^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

History			
Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 110, 265 (2009)	15-Nov-2008

Other studies: 1978b315, 1983Pe13, 1976Be47, 1997Ne04, 1999Vy01, 2001Ba04 (or 2001Ba86, or 2001Ne06).

2001Ba04 (or 2001Ba86 or 2001Ne06): E(^{13}C)=63 MeV; 98% enriched ^{170}Er target, ^{179}W ions implanted In-beam into thick Tl polycrystalline foil At T=473 K for level-mixing spectroscopy (LEMS) method determination of Q(3348 level). See also 1999Vy01 (Tl host), 1997Ne04 (Bi host).

1998ByZZ: E(^{13}C)=65 MeV, pulsed beam; ^{179}W recoils implanted In thick Tl foil At 260 C In H=2.43 *2* tessla magnetic field; Ge detectors At +135° and −135°; measured g-factors using DTPAD ($21/2^+$ and $35/2^-$ high-K isomers).

1994Wa05: E(^{13}C)=67 MeV, ^{170}Er target, pulsed beam (FWHM=1 ns, 864 ns pulse separation), six Compton-suppressed Ge detectors (CAESAR array); measured Eγ, Iγ, prompt (±15 ns window, both In beam and out of beam) and delayed (240 ns to 420 ns event separation) $\gamma\gamma$ coin, $\gamma\gamma$(t), beam-γ(t), prompt-gated $\gamma(\theta)$ (3 angles); band-mixing analysis, blocking calculations. See also 1991Wa26.

1983Pe13: 96% ^{170}Er target; E(^{13}C)=61-65 MeV; pulsed beam. Measured Eγ, Iγ, Ice, $\gamma(\theta)$, $\gamma\gamma$ coin. Detectors: 4Ge(Li) detectors, 14 NaI detectors, mini-orange magnetic spectrometer. details of ce and $\gamma(\theta)$ data not given by authors.

1978Be15: ^{170}Er(^{13}C,4nγ), E unstated, and ^{180}Hf(α,5nγ) at Eα=58 MeV; Ge(Li) detector; measured Eγ, Iγ, prompt and delayed $\gamma\gamma$ coin, beam-γ(t).

^{179}W Levels

The level scheme is taken from 1994Wa05.

E(level)[†]	J$^\pi$[‡]	T$_{1/2}$[#]
0.0[a]	$7/2^-$	
119.84[a] *14*	$9/2^-$	
221.99[e] *20*	$1/2^-$	
264.39[a] *14*	$11/2^-$	
304.8[e] *3*	$3/2^-$	
308.89[c] *14*	$9/2^+$	1.6 ns *2*
318.5[e] *3*	$5/2^-$	
372.65[c] *15*	$11/2^+$	
432.46[a] *16*	$13/2^-$	
468.41[c] *15*	$13/2^+$	
508.6[e] *4*	$7/2^-$	
533.2[e] *3*	$9/2^-$	
605.94[c] *16*	$15/2^+$	
622.84[a] *17*	$15/2^-$	
748.11[c] *16*	$17/2^+$	
823.1[e] *4*	$11/2^-$	
833.98[a] *18*	$17/2^-$	
857.2[e] *4*	$13/2^-$	
915.59[f] *17*	$(13/2^+)$	
960.80[c] *17*	$19/2^+$	
1064.46[a] *18*	$19/2^-$	
1123.17[c] *18*	$21/2^+$	
1127.17[f] *17*	$(15/2^+)$	
1150.36 *15*	$13/2^+$[@]	
1216.16[f] *17*	$17/2^+$	
1224.5[e] *5*	$15/2^-$	
1272.9[e] *4*	$17/2^-$	

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^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

^{179}W Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
1312.46[a] 19	21/2$^-$		
1425.04[c] 19	23/2$^+$		
1517.11 16	17/2$^+$[&]		
1532.40[f] 18	(19/2$^+$)		
1575.86[a] 19	23/2$^-$		
1582.68[c] 20	25/2$^+$		
1631.83[d] 17	21/2$^+$	390 ns 30	T$_{1/2}$: other datum: 375 ns, ΔT$_{1/2}$ unstated (1978Be15). g-factor: much less than 0.48 and of opposite sign to that for 31/2$^-$ 3348 level (1998ByZZ; from DTPAD).
1698.0[e] 5	19/2$^-$		
1754.6[e] 4	21/2$^-$		
1832.20[b] 20	23/2$^-$	<0.5 ns	T$_{1/2}$: based on time centroid of 200γ relative to beam pulse.
1854.03[a] 21	25/2$^-$		
1873.30[d] 20	23/2$^+$		
1987.40[c] 23	27/2$^+$		
2012.02[g] 20	(23/2)$^+$	<1.0 ns	T$_{1/2}$: based on lack of centroid shift for 139γ.
2037.78[b] 21	25/2$^-$		
2088.4[h] 3	(23/2)	<0.5 ns	J$^{\pi}$: π=(−) is indicated In band label In fig. 1 (part 3) of 1994Wa05. T$_{1/2}$: based on lack of centroid shift for 457γ.
2120.38[c] 23	29/2$^+$		
2137.92[d] 21	25/2$^+$		
2141.22[a] 20	27/2$^-$		
2221.8[e] 6	23/2$^-$		
2261.28[b] 20	27/2$^-$		E(level): misprinted as 2271.7 and 2761.7 in 1983Pe13 and 1978Be15, respectively.
2272.8[e] 4	25/2$^-$		
2291.66[g] 24	(25/2)$^+$		
2299.6[h] 4	(25/2)		
2424.34[d] 23	27/2$^+$		
2442.62[a] 22	29/2$^-$		
2504.75[b] 21	29/2$^-$		
2546.7[h] 4	(27/2)		
2586.24[g] 22	(27/2)$^+$		
2633.5[c] 3	31/2$^+$		
2723.42[c] 25	33/2$^+$		
2730.79[d] 23	29/2$^+$		
2738.65[b] 20	31/2$^-$		
2766.7[e] 6	27/2$^-$		
2772.55[a] 21	31/2$^-$		
2798.3[e] 4	29/2$^-$		
2822.0[h] 5	(29/2)		
2893.73[g] 24	(29/2)$^+$		
3031.90[b] 22	33/2$^-$		
3055.0[d] 3	31/2$^+$		
3082.08[a] 21	33/2$^-$		
3121.0[h] 5	(31/2)		
3210.5[g] 3	(31/2)$^+$		
3224.92[i] 23	(31/2$^+$)	<0.5 ns	T$_{1/2}$: based on lack of centroid shift for 331γ.
3326.23[b] 22	35/2$^-$		

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^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

^{179}W Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	T$_{1/2}$[#]	Comments
3328.0[e] 4	33/2$^-$		
3343.4[c] 4	35/2$^+$		
3345.9[e] 6	31/2$^-$		
3348.36[j] 22	35/2$^-$	750 ns 80	g=0.475 5 (1998ByZZ); Q=4.0 +8−11 (2001Ba04) g-factor from TDPAD (1998ByZZ). Q: from level-mixing spectroscopy (LEMS) (2001Ba04; see also 1999Vy01, 2001Ba86, 2001Ne06). Q implies β_2=0.19 +4−5, based on rotational model (2001Ba04). other T$_{1/2}$: 710 ns, ΔT$_{1/2}$ unstated (1978Be15).
3348.52[i] 24	(33/2$^+$)		
3370.6[c] 4	37/2$^+$		
3391.3[d] 3	33/2$^+$		
3401.65[a] 24	35/2$^-$		
3439.0[h] 6	(33/2)		
3534.9[g] 4	(33/2)$^+$		
3535.4[l] 3	35/2$^{(-)}$		
3570.01[i] 25	(35/2$^+$)		
3582.6[k] 3	37/2$^+$	<0.5 ns	T$_{1/2}$: based on lack of centroid shift for 234γ.
3596.5[m] 3	37/2$^-$	0.7 ns 2	T$_{1/2}$: from time centroid shift for 248γ. Corrected for isomeric feeding.
3637.8[b] 3	37/2$^-$		
3711.7[j] 3	37/2$^-$		
3746.5[d] 4	35/2$^+$		
3748.2[a] 3	37/2$^-$		
3778.1[n] 3	39/2$^+$	<0.5 ns	T$_{1/2}$: based on lack of centroid shift for 457γ (1994Wa05). Other: 80 ns from 1978Be15.
3779.0?[h] 9	(35/2)		
3827.1[i] 3	(37/2$^+$)		
3853.2?[l] 4	(37/2$^-$)		
3906.4[k] 3	39/2$^+$		
3920.0[e] 3	37/2$^-$		
3963.6[b] 3	39/2$^-$		
3968.6[m] 3	39/2$^-$		
3984.9?[e] 12	(35/2$^-$)		
4041.2[c] 4	41/2$^+$		
4090.5[j] 4	39/2$^-$		
4091.2[c] 4	39/2$^+$		
4094.7[a] 4	39/2$^-$		
4117.2[i] 3	(39/2$^+$)		
4120.1[n] 4	41/2$^+$		
4186.2?[l] 4	(39/2$^-$)		
4243.4[k] 3	41/2$^+$		
4305.0[b] 4	41/2$^-$		
4354.5[m] 3	41/2$^-$		
4435.5[i] 3	(41/2$^+$)		
4464.3[a] 4	41/2$^-$		
4476.8[n] 4	43/2$^+$		
4477.5[j] 4	41/2$^-$		
4573.3[e] 4	41/2$^-$		
4596.9[k] 4	43/2$^+$		
4609.8[o] 3	43/2$^+$	0.7 ns 2	
4666.5[b] 4	43/2$^-$		
4738.2[c] 5	45/2$^+$		

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^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

^{179}W Levels (continued)

E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡	E(level)†	Jπ‡
4748.3[m] 4	43/2⁻	5119.9[o] 4	47/2⁺	5489.6[o] 4	49/2⁺	5947.5[i] 4	(49/2⁺)
4779.3[i] 4	(43/2⁺)	5141.3[m] 4	45/2⁻	5497.4[p] 4	49/2(⁻)	6069.5?[n] 8	(51/2⁺)
4800.7[o] 4	45/2⁺	5146.9[i] 4	(45/2⁺)	5536.8[i] 4	(47/2⁺)	6234.8[p] 4	53/2(⁻)
4845.1[a] 4	43/2⁻	5178.3[p] 4	47/2(⁻)	5611.1[c] 5	47/2⁺	6268.6?[b] 11	(51/2⁻)
4847.1[c] 5	43/2⁺	5233.3[a] 5	45/2⁻	5646.3[n] 4	49/2⁺	6310.1[c] 6	53/2⁺
4849.8[n] 4	45/2⁺	5239.6[n] 4	47/2⁺	5648.7[a] 5	47/2⁻	6330.7[o] 5	53/2⁺
4864.8?[j] 8	(43/2⁻)	5278.3?[e] 11	(45/2⁻)	5764.1[k] 4	49/2⁺	6623.4?[p] 8	(55/2⁻)
4921.4[p] 4	45/2(⁻)	5357.1[k] 4	47/2⁺	5833.6[b] 5	49/2⁻	6708.6?[b] 11	(53/2⁻)
4967.8[k] 4	45/2⁺	5436.6[b] 4	47/2⁻	5852.0[p] 4	51/2(⁻)	6792.5[o] 5	55/2⁺
5036.7[b] 4	45/2⁻	5487.0[c] 5	49/2⁺	5895.4[o] 4	51/2⁺		

† From least-squares fit to Eγ, omitting lines whose placement is uncertain, except when a level is deexcited only by γ rays with uncertain placement; in the latter case ΔE_γ=1 keV has been assumed for lines having no author-assigned ΔE_γ.

‡ From 1994Wa05, based on γ multipolarities (from γ(θ) and/or I(γ+ce) balance), γ branching, deduced properties of rotational structures. 1994Wa05 assume mult=E1, M1 or E2, unless ns or longer half-lives are involved (in which case M2 transitions are also considered), and assume that M1 transitions are more likely than E2 between intrinsic states for which ΔJ=0 or 1. See 1994Wa05 for detailed justification for their configuration- and Jπ-assignments.

From 1994Wa05, except as noted. values below 10 ns are from centroid-shift analysis of background-subtracted beam-γ(t) spectra. Those for the 1632 and 3348 levels were measured by projecting time spectra In coincidence with specific γ transitions. No additional isomers with $T_{1/2}$>10 ns were observed by 1994Wa05.

@ Probably a quadrupole or octupole vibration coupled to the 9/2[624] or 7/2[514] configuration, respectively (1994Wa05).

& Possibly a rotational excitation of the Kπ=13/2⁺, 1150-keV state; could alternatively be a Kπ=17/2⁺ state having Configuration=((ν 1/2[521])(ν 7/2[514])(ν 9/2[624])) (1994WA05).

[a] Band(A): ν 7/2[514] g.s. band. Deduced g_K(exp)=+0.30 *7*, As expected for this configuration (1994Wa05).

[b] Band(B): Kπ=23/2⁻ band. Three-quasineutron Configuration=((ν 7/2[514])(ν 7/2[633])(ν 9/2[624])) exhibiting high alignment. lies At lower energy than the g.s. band for J≥31/2. deduced g_K(exp)=+0.24 *5* (1994Wa05).

[c] Band(C): ν 9/2[624] Coriolis mixed band. Deduced g_K(exp)=+0.08 *6*; delayed band crossings At ħω≈0.32-0.36 MeV for both signatures; significant alignment (≈2ħ) (1994Wa05).

[d] Band(D): Kπ=21/2⁺ band. Three-quasineutron Configuration=((ν 5/2[512])(ν 7/2[514])(ν 9/2[624])). Deduced g_K(exp)=+0.13 *5* (1994Wa05).

[e] Band(E): ν 1/2[521] band. Band crossings At ħω≈0.26 MeV for both signatures (1994Wa05).

[f] Band(F): tentative ν 7/2[633] band. Significant Coriolis-induced perturbations As expected for a (ν $i_{13/2}$) configuration (1994Wa05).

[g] Band(G): Kπ=(23/2)⁺ band. Three-quasiparticle Configuration=((ν 7/2[514])(π 7/2[404])(π 9/2[514])). Deduced g_K(exp)=+0.7 *1* (1994Wa05).

[h] Band(H): Kπ=(23/2⁻) band. Three-quasiparticle Configuration=((ν 9/2[624])(π 5/2[402])(π 9/2[514])). Deduced g_K(exp)>0.52 or<0.08, alignment≈2.5ħ (1994Wa05).

[i] Band(I): Kπ=(31/2⁺) band. Five quasiparticle Configuration=(3ν(5/2[512]+7/2[514]+9/2[624]) + 2π(1/2[541]+9/2[514])) band. Deduced g_K(exp)=+0.24 *5*, alignment≈5ħ (1994Wa05).

[j] Band(J): Kπ=35/2⁻ band. Five quasiparticle Configuration=(3ν(5/2[512]+7/2[514]+9/2[624]) + 2π(5/2[402]+9/2[514])) band. Deduced g_K(exp)=+0.6 *1* or 0.0 *1* (1994Wa05).

[k] Band(K): Kπ=37/2⁺ band. Five quasiparticle Configuration=(3ν(7/2[514]+7/2[633]+9/2[624]) + 2π(5/2[402]+9/2[514])) band. Deduced g_K(exp)=+0.54 *6* (1994Wa05).

[l] Band(L): Kπ=(35/2)⁻ band. Five quasiparticle Configuration=(3ν(7/2[514]+7/2[633]+9/2[624]) + 2π(5/2[402]+7/2[404])) band.

[m] Band(M): Kπ=37/2⁻ band. Five quasiparticle Configuration=(3ν(5/2[512]+7/2[514]+9/2[624]) + 2π(7/2[404]+9/2[514])) band. Deduced g_K(exp)=+0.36 *6* or +0.24 *6* (1994Wa05).

[n] Band(N): Kπ=39/2⁺ band. Five quasiparticle Configuration=(3ν(7/2[514]+7/2[633]+9/2[624]) + 2π(7/2[404]+9/2[514])) band.

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^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

^{179}W Levels (continued)

Deduced g_K(exp)=+0.5 *1*, alignment≈4$\hbar$ (1994Wa05).

[o] Band(O): $K^\pi=43/2^+$ band. Seven quasiparticle Configuration=(3ν(7/2[514]+5/2[512]+9/2[624]) + 4π(1/2[541]+5/2[402]+7/2[404]+9/2[514])) band. Deduced g_K(exp)=+0.46 *7* or +0.14 *7* (1994Wa05).

[p] Band(P): $K^\pi=45/2^{(-)}$ band. Seven quasiparticle Configuration=(3ν(7/2[514]+7/2[633]+9/2[624]) + 4π(1/2[541]+5/2[402]+7/2[404]+9/2[514])) band. Deduced g_K(exp)=+0.42 *6* or +0.18 *6*, large alignment (1994Wa05).

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$

A_2 data from $\gamma(\theta)$ (1994Wa05) are given in comments.

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	α[c]	Comments
22.1 *2*		3348.52	(33/2$^+$)	3326.23	35/2$^-$				
61.0 *2*	45[&] *15*	3596.5	37/2$^-$	3535.4	35/2$^{(-)}$	M1		3.42 *6*	Mult.: based on I(γ+ce) balance at 3535 level (1994Wa05).
63.6 *2*	243[&] *72*	372.65	11/2$^+$	308.89	9/2$^+$	D+Q	167 *45*	4.9 *16*	Mult.,Iγ(delayed),α: from delayed intensity balance At 309 level, α(exp)=4.9 *16* assuming E2 multipolarity for 159.5γ and adopted E1 multipolarity for 189γ and 309γ. this α(exp) implies δ(M1,E2)=0.30 *+13−19*.
82.8 *2*	53[&] *13*	304.8	3/2$^-$	221.99	1/2$^-$				
89.2 *2*		1216.16	17/2$^+$	1127.17	(15/2$^+$)		4 *2*		Weak line in singles spectrum.
95.6 *2*	232[&] *70*	468.41	13/2$^+$	372.65	11/2$^+$		162 *2*		
96.5 *2*	18[&] *4*	318.5	5/2$^-$	221.99	1/2$^-$				
99.5 *2*		1631.83	21/2$^+$	1532.40	(19/2$^+$)		6 *2*		Weak line in singles spectrum.
108.2 *2*	116[&] *35*	372.65	11/2$^+$	264.39	11/2$^-$		41 *3*		
114.8 *2*		1631.83	21/2$^+$	1517.11	17/2$^+$		32 *3*		
119.8 *2*	586 *9*	119.84	9/2$^-$	0.0	7/2$^-$	M1+E2	501 *15*	2.4 *4*	Mult.: A_2=−0.46 *10*; $\Delta\pi$=No from delayed intensity balance At 120 level.
123.7 *2*	45 *3*	3348.52	(33/2$^+$)	3224.92	(31/2$^+$)				
137.4 *2*	450 *25*	605.94	15/2$^+$	468.41	13/2$^+$	D+Q	197 *7*		Mult.: A_2=−1.07 *10*.
138.7 *2*	110 *5*	2012.02	(23/2)$^+$	1873.30	23/2$^+$	M1(+E2)		1.5 *4*	Mult.: from 1.3<α(exp)<2.4, based on I(γ+ce) balance at 2012 level (1994Wa05). A_2=−0.12 *10*.
142.1 *2*	244 *5*	748.11	17/2$^+$	605.94	15/2$^+$	D+Q	186 *7*		Mult.: A_2=−1.01 *5*.
144.5 *2*	179 *7*	264.39	11/2$^-$	119.84	9/2$^-$	D+Q	146 *7*		Mult.: A_2=−0.51 *8*.
157.6 *2*	34 *11*	1582.68	25/2$^+$	1425.04	23/2$^+$				
159.5 *2*	106 *5*	468.41	13/2$^+$	308.89	9/2$^+$		43 *3*		Mult.: A_2=+0.08 *13*.
162.2 *2*	114[&] *30*	1123.17	21/2$^+$	960.80	19/2$^+$		25 *2*		
164.3 *2*	22 *2*	2037.78	25/2$^-$	1873.30	23/2$^+$				
168.0 *2*	90[&] *30*	432.46	13/2$^-$	264.39	11/2$^-$		13 *2*		
178.7 *2*	12[&] *4*	3570.01	(35/2$^+$)	3391.3	33/2$^+$				
179.7 *2*	23 *4*	2012.02	(23/2)$^+$	1832.20	23/2$^-$				
181.6 *2*	349 *15*	3778.1	39/2$^+$	3596.5	37/2$^-$				
187.0 *2*	115 *6*	3535.4	35/2$^{(-)}$	3348.36	35/2$^-$	M1		0.804	Mult.: based on I(γ+ce) balance at 3535 level (1994Wa05).
189.0 *2*	1241 *24*	308.89	9/2$^+$	119.84	9/2$^-$	(D)	594 *19*		Mult.: A_2=−0.02 *8* implies presence of a D component.
190.3 *2*	68 *20*	622.84	15/2$^-$	432.46	13/2$^-$		44 *8*		
190.9 *2*	87 *5*	4800.7	45/2$^+$	4609.8	43/2$^+$				
195.5 *2*	47 *3*	3778.1	39/2$^+$	3582.6	37/2$^+$	M1		0.710	Mult.: from α(exp)=0.9 *2*, based on I(γ+ce) balance at 1832 level (1994Wa05) and mult(234γ)=E1.
200.3 *2*	532 *19*	1832.20	23/2$^-$	1631.83	21/2$^+$	E1	31 *3*	0.0624	Mult.: from α(exp)<0.15, based on I(γ+ce) balance at 1832 level (1994Wa05). A_2=−0.50 *5*.

$^{179}_{74}W_{105}$-6

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	α[c]	Comments
203.8 *2*	300[&] *75*	508.6	7/2$^-$	304.8	3/2$^-$				
204.1 *2*	100[&] *30*	468.41	13/2$^+$	264.39	11/2$^-$		24 *2*		
205.6 *2*	247 *15*	2037.78	25/2$^-$	1832.20	23/2$^-$	D+Q	15 *3*		Mult.: A_2=−1.19 *13*; implies δ(D,Q)<0.
206.7 *2*		1631.83	21/2$^+$	1425.04	23/2$^+$		58 *3*		
[x]210.7[b] *2*	28[&] *8*								
211.0 *2*	30[&] *10*	833.98	17/2$^-$	622.84	15/2$^-$		4 *1*		
211.2 *2*	84 *4*	2299.6	(25/2)	2088.4	(23/2)				
211.5[d] *2*		1127.17	(15/2$^+$)	915.59	(13/2$^+$)		2[&] *1*		Weak line in singles spectrum.
212.5 *2*	205 *6*	960.80	19/2$^+$	748.11	17/2$^+$	D+Q	61 *3*		Mult.: A_2=−1.01 *9*.
214.6 *2*	205 *6*	533.2	9/2$^-$	318.5	5/2$^-$				Mult.: A_2=+0.13 *9*.
221.4 *2*	68 *5*	3570.01	(35/2$^+$)	3348.52	(33/2$^+$)	D+Q			Mult.: from A_2=−1.21 *25*.
221.9 *2*		221.99	1/2$^-$	0.0	7/2$^-$				
223.4 *2*	116 *6*	2261.28	27/2$^-$	2037.78	25/2$^-$	D+Q	7 *2*		$A_2\leq$−0.7; implies δ(D,Q)<0.
230.3 *2*	30[&] *10*	1064.46	19/2$^-$	833.98	17/2$^-$		25 *2*		
233.2 *2*	433 *45*	605.94	15/2$^+$	372.65	11/2$^+$		200 *8*		Mult.: A_2=+0.24 *24*.
234[d]		2738.65	31/2$^-$	2504.75	29/2$^-$		4 *2*		Weak line in singles spectrum.
234.2 *2*	322 *15*	3582.6	37/2$^+$	3348.36	35/2$^-$	E1		0.0420	Mult.: from α(exp)<0.10, based on I(γ+ce) balance at 3582 level (1994Wa05). Supported by A_2=−0.23 *19*.
241.4 *2*	604 *21*	1873.30	23/2$^+$	1631.83	21/2$^+$	D+Q			Mult.: A_2=−1.13 *15*; implies δ(D,Q)<0.
243.3 *2*	52[&] *15*	2504.75	29/2$^-$	2261.28	27/2$^-$		3 *1*		
244.0 *2*		3326.23	35/2$^-$	3082.08	33/2$^-$		2 *1*		Weak line in singles spectrum.
247.1 *2*	52 *6*	2546.7	(27/2)	2299.6	(25/2)				
248.0 *2*	20[&] *6*	1312.46	21/2$^-$	1064.46	19/2$^-$		3 *1*		
248.2 *2*	266 *13*	3596.5	37/2$^-$	3348.36	35/2$^-$	D+Q			Mult.: from A_2=−0.97 *10*.
252.8 *2*	545 *10*	372.65	11/2$^+$	119.84	9/2$^-$	D	253 *11*		Mult.: A_2=−0.38 *4*.
255.2 *2*		1216.16	17/2$^+$	960.80	19/2$^+$		48 *4*		Weak line in singles spectrum.
256.7 *2*	60 *4*	5178.3	47/2$^{(-)}$	4921.4	45/2$^{(-)}$				
257.2 *2*	64 *3*	3827.1	(37/2$^+$)	3570.01	(35/2$^+$)				
259.3 *2*	16[&] *5*	3031.90	33/2$^-$	2772.55	31/2$^-$		2 *1*		
263.4 *2*	15[&] *4*	1575.86	23/2$^-$	1312.46	21/2$^-$		12[&] *3*		
264.5 *2*	950 *30*	264.39	11/2$^-$	0.0	7/2$^-$		725 *50*		A_2=−0.10 *8* for 264.5γ+264.6γ doublet.
264.6 *2*	197 *8*	2137.92	25/2$^+$	1873.30	23/2$^+$				A_2=−0.10 *8* for 264.5γ+264.6γ doublet.
266.3 *2*		3348.36	35/2$^-$	3082.08	33/2$^-$		2 *1*		
275.3 *2*	35 *3*	2822.0	(29/2)	2546.7	(27/2)				
279.6 *2*	251 *10*	2291.66	(25/2)$^+$	2012.02	(23/2)$^+$				
279.7 *2*	7.1×10^2[&] *18*	748.11	17/2$^+$	468.41	13/2$^+$		413 *16*		
286.4 *2*	119 *6*	2424.34	27/2$^+$	2137.92	25/2$^+$				Eγ=266.2 given by 1983Pe13 is presumed to be a misprint.
287.1 *2*	14[&] *4*	2141.22	27/2$^-$	1854.03	25/2$^-$		12 *2*		
290.0 *2*	29 *3*	4117.2	(39/2$^+$)	3827.1	(37/2$^+$)				

$^{179}_{74}W_{105}$-7

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

γ(^{179}W) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	Comments
294.5 *2*	219 *9*	2586.24	$(27/2)^+$	2291.66	$(25/2)^+$	(D+Q)		Mult.: A_2=+0.04 *15*.
296.0 *2*		2738.65	$31/2^-$	2442.62	$29/2^-$		16 *5*	Weak line in singles spectrum.
299.0 *2*	33 *3*	3121.0	(31/2)	2822.0	(29/2)			
300.6 *2*		1216.16	$17/2^+$	915.59	$(13/2^+)$		18[&] *5*	Weak line in singles spectrum.
301.8 *2*	85[&] *26*	1425.04	$23/2^+$	1123.17	$21/2^+$		15 *5*	
306.5 *2*	80[&] *27*	2730.79	$29/2^+$	2424.34	$27/2^+$			
307.4 *2*	122[&] *36*	2893.73	$(29/2)^+$	2586.24	$(27/2)^+$			
308.9 *2*	890 *22*	308.89	$9/2^+$	0.0	$7/2^-$	D	411 *16*	Mult.: A_2=−0.23 *6*.
309.7 *2*		915.59	$(13/2^+)$	605.94	$15/2^+$		9 *3*	Weak line in singles spectrum.
311.6 *2*	128 *8*	4921.4	$45/2^{(-)}$	4609.8	$43/2^+$			
312.7 *2*	985 *41*	432.46	$13/2^-$	119.84	$9/2^-$		142 *8*	Mult.: A_2=+0.08 *9*.
314.5 *2*	328[&] *66*	823.1	$11/2^-$	508.6	$7/2^-$			
316.4 *2*		3348.36	$35/2^-$	3031.90	$33/2^-$		25 *5*	
316.5 *2*	17[&] *6*	1064.46	$19/2^-$	748.11	$17/2^+$		15 *5*	
316.7 *2*	36 *3*	3210.5	$(31/2)^+$	2893.73	$(29/2)^+$			
317.7[d] *2*	28 *8*	3853.2?	$(37/2^-)$	3535.4	$35/2^{(-)}$			
318.0 *2*	19[&] *6*	3439.0	(33/2)	3121.0	(31/2)			
318.2 *2*	20[&] *7*	4435.5	$(41/2^+)$	4117.2	$(39/2^+)$			
319.0 *2*	65[&] *22*	5497.4	$49/2^{(-)}$	5178.3	$47/2^{(-)}$			A_2=+0.27 *14* for 319.0γ+319.2γ doublet.
319.2 *2*	60[&] *20*	5119.9	$47/2^+$	4800.7	$45/2^+$			A_2=+0.27 *14* for 319.0γ+319.2γ doublet.
323.9 *2*	250 *40*	857.2	$13/2^-$	533.2	$9/2^-$			
323.9 *2*	175 *10*	3906.4	$39/2^+$	3582.6	$37/2^+$			
324.1 *2*	38[&] *13*	3055.0	$31/2^+$	2730.79	$29/2^+$			
324.4 *2*	18[&] *6*	3534.9	$(33/2)^+$	3210.5	$(31/2)^+$			
331.2 *2*	136 *10*	3224.92	$(31/2^+)$	2893.73	$(29/2)^+$	(D+Q)		Mult.: A_2=+0.14 *7*.
333.0[d] *2*	15 *4*	4186.2?	$(39/2^-)$	3853.2?	$(37/2^-)$			
336[d]	20 *8*	3391.3	$33/2^+$	3055.0	$31/2^+$			
337.0 *2*	128 *7*	4243.4	$41/2^+$	3906.4	$39/2^+$			Mult.: A_2=+0.19 *13*.
340[d]	8[&] *3*	3779.0?	(35/2)	3439.0	(33/2)			
342.0 *2*	145 *10*	4120.1	$41/2^+$	3778.1	$39/2^+$			Mult.: A_2=+0.46 *10*; consistent with Q or D+Q, but placement implies the latter.
345.2 *2*	22 *6*	3570.01	$(35/2^+)$	3224.92	$(31/2^+)$			
353.4 *2*	51 *5*	4596.9	$43/2^+$	4243.4	$41/2^+$			
354.5 *2*	34 *4*	5852.0	$51/2^{(-)}$	5497.4	$49/2^{(-)}$			
354.9 *2*	688 *32*	960.80	$19/2^+$	605.94	$15/2^+$	E2[a]	175 *8*	A_2=+0.33 *11*.
356.6 *2*	81 *5*	4476.8	$43/2^+$	4120.1	$41/2^+$			
358.5 *2*	1327 *39*	622.84	$15/2^-$	264.39	$11/2^-$	E2[a]	863 *37*	A_2=+0.19 *7*.
363.3 *2*	98 *6*	3711.7	$37/2^-$	3348.36	$35/2^-$			
366.5 *2*	64 *5*	4609.8	$43/2^+$	4243.4	$41/2^+$			

$^{179}_{74}W_{105}$-8

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	α[c]	Comments
366.7 *2*		1517.11	17/2$^+$	1150.36	13/2$^+$		23 *2*		Weak line in singles spectrum.
369.7 *2*	31 *5*	5489.6	49/2$^+$	5119.9	47/2$^+$				
370.9 *2*	30[&] *10*	4967.8	45/2$^+$	4596.9	43/2$^+$				
372.0 *2*	90[&] *20*	3968.6	39/2$^-$	3596.5	37/2$^-$				
372.9 *2*	40[&] *13*	4849.8	45/2$^+$	4476.8	43/2$^+$				
375.1 *2*	860 *17*	1123.17	21/2$^+$	748.11	17/2$^+$	(Q)	176 *8*		Mult.: A_2=+0.22 *5*.
377.6 *2*	42 *5*	5178.3	47/2$^{(-)}$	4800.7	45/2$^+$				
378.9 *2*	51 *5*	4090.5	39/2$^-$	3711.7	37/2$^-$				
379.1 *2*		1127.17	(15/2$^+$)	748.11	17/2$^+$		6 *2*		Weak line in singles spectrum.
380.4 *2*	20 *5*	2012.02	(23/2)$^+$	1631.83	21/2$^+$				
382.6 *2*	19 *2*	6234.8	53/2$^{(-)}$	5852.0	51/2$^{(-)}$				
385.8 *2*	64 *7*	4354.5	41/2$^-$	3968.6	39/2$^-$				
387.0 *2*		4477.5	41/2$^-$	4090.5	39/2$^-$				Iγ=23 *2* for 387.0γ+387γ doublet.
387[d]		4864.8?	(43/2$^-$)	4477.5	41/2$^-$				Iγ=23 *2* for 387.0γ+387γ doublet.
389[d]		6623.4?	(55/2$^-$)	6234.8	53/2$^{(-)}$				
389.2 *2*	20[&] *7*	5357.1	47/2$^+$	4967.8	45/2$^+$				
389.7 *2*	17[&] *6*	5239.6	47/2$^+$	4849.8	45/2$^+$				
389.9 *2*		1517.11	17/2$^+$	1127.17	(15/2$^+$)		17 *2*		Weak line in singles spectrum.
393[d]		5141.3	45/2$^-$	4748.3	43/2$^-$				
394[d]		4748.3	43/2$^-$	4354.5	41/2$^-$				
401.4 *2*	223[&] *45*	1224.5	15/2$^-$	823.1	11/2$^-$				A_2=+0.25 *3* for 401.4γ+401.5γ doublet.
401.5 *2*	635[&] *64*	833.98	17/2$^-$	432.46	13/2$^-$		86 *6*		A_2=+0.25 *3* for 401.4γ+401.5γ doublet.
404.7 *2*	26 *9*	1987.40	27/2$^+$	1582.68	25/2$^+$				
405.2 *2*		1532.40	(19/2$^+$)	1127.17	(15/2$^+$)		7 *2*		
405.7 *2*	26 *4*	5895.4	51/2$^+$	5489.6	49/2$^+$				
406.7 *2*	12[&] *4*	5646.3	49/2$^+$	5239.6	47/2$^+$				
406.9 *2*	12[&] *4*	5764.1	49/2$^+$	5357.1	47/2$^+$				
409.2 *2*		1532.40	(19/2$^+$)	1123.17	21/2$^+$		3[&] *1*		Weak line in singles spectrum.
415.6 *2*	213 *10*	1272.9	17/2$^-$	857.2	13/2$^-$	E2[a]		0.0338	A_2=+0.24 *4*.
415.6 *2*		1631.83	21/2$^+$	1216.16	17/2$^+$		250 *10*		
419[d]	8[&] *3*	2291.66	(25/2)$^+$	1873.30	23/2$^+$				
423[d]	7[&] *3*	6069.5?	(51/2$^+$)	5646.3	49/2$^+$				
429.1 *2*	116 *6*	2261.28	27/2$^-$	1832.20	23/2$^-$	(Q)	9 *3*		Mult.: A_2=+0.28 *16*.
435.4 *2*	11 *2*	6330.7	53/2$^+$	5895.4	51/2$^+$				
441.6 *2*	1090 *30*	1064.46	19/2$^-$	622.84	15/2$^-$		949 *41*		Mult.: A_2=+0.14 *6*; consistent with ΔJ=2 PLACEMENT..
447.1 *2*		915.59	(13/2$^+$)	468.41	13/2$^+$		7 *2*		Weak line in singles spectrum.
448.3 *2*	18[&] *6*	2586.24	(27/2)$^+$	2137.92	25/2$^+$				
452.6 *2*		1575.86	23/2$^-$	1123.17	21/2$^+$		5 *2*		Weak line in singles spectrum.
456.6 *2*	94 *6*	2088.4	(23/2)	1631.83	21/2$^+$				

$^{179}_{74}W_{105}$-9

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	Iγ(delayed) [@]	α [c]	Comments
459.6 *2*	679 *11*	1582.68	25/2$^+$	1123.17	21/2$^+$	E2 [a]	13 *2*		A_2=+0.30 *4*.
462 [d]		6792.5	55/2$^+$	6330.7	53/2$^+$				
464.2 *2*	554 *13*	1425.04	23/2$^+$	960.80	19/2$^+$	E2 [a]	71 *5*		A_2=+0.28 *5*.
466.9 *2*	122 *6*	2504.75	29/2$^-$	2037.78	25/2$^-$		8 *3*		
467.9 *2*		1216.16	17/2$^+$	748.11	17/2$^+$		49 *4*		Weak line in singles spectrum.
470 [d]	4 [&] *2*	2893.73	(29/2)$^+$	2424.34	27/2$^+$				
473.5 *2*	148 *22*	1698.0	19/2$^-$	1224.5	15/2$^-$	E2 [a]		0.0241	A_2=+0.36 *12*.
477.4 *2*	8 [&] *4*	2738.65	31/2$^-$	2261.28	27/2$^-$		14 *4*		
478.5 *2*	660 *15*	1312.46	21/2$^-$	833.98	17/2$^-$		61 *8*		A_2=+0.26 *4* for 478.5γ+478.6γ doublet.
478.6 *2*	63 *3*	3827.1	(37/2$^+$)	3348.52	(33/2$^+$)				A_2=+0.26 *4* for 478.5γ+478.6γ doublet.
481.7 *2*	179 *12*	1754.6	21/2$^-$	1272.9	17/2$^-$	(Q)			Mult.: A_2=+0.27 *15*.
494.3 *2*	9 *3*	3224.92	(31/2$^+$)	2730.79	29/2$^+$				
506.1 *2*	115 *6*	2137.92	25/2$^+$	1631.83	21/2$^+$				
508.6 *2*		1631.83	21/2$^+$	1123.17	21/2$^+$		195 *10*		
510 [d]		5119.9	47/2$^+$	4609.8	43/2$^+$				
511.1 *2*	82 [&] *35*	2772.55	31/2$^-$	2261.28	27/2$^-$		5 *2*		
511.4 *2*	100×10^1 [&] *20*	1575.86	23/2$^-$	1064.46	19/2$^-$		982 *45*		
513 [d]		2633.5	31/2$^+$	2120.38	29/2$^+$				
514.9 [d] *2*	11 [&] *4*	3570.01	(35/2$^+$)	3055.0	31/2$^+$				
518.1 *2*	172 *13*	2272.8	25/2$^-$	1754.6	21/2$^-$	E2 [a]		0.0192	A_2=+0.34 *15*.
521.3 *2*		1127.17	(15/2$^+$)	605.94	15/2$^+$		8 *2*		Weak line in singles spectrum.
523 [d]	<20	2822.0	(29/2)	2299.6	(25/2)				
523.8 *2*	109 [&] *35*	2221.8	23/2$^-$	1698.0	19/2$^-$				
525.4 *2*	95 [&] *21*	2798.3	29/2$^-$	2272.8	25/2$^-$				
527 [d]		1150.36	13/2$^+$	622.84	15/2$^-$		1 [&] *1*		
527.1 *2*	42 [&] *12*	3031.90	33/2$^-$	2504.75	29/2$^-$		5 *1*		
529.7 *2*	66 [&] *13*	3328.0	33/2$^-$	2798.3	29/2$^-$				
537.6 *2*	541 *18*	2120.38	29/2$^+$	1582.68	25/2$^+$	E2 [a]	6 *2*		A_2=+0.30 *8*.
541.6 *2*	679 *20*	1854.03	25/2$^-$	1312.46	21/2$^-$	E2 [a]	51 *4*		A_2=+0.29 *6*.
543.0 *2*		915.59	(13/2$^+$)	372.65	11/2$^+$		12 *3*		Weak line in singles spectrum.
544.1 *2*		1150.36	13/2$^+$	605.94	15/2$^+$		3 [&] *1*		Weak line in singles spectrum.
544.9 *2*	64 [&] *20*	2766.7	27/2$^-$	2221.8	23/2$^-$				
547.1 *2*	55 *4*	4117.2	(39/2$^+$)	3570.01	(35/2$^+$)				
551.2 *2*	116 *7*	2424.34	27/2$^+$	1873.30	23/2$^+$	(Q)			Mult.: A_2=+0.30 *22*.
553.6 *2*	9 [&] *4*	3326.23	35/2$^-$	2772.55	31/2$^-$		8 *2*		
558.7 *2*		2141.22	27/2$^-$	1582.68	25/2$^+$		4 *2*		Weak line in singles spectrum.
562.4 *2*	377 *16*	1987.40	27/2$^+$	1425.04	23/2$^+$	Q			Mult.: A_2=+0.26 *10*.
565.5 *2*	845 *22*	2141.22	27/2$^-$	1575.86	23/2$^-$	Q	977 *43*		Mult.: A_2=+0.23 *6*.
567.3 *2*		1631.83	21/2$^+$	1064.46	19/2$^-$		14 *4*		

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$ (continued)

E_γ †	I_γ ‡	E_i(level)	J_i^π	E_f	J_f^π	Mult.#	Iγ(delayed)@	Comments
571.7 *2*		1532.40	$(19/2^+)$	960.80	$19/2^+$		6& *2*	Weak line in singles spectrum.
574d		3121.0	(31/2)	2546.7	(27/2)			
574.3 *2*	29& *10*	2586.24	$(27/2)^+$	2012.02	$(23/2)^+$			
575.7 *2*		3348.36	$35/2^-$	2772.55	$31/2^-$		8 *2*	
576.1 *2*	15 *4*	5497.4	$49/2^{(-)}$	4921.4	$45/2^{(-)}$			
579.2 *2*	32& *10*	3345.9	$31/2^-$	2766.7	$27/2^-$			
587.6 *2*	174& *40*	3326.23	$35/2^-$	2738.65	$31/2^-$		135 *10*	A_2=+0.26 *9* for 587.6γ+588.5γ+589.3γ triplet.
588.5 *2*	370& *80*	2442.62	$29/2^-$	1854.03	$25/2^-$		36 *8*	A_2=+0.26 *9* for 587.6γ+588.5γ+589.3γ triplet.
589.3 *2*	150& *40*	3031.90	$33/2^-$	2442.62	$29/2^-$		18 *4*	A_2=+0.26 *9* for 587.6γ+588.5γ+589.3γ triplet.
591.9 *2*	32& *6*	3920.0	$37/2^-$	3328.0	$33/2^-$			
592.9 *2*	117 *4*	2730.79	$29/2^+$	2137.92	$25/2^+$	(Q)		Mult.: A_2=+0.27 *20*.
597.6 *2*	618 *32*	2738.65	$31/2^-$	2141.22	$27/2^-$		1000 *44*	Mult.: A_2=+0.04 *15*.
601.5 *2*		1517.11	$17/2^+$	915.59	$(13/2^+)$		10 *3*	Weak line in singles spectrum.
602.1 *2*	40 *6*	2893.73	$(29/2)^+$	2291.66	$(25/2)^+$			
603.1 *2*	330 *14*	2723.42	$33/2^+$	2120.38	$29/2^+$	Q	5 *2*	Mult.: A_2=+0.30 *8*.
605.9 *2*	93& *18*	3637.8	$37/2^-$	3031.90	$33/2^-$			
608.5 *2*	38 *6*	4435.5	$(41/2^+)$	3827.1	$(37/2^+)$			
609.8 *2*		3348.36	$35/2^-$	2738.65	$31/2^-$	E2	924 *41*	Mult.: from unenumerated ce data of 1983Pe13 (both In-beam and out-of-beam data).
610.2 *2*		1216.16	$17/2^+$	605.94	$15/2^+$		108 *6*	Weak line in singles spectrum.
617d		3439.0	(33/2)	2822.0	(29/2)			
617.9d *2*	15& *5*	3348.52	$(33/2^+)$	2730.79	$29/2^+$			
618.1 *2*		2738.65	$31/2^-$	2120.38	$29/2^+$		4 *2*	Weak line in singles spectrum.
624.3 *2*	17 *2*	3210.5	$(31/2)^+$	2586.24	$(27/2)^+$			
625.0 *2*		3348.36	$35/2^-$	2723.42	$33/2^+$		5 *2*	
629.2 *2*	41& *10*	3401.65	$35/2^-$	2772.55	$31/2^-$			
630.7 *2*	84 *4*	3055.0	$31/2^+$	2424.34	$27/2^+$			
631.4 *2*	136& *28*	2772.55	$31/2^-$	2141.22	$27/2^-$		10 *2*	
637.4 *2*	75& *15*	3963.6	$39/2^-$	3326.23	$35/2^-$			
638.7 *2*	73 *6*	3224.92	$(31/2^+)$	2586.24	$(27/2)^+$			
639d		3984.9?	$(35/2^-)$	3345.9	$31/2^-$			
639.4 *2*	180 *15*	3082.08	$33/2^-$	2442.62	$29/2^-$	(Q)	3 *1*	Mult.: A_2=+0.23 *9*.
641d		3534.9	$(33/2)^+$	2893.73	$(29/2)^+$			
646.1 *2*	178& *44*	2633.5	$31/2^+$	1987.40	$27/2^+$			
647.2 *2*	230& *46*	3370.6	$37/2^+$	2723.42	$33/2^+$			
650.8d *2*	8& *3*	4186.2?	$(39/2^-)$	3535.4	$35/2^{(-)}$			
650.9 *2*	68& *12*	2504.75	$29/2^-$	1854.03	$25/2^-$		3 *1*	
654.3 *2*	11& *3*	4573.3	$41/2^-$	3920.0	$37/2^-$			

$^{179}_{74}W_{105}$-11

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

γ(^{179}W) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	Comments
658[d]		3779.0?	(35/2)	3121.0	(31/2)			
658.8 2		1127.17	(15/2$^+$)	468.41	13/2$^+$		13 2	Weak line in singles spectrum.
660.5 2	70 20	3391.3	33/2$^+$	2730.79	29/2$^+$			
660.7 2	16 3	4243.4	41/2$^+$	3582.6	37/2$^+$			
662.1 2	70 20	4779.3	(43/2$^+$)	4117.2	(39/2$^+$)			
662.9 2	49[&] 10	3401.65	35/2$^-$	2738.65	31/2$^-$			
666.1 2	128[&] 30	3748.2	37/2$^-$	3082.08	33/2$^-$			
667.2 2	81[&] 20	4305.0	41/2$^-$	3637.8	37/2$^-$			
670.6[d] 2	159 7	4041.2	41/2$^+$	3370.6	37/2$^+$	Q		Mult.: A_2=+0.27 9.
671.1 2		1631.83	21/2$^+$	960.80	19/2$^+$		87 5	
673.7 2	14 3	5852.0	51/2$^{(-)}$	5178.3	47/2$^{(-)}$			
682.0 2		1150.36	13/2$^+$	468.41	13/2$^+$		9 3	Weak line in singles spectrum.
685.2 2	15[&] 4	2261.28	27/2$^-$	1575.86	23/2$^-$		3 1	
688.9 2	12[&] 4	5489.6	49/2$^+$	4800.7	45/2$^+$			
690.6 2	12[&] 4	4596.9	43/2$^+$	3906.4	39/2$^+$			
691.5 2	31 4	3746.5	35/2$^+$	3055.0	31/2$^+$			
693.0 2	54[&] 11	4094.7	39/2$^-$	3401.65	35/2$^-$			
697.0 2	61[&] 15	4738.2	45/2$^+$	4041.2	41/2$^+$			
699[d]	16 5	4476.8	43/2$^+$	3778.1	39/2$^+$			
702.9 2	39[&] 8	4666.5	43/2$^-$	3963.6	39/2$^-$			
704[d]		5278.3?	(45/2$^-$)	4573.3	41/2$^-$			
709.9 2	83 10	3343.4	35/2$^+$	2633.5	31/2$^+$	Q		Mult.: A_2=+0.29 13.
711.4 2	29 5	5146.9	(45/2$^+$)	4435.5	(41/2$^+$)			
[x]714.5 2	14 3							
716.1 2	70 9	4464.3	41/2$^-$	3748.2	37/2$^-$			
718.0 2		1150.36	13/2$^+$	432.46	13/2$^-$		2[&] 1	Weak line in singles spectrum.
724.4 2	16 3	4967.8	45/2$^+$	4243.4	41/2$^+$			
729.7 2	17 3	4849.8	45/2$^+$	4120.1	41/2$^+$			
731.7 2	42[&] 8	5036.7	45/2$^-$	4305.0	41/2$^-$			
737.5 2	12 3	6234.8	53/2$^{(-)}$	5497.4	49/2$^{(-)}$			
742[d]		4090.5	39/2$^-$	3348.36	35/2$^-$			
747.8 2		1216.16	17/2$^+$	468.41	13/2$^+$		19 3	Weak line in singles spectrum.
747.8 2	44[&] 13	4091.2	39/2$^+$	3343.4	35/2$^+$			
748.8 2	42[&] 12	5487.0	49/2$^+$	4738.2	45/2$^+$			
750.4 2	30[&] 6	4845.1	43/2$^-$	4094.7	39/2$^-$			
755.9 2	19[&] 6	4847.1	43/2$^+$	4091.2	39/2$^+$			
757.5 2	15 3	5536.8	(47/2$^+$)	4779.3	(43/2$^+$)			
758.1 2	27 3	4354.5	41/2$^-$	3596.5	37/2$^-$			

$^{179}_{74}W_{105}$-12

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

γ(^{179}W) (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Iγ(delayed)[@]	α[c]	Comments
760.2 *2*	5 *2*	5357.1	47/2$^+$	4596.9	43/2$^+$				
762.9 *2*	7 *2*	5239.6	47/2$^+$	4476.8	43/2$^+$				
764.0 *2*	7[&] *3*	5611.1	47/2$^+$	4847.1	43/2$^+$				
765.7 *2*	6 *2*	4477.5	41/2$^-$	3711.7	37/2$^-$				
769.0 *2*		1517.11	17/2$^+$	748.11	17/2$^+$		16 *2*		Weak line in singles spectrum.
769.0 *2*	20[&] *4*	5233.3	45/2$^-$	4464.3	41/2$^-$				
770.1 *2*	27[&] *6*	5436.6	47/2$^-$	4666.5	43/2$^-$				
771[d]		6623.4?	(55/2$^-$)	5852.0	51/2$^{(-)}$				
774[d]		4864.8?	(43/2$^-$)	4090.5	39/2$^-$				
775.5 *2*	16 *3*	5895.4	51/2$^+$	5119.9	47/2$^+$				
777.7 *2*		1150.36	13/2$^+$	372.65	11/2$^+$		2[&] *1*		Weak line in singles spectrum.
779.7 *2*	30 *3*	4748.3	43/2$^-$	3968.6	39/2$^-$				
784.3 *2*		1532.40	(19/2$^+$)	748.11	17/2$^+$		9[&] *3*		Weak line in singles spectrum.
786.8 *2*	22 *3*	5141.3	45/2$^-$	4354.5	41/2$^-$				
796.5 *2*	8[&] *3*	5764.1	49/2$^+$	4967.8	45/2$^+$				
796.6 *2*	8[&] *3*	5646.3	49/2$^+$	4849.8	45/2$^+$				
796.9 *2*	10[&] *3*	5833.6	49/2$^-$	5036.7	45/2$^-$				
800.4[d] *2*	5 *2*	3224.92	(31/2$^+$)	2424.34	27/2$^+$				
800.6 *2*	8 *3*	5947.5	(49/2$^+$)	5146.9	(45/2$^+$)				
803.6 *2*	9[&] *3*	5648.7	47/2$^-$	4845.1	43/2$^-$				
823.1 *2*	12[&] *4*	6310.1	53/2$^+$	5487.0	49/2$^+$				
830[d]	4[&] *2*	6069.5?	(51/2$^+$)	5239.6	47/2$^+$				
831.7 *2*	250 *6*	4609.8	43/2$^+$	3778.1	39/2$^+$	E2		0.00658 *10*	Mult.: Q from A_2=+0.46 *10*; not M2 from RUL.
832[d]	7[&] *3*	6268.6?	(51/2$^-$)	5436.6	47/2$^-$				
838.0 *2*	20[&] *4*	3920.0	37/2$^-$	3082.08	33/2$^-$				
841.1 *2*	9 *3*	6330.7	53/2$^+$	5489.6	49/2$^+$				
841.6 *2*		1150.36	13/2$^+$	308.89	9/2$^+$		2[&] *1*		Weak line in singles spectrum.
875[d]		6708.6?	(53/2$^-$)	5833.6	49/2$^-$				
[x]878.1[b] *2*	23[&] *8*								
883.8 *2*		1631.83	21/2$^+$	748.11	17/2$^+$		598 *22*		E_γ: misprinted as 838.8 in fig. 1 of 1991Wa26.
886.0 *2*		1150.36	13/2$^+$	264.39	11/2$^-$		4[&] *1*		Weak line in singles spectrum.
894.4 *2*		1517.11	17/2$^+$	622.84	15/2$^-$		9[&] *3*		Weak line in singles spectrum.
897.1 *2*	10[&] *3*	6792.5	55/2$^+$	5895.4	51/2$^+$				
911.2 *2*		1517.11	17/2$^+$	605.94	15/2$^+$		5 *2*		Weak line in singles spectrum.
[x]1011.0 *2*	15[&] *5*								
[x]1240.3 *2*	14[&] *5*								
[x]1257.0 *2*	15[&] *5*								

$^{179}_{74}W_{105}$-13

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

$\gamma(^{179}W)$ (continued)

E_γ [†]	I_γ [‡]	E_i(level)
[x]1257.8 2	10[&] 3	
[x]1267.4 2	15[&] 5	
[x]1281.5 2	11[&] 4	

[†] From 1994Wa05.
[‡] Prompt photon intensity measured during beam bursts; relative to Iγ=1000 for delayed component of 597.6γ (1994Wa05).
[#] From $\gamma(\theta)$ (1994Wa05) measured At three angles, except As noted. A_4 could Be determined for only the strongest transitions; In these cases, the authors verified that the A_4 values were indeed reasonable. the absence of A_4 data for the other transitions leads to some ambiguities In the assignment of multipolarities from these data.
[@] Delayed photon intensity relative to I(597.6γ)=1000 (1994Wa05). Measured between beam bursts; consists entirely of transitions below the 750-ns and 390-ns isomers.
[&] From $\gamma\gamma$ coin. $\gamma\gamma$ angular-correlation effects are probably minimal for projections through an isomeric state but May Be As large As 20% for Iγ from prompt-coincidence projections (1994Wa05).
[a] Q from $\gamma(\theta)$. not M2 based on RUL, assuming parent level $T_{1/2}$<15 ns for γ observed In prompt coincidence In 1994Wa05.
[b] The 210.7γ and 878.1γ are in prompt coin with each other.
[c] 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.
[d] Placement of transition in the level scheme is uncertain.
[x] γ ray not placed in level scheme.

$^{179}_{74}W_{105}$-14

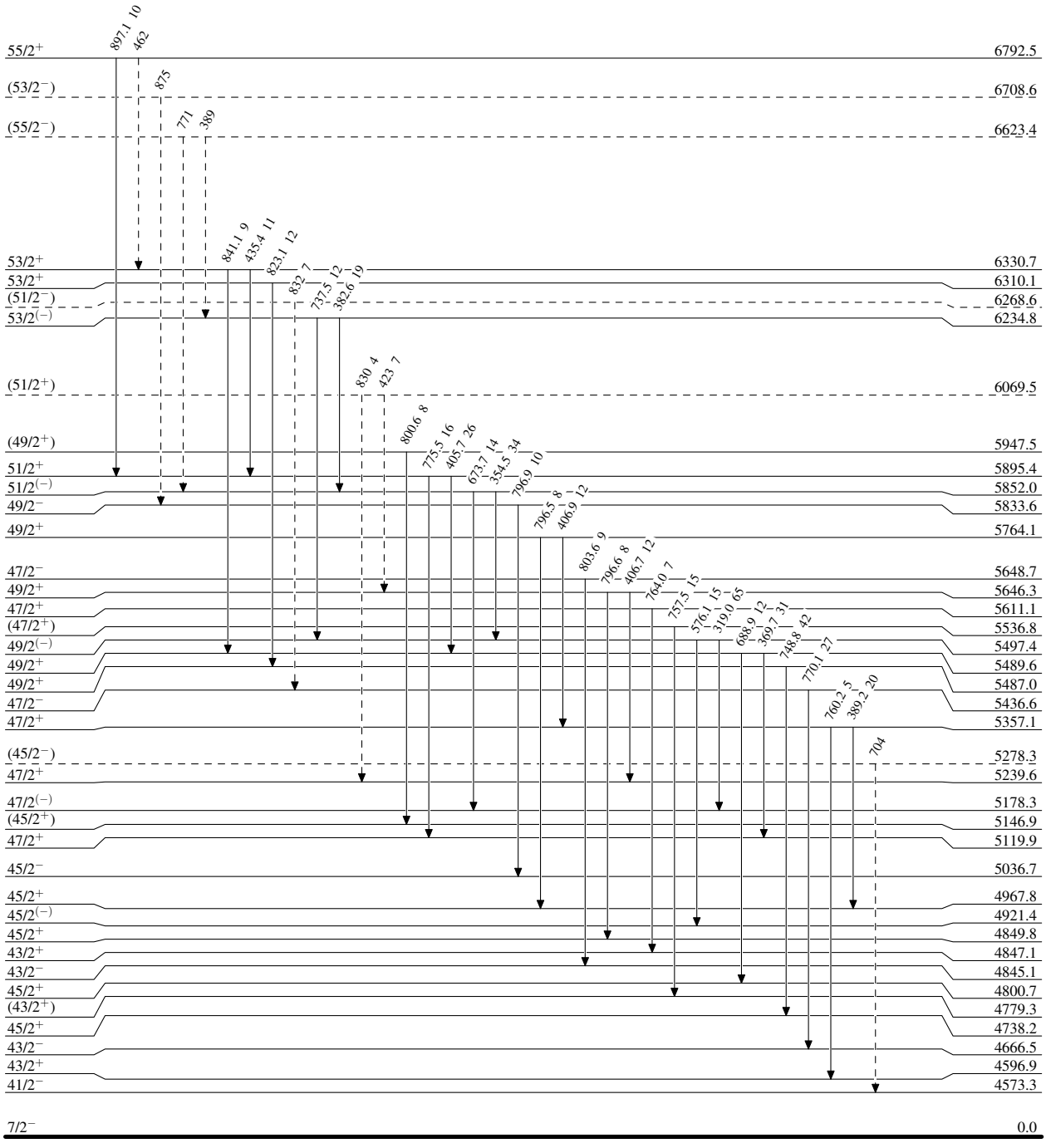
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

Legend

Level Scheme

Intensities: Relative I_γ

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



$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

Level Scheme (continued)

Intensities: Relative I_γ

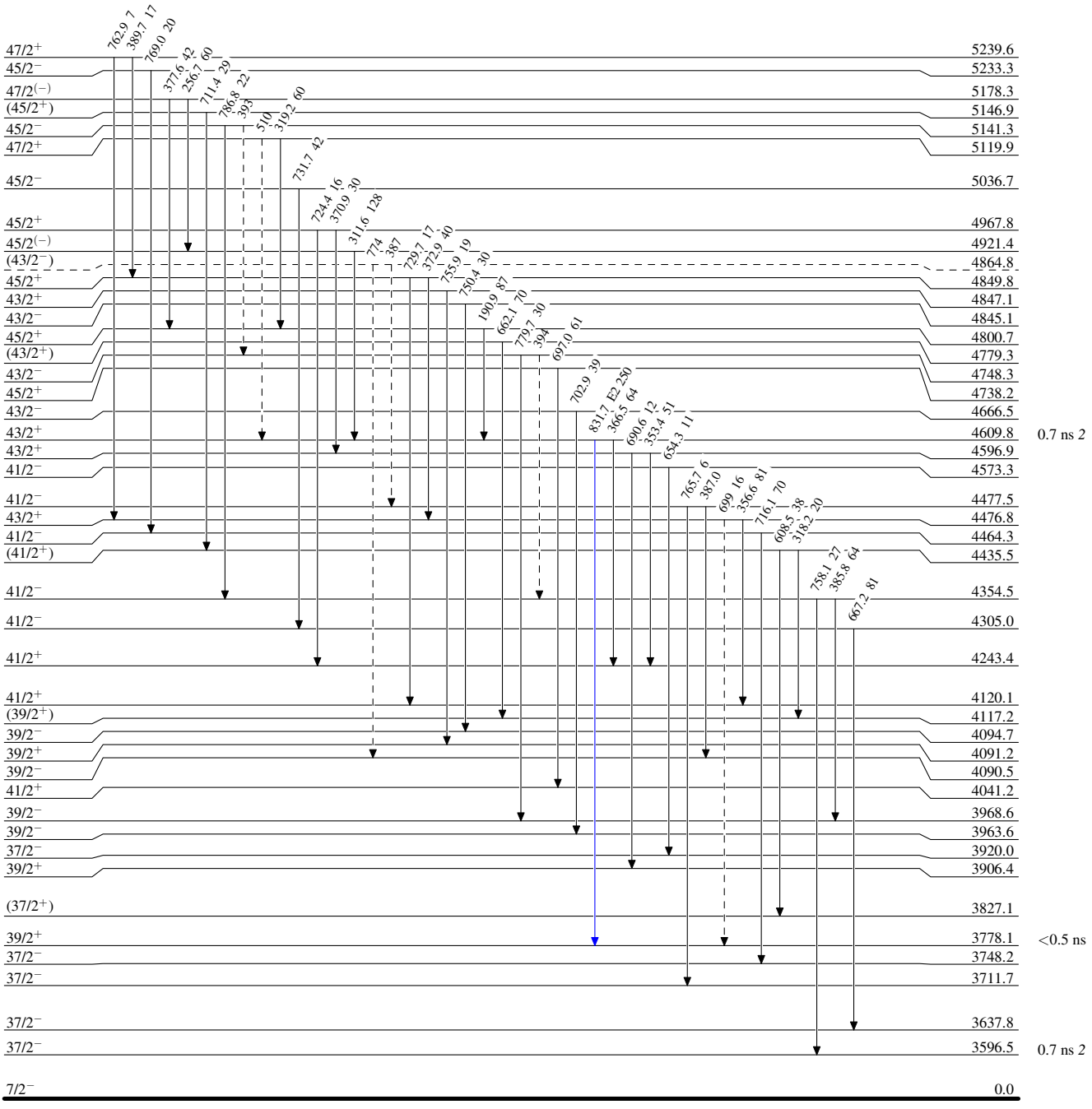
Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{179}_{74}W_{105}$

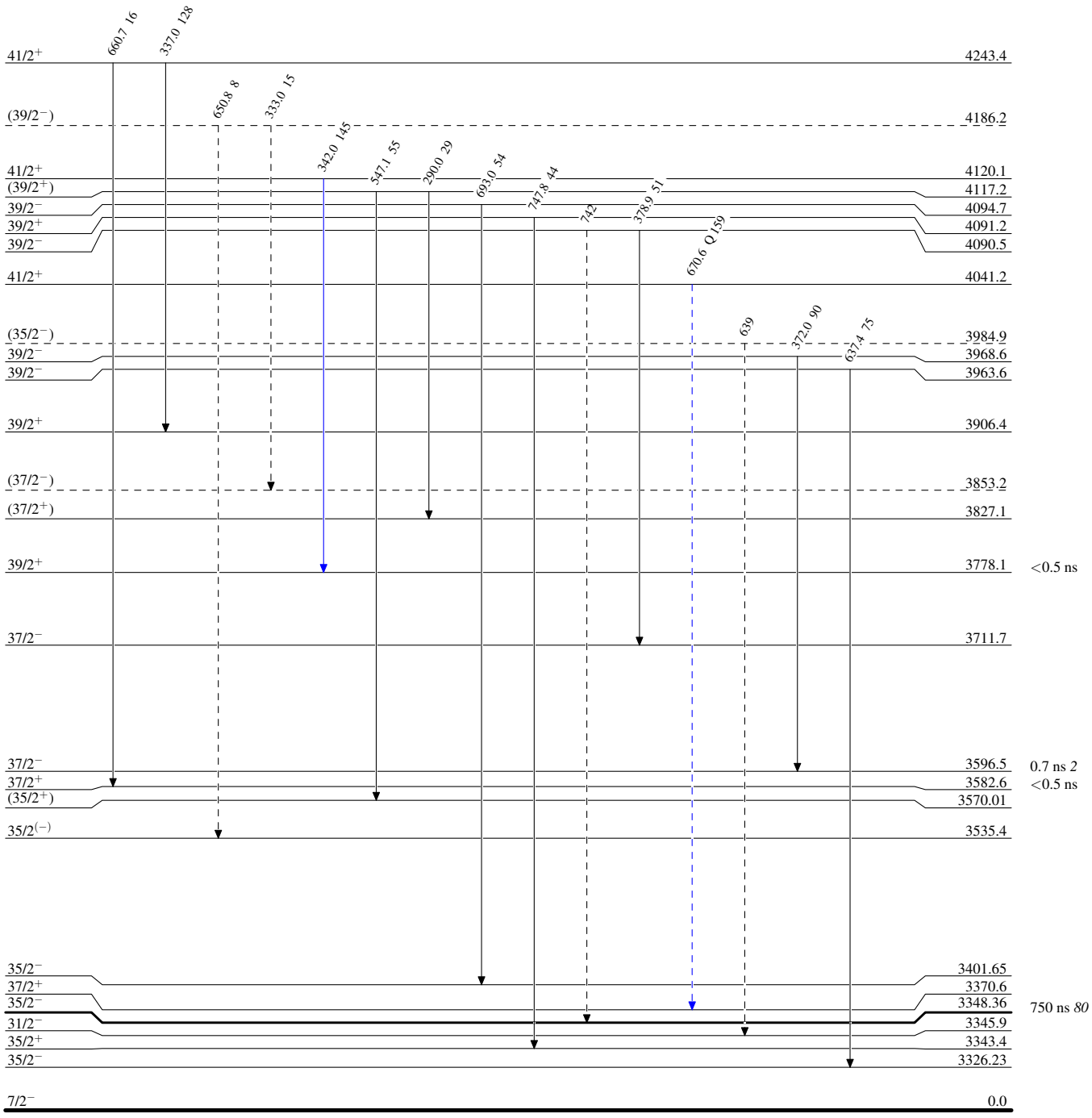
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

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_γ



$^{179}_{74}W_{105}$

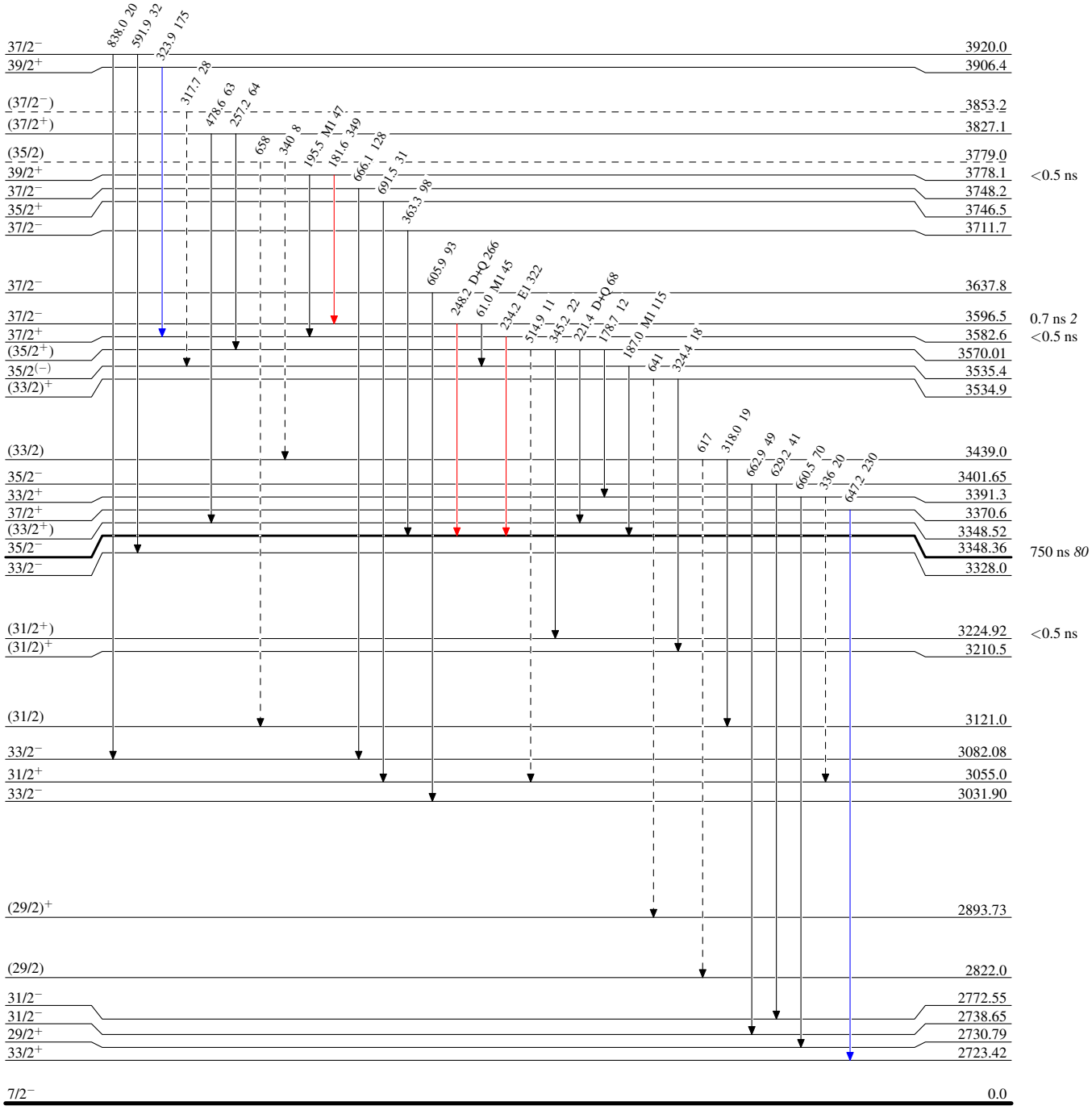
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

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_γ



$^{179}_{74}W_{105}$

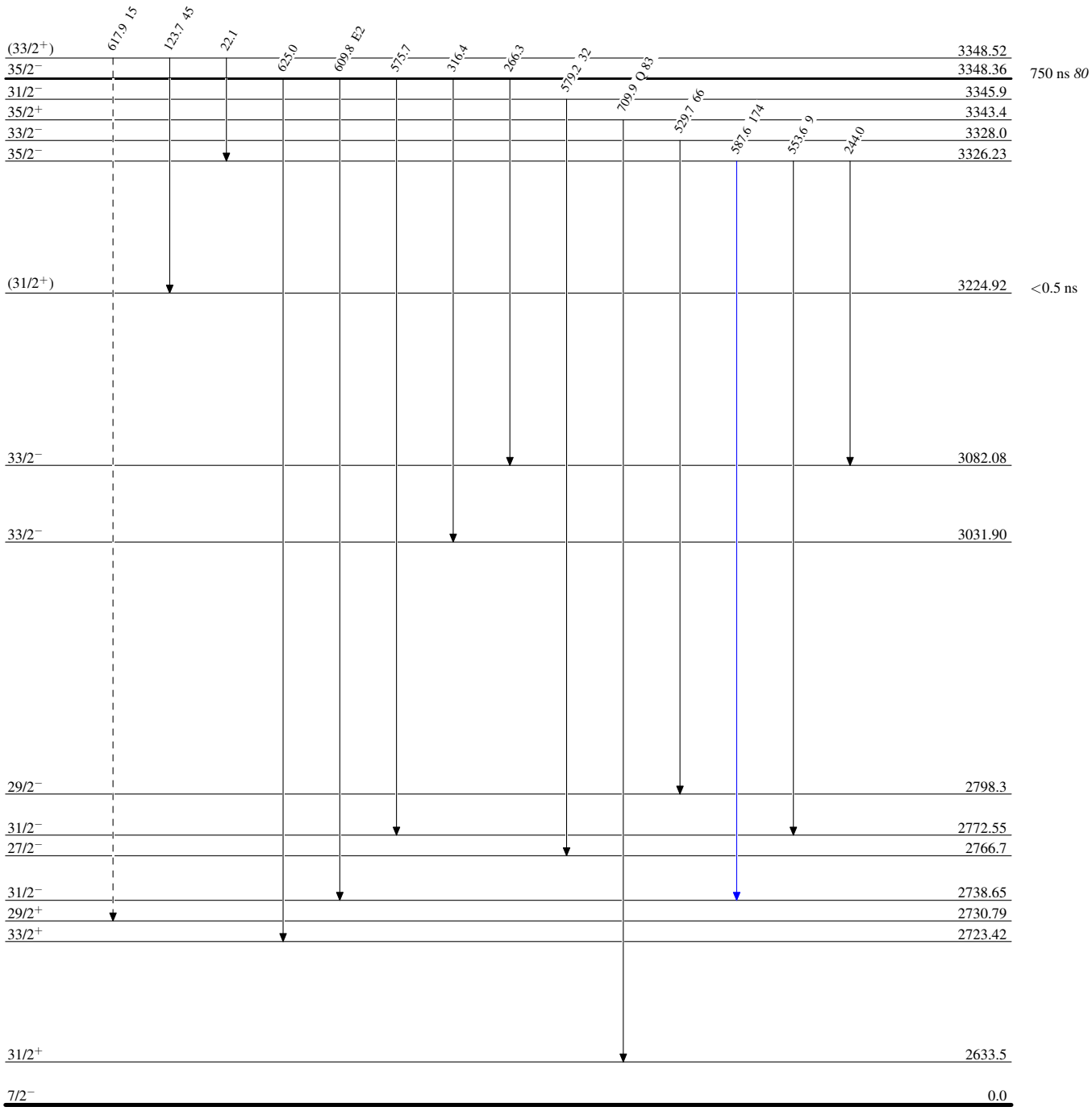
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

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_γ



$^{179}_{74}W_{105}$

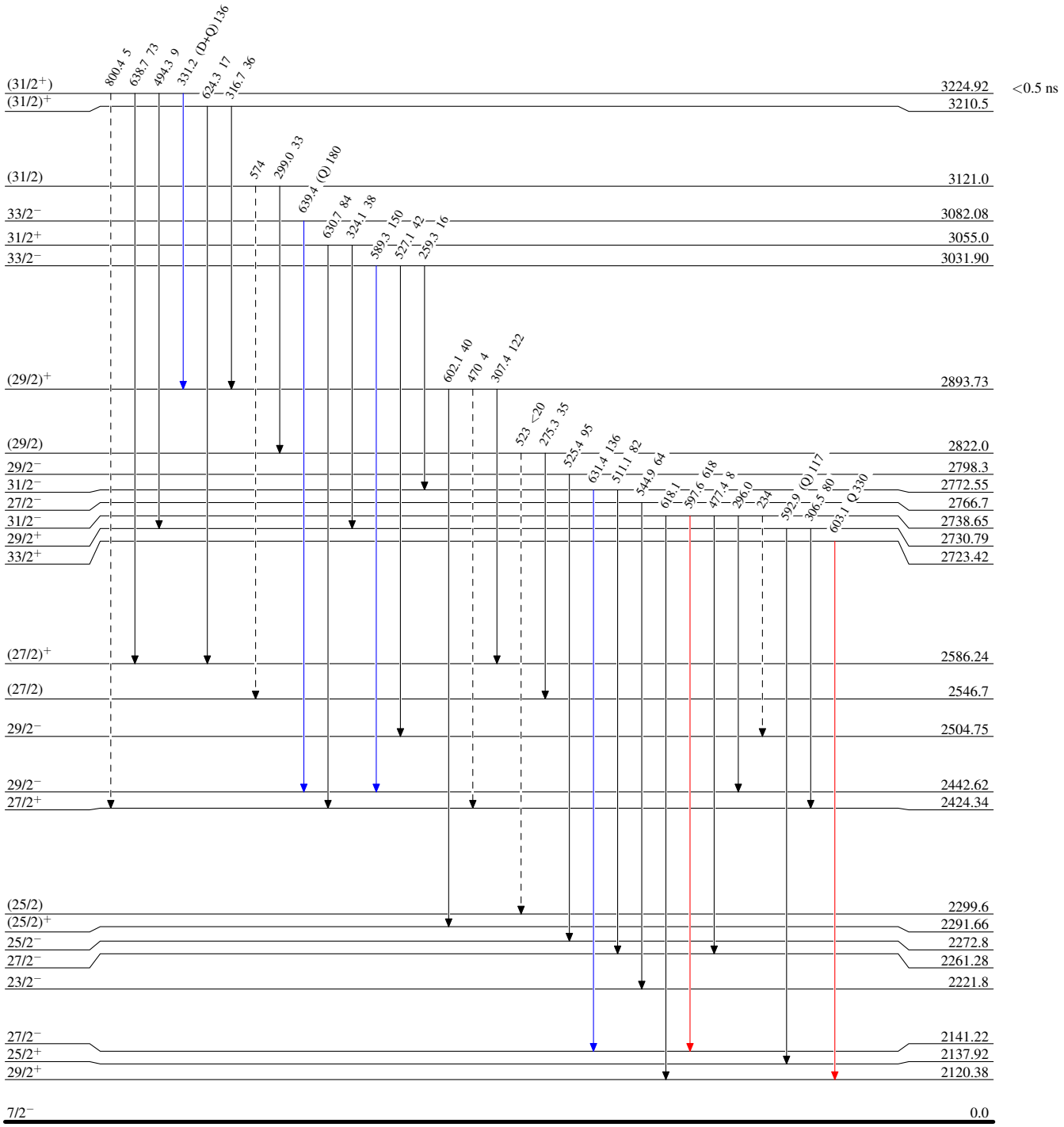
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

Legend

Level Scheme (continued)

Intensities: Relative I_γ

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



$^{179}_{74}W_{105}$

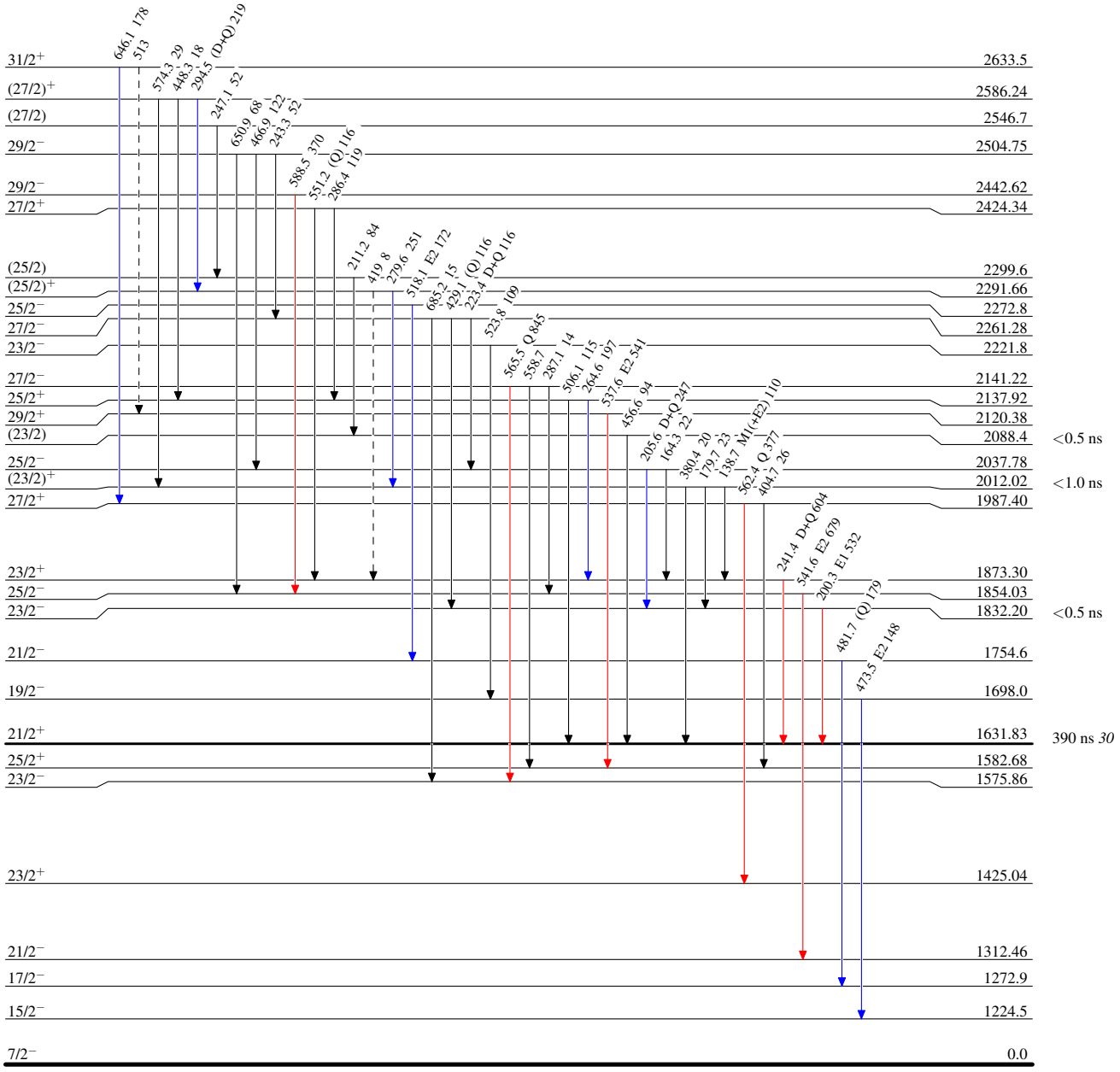
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

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_γ



$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

Legend

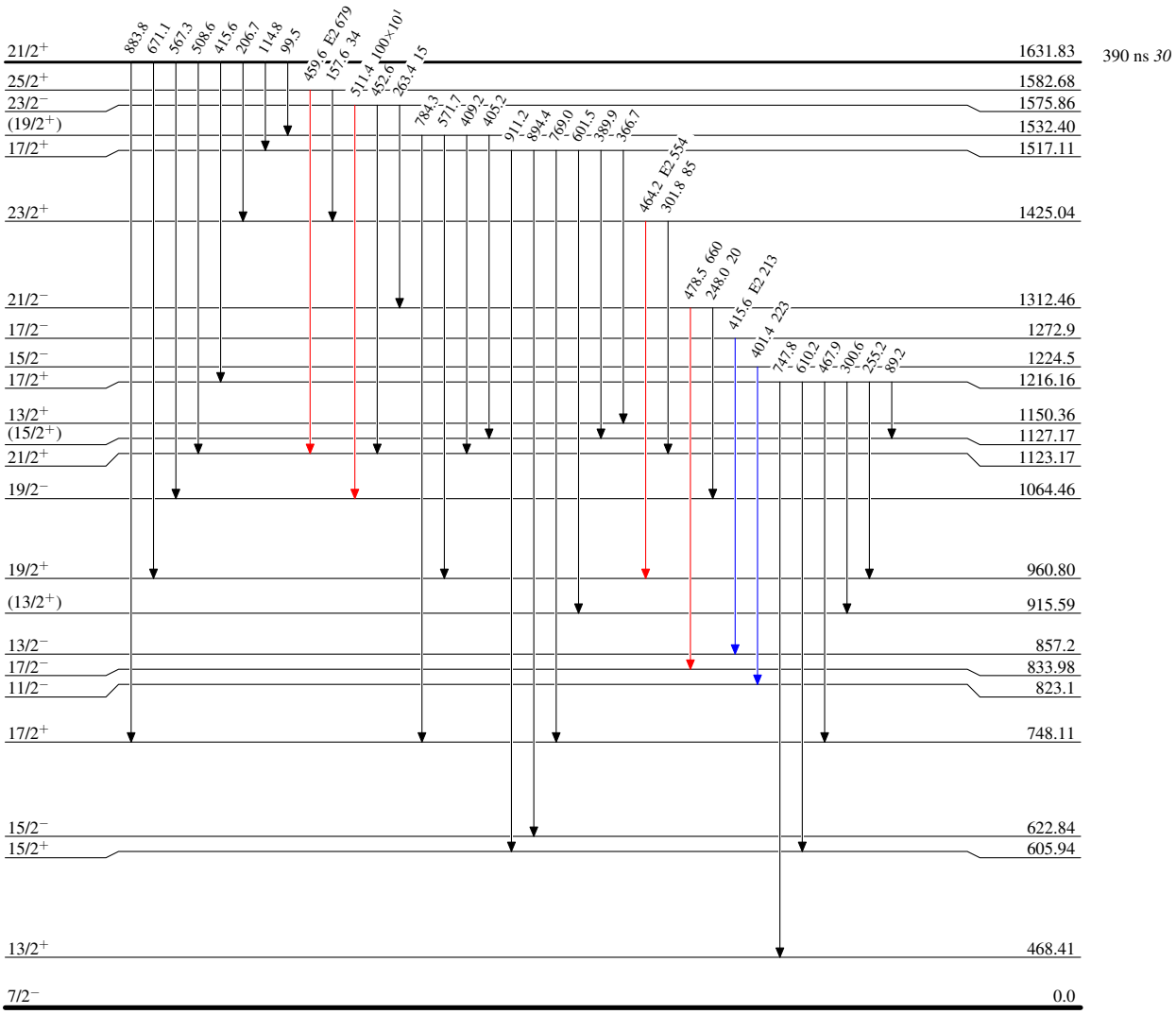
$I_\gamma < 2\% \times I_\gamma^{max}$

$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$

Level Scheme (continued)

Intensities: Relative I_γ



$^{179}_{74}W_{105}$

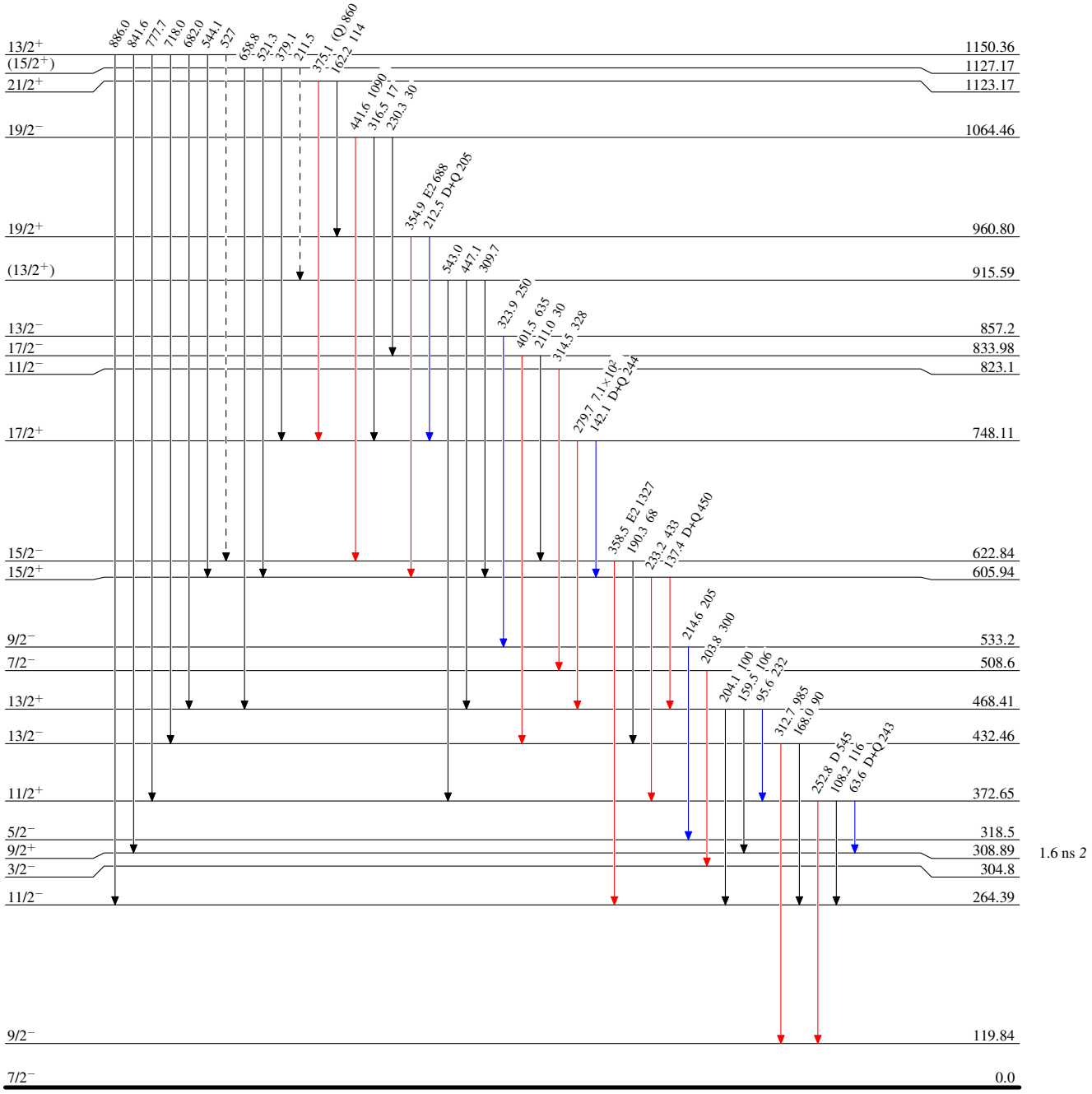
^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

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_γ



$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15

Level Scheme (continued)

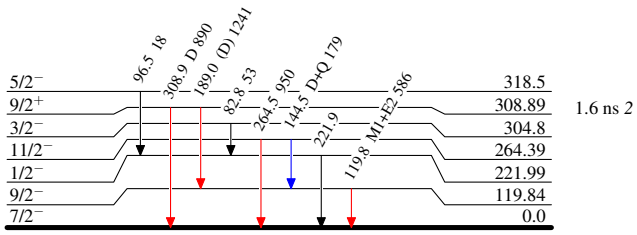
Intensities: Relative I_γ

Legend

$I_\gamma < 2\% \times I_\gamma^{max}$

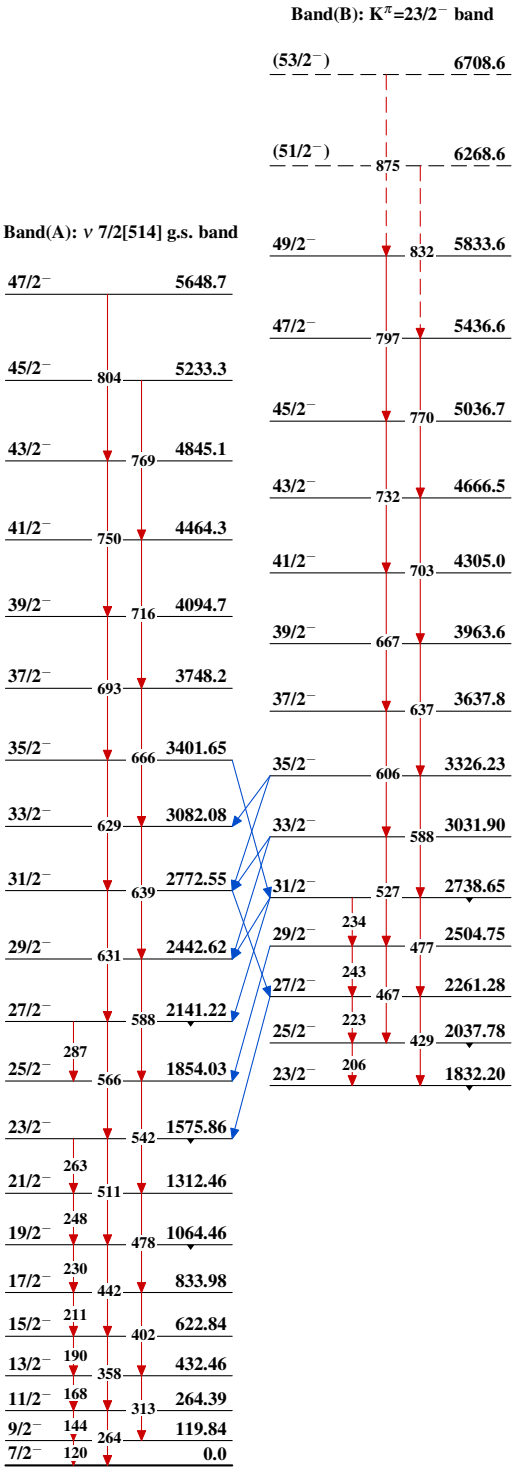
$I_\gamma < 10\% \times I_\gamma^{max}$

$I_\gamma > 10\% \times I_\gamma^{max}$



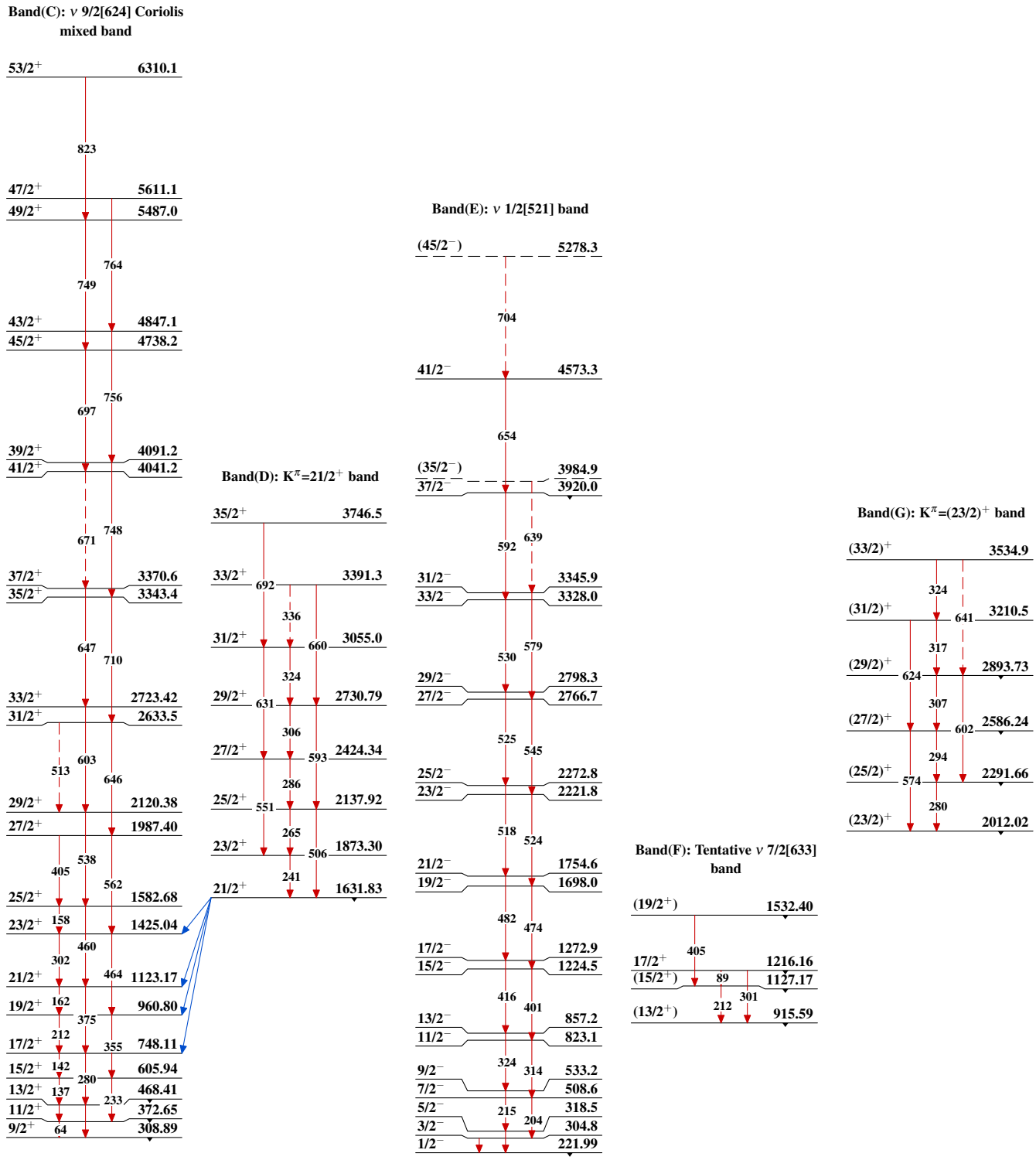
$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15



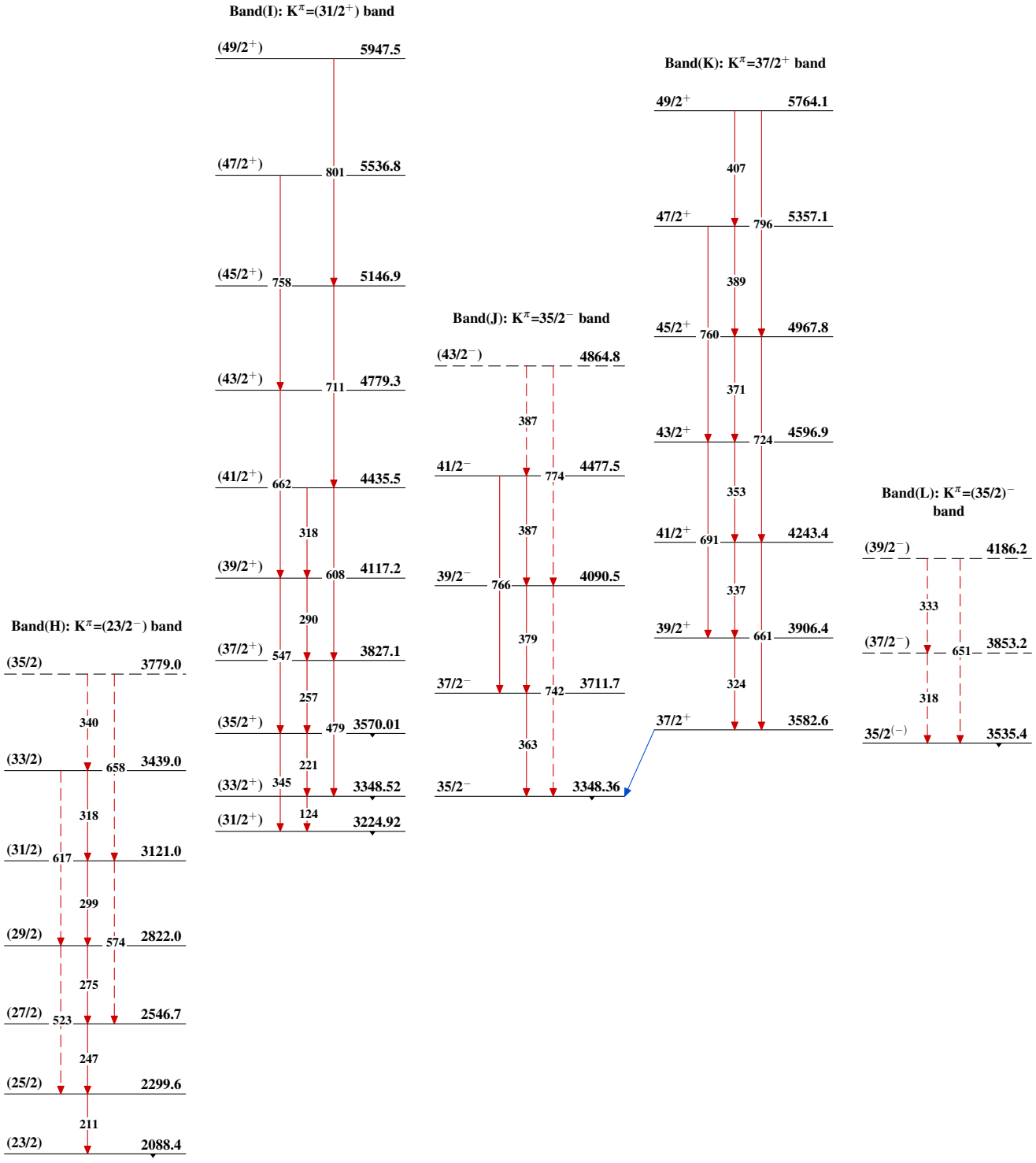
$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)

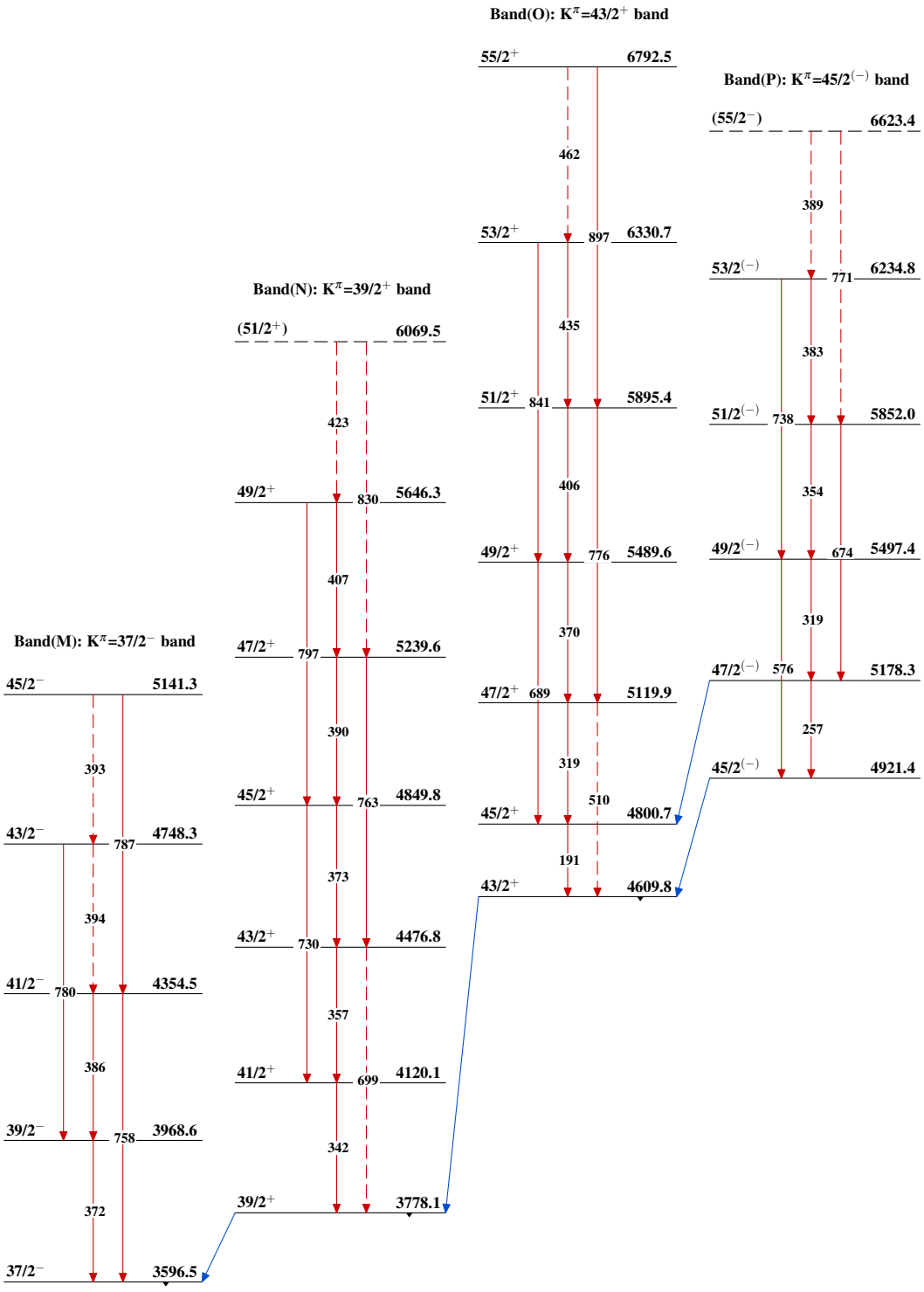


$^{179}_{74}W_{105}$

^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)



^{170}Er(^{13}C,4nγ), ^{180}Hf(α,5nγ) 1994Wa05,1991Wa26,1978Be15 (continued)



$^{179}_{74}W_{105}$