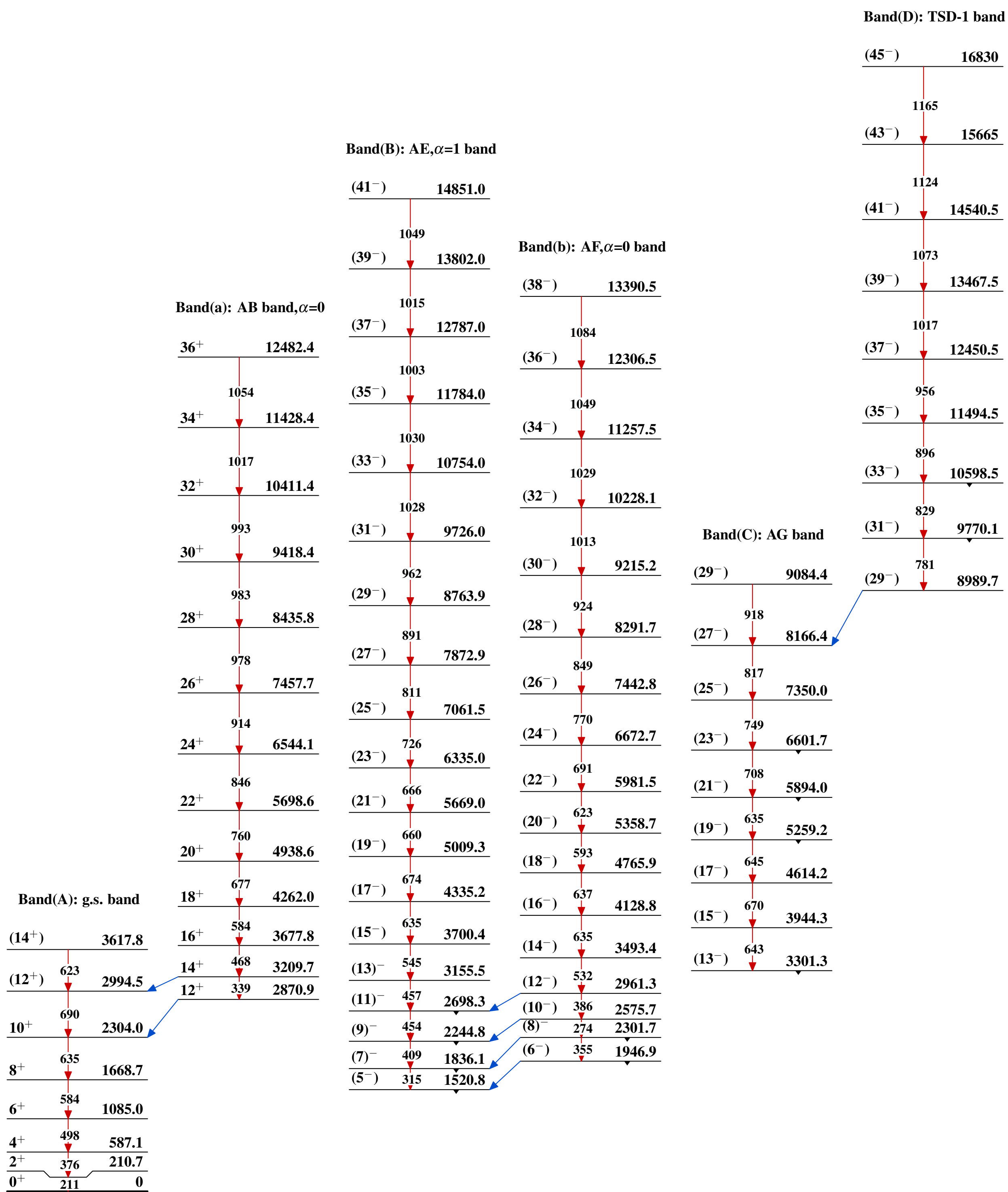
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

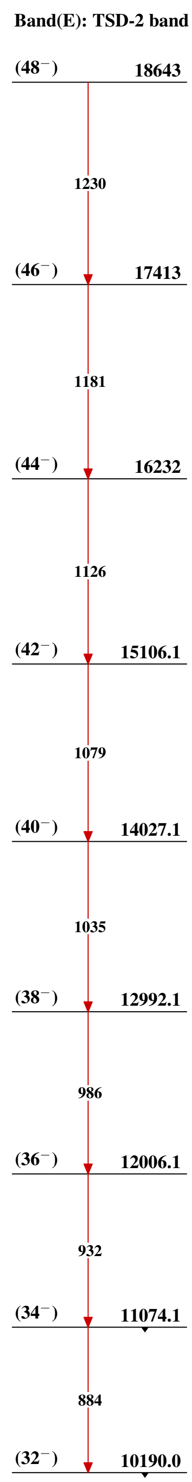


Adopted Levels, Gammas



$^{164}_{72}Hf_{92}$

Adopted Levels, Gammas (continued)



$^{164}_{72}Hf_{92}$