Adopted Levels, Gammas

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

Q(β^-)=−105.6 *4*; S(n)=6098.99 *8*; S(p)=7414.5 *21*; Q(α)=1806.3 *15* 2012Wa38
Note: Current evaluation has used the following Q record −105.6 4 *6098.99 87417.9 201803.8 15* 2003Au03.
For hfs and/or isotope shift measurements, see 1994An14, 1994Ji07, 1994Zi04, 1995Ji15, 1996Zh35, 1997Zh36, 1999Le11.

^{179}Hf Levels

Levels from (γ,γ'), (e,e′) with E≤2310 have been omitted from XREF because their ΔE is large compared with the energy spacing of many low-lying levels.

Cross Reference (XREF) Flags

A	^{178}Hf(n,γ) E=thermal	E	^{178}Hf(n,γ) E=7.78 eV res	I	^{179}Ta ε decay
B	^{179}Lu β^- decay	F	Coulomb excitation	J	^{179}Hf(γ,γ'), (e,e′)
C	^{179}Hf IT decay (18.67 s)	G	^{178}Hf(d,p), ^{180}Hf(d,t)	K	^{176}Yb(^{9}Be,α2nγ),
D	^{179}Hf IT decay (25.05 d)	H	^{180}Hf(^{3}He,α)	L	^{177}Hf(t,p)

E(level)†	J$^\pi$‡	T$_{1/2}$	XREF	Comments
0.0[j]	9/2+[k]	stable	ABCDEFGHIJK	μ=−0.6409 *13* Q=+3.79 *3* Δ<r^2>(^{179}Hf−^{178}Hf)=+0.027 *2* (1994An14), +0.028 *3* (1997Zh36), +0.036 *1* (1999Le11, 10% systematic normalization uncertainty not included; value is relative to Δ<r^2>(^{178}Hf,^{180}Hf)=0.098 as measured by 1994Zi04, much higher than Δ<r^2>(^{178}Hf,^{180}Hf)=0.075 *4* and 0.076 *5* from 1994An14 and 1997Zh36, respectively). Other Δ<r^2>: 1994Zi04. <r^2>$^{1/2}$(charge)=5.3358 *24* (2004An14). μ: Atomic beam (direct) (1989Ra17, from 1973Bu25). Q: Muonic x-ray hfs (1989Ra17, from 1984Ta04 and 1983Ta14). Other values: +3.7 *7* (reanalysis of atomic beam data of 1973Bu25 quoted in 1985St28, originally given as +5.1 *5* in 1973Bu25); 3.93 *5* (1983Ol03), +5.3 *5* (uncorrected, 1977Bu23). J$^\pi$: L(^{3}He,α)=4 for g.s. and M1+E2 123γ from 123 level (for which L(^{3}He,α)=6) establishes J^π=9/2$^+$ for g.s. and J^π=11/2$^+$ for 123 level. g.s. assignment supported by experimental μ which is consistent with theoretical value of −0.6 calculated by evaluator for J^π=9/2$^+$, 9/2[624]. Nilsson orbital assignment based also on energy systematics of this orbital in ^{177}Yb, ^{181}W, and ^{183}Os (N=107 isotones).
122.7904[j] *24*	11/2+[k]	37 ps *3*	AB D FGH K	Q=1.88 *3* Q: Muonic x-ray hfs (1989Ra17, from 1984Ta10). J$^\pi$: see comment on J^π(g.s.). T$_{1/2}$: from ce delay (1960Bl10) in Coulomb excitation.
214.3395[l] *22*	7/2−	1.85 ns *4*	ABC E G KL	J$^\pi$: E1 214.3γ to 9/2$^+$, E2 1245γ from 3/2$^-$. Spectroscopic factor in (d,p) is consistent with 7/2$^-$ 7/2[514]. Nilsson orbital assignment based also on energy systematics of this orbital in ^{177}Yb and ^{181}W (N=107 isotones). T$_{1/2}$: weighted average of 1.86 ns *5* from ^{179}Hf IT decay (18.67 s) and 1.82 ns *10* from (n,γ).
268.92[j] *6*	13/2+[k]	21 ps *3*	D FGH K	XREF: G(269.1).

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
				$T_{1/2}$: from B(E2) in Coulomb excitation and adopted transition properties. Jπ: L=6 in (^{3}He,α) and (d,p); intraband E2 269γ to $9/2^+$ g.s. and M1+E2 146γ to $11/2^+$ 123.
337.7178[l] 23	$9/2^-$		AB E GH L	Jπ: L=5 in (^{3}He,α); E2 101.3γ from $5/2^-$ 476. Spectroscopic factor in (d,p) is consistent with $9/2^-$ 7/2[514].
375.0352[m] 25	$1/2^-$[n]	18.67 s 4	A C E G KL	%IT=100 Jπ: L=0,1 in (d,p); M3 160.3γ to $7/2^-$ 214. Spectroscopic factor in (d,p), and band structure with experimental decoupling constant a=+0.16, are consistent with $1/2^-$ 1/2[510]. Nilsson orbital assignment based also on energy systematics of this orbital in ^{177}Yb and ^{183}Os (N=107 isotones). $T_{1/2}$: from ^{179}Hf IT decay (18.67 s).
420.8943[m] 25	$3/2^-$[n]		A E G KL	Jπ: M1 55.4γ from $5/2^-$ 476; primary γ from $1/2^+$ in (n,γ) E=thermal. Spectroscopic factor in (d,p) is consistent with that for $3/2^-$ 1/2[510] level.
438.68[j] 8	$15/2^+$[k]		D FGH	E(level): from ^{179}Hf IT decay (25.05 d). Jπ: intraband M1+E2 170γ to $13/2^+$ 269 and E2 316γ to $11/2^+$ 123.
476.3341[m] 25	$5/2^-$[n]		A E GH K	Jπ: M1 γ to Jπ≤$3/2^-$; L(d,p)=2,3,5. Spectroscopic factor in (d,p) is consistent with $5/2^-$ 1/2[510].
487.709[l] 5	$(11/2^-)$		A G KL	Jπ: spectroscopic factor in (d,p) is consistent with $11/2^-$ 7/2[514]; γ rays to $7/2^-$ and $9/2^+$ and $9/2^-$; continuation of band based on Jπ=$7/2^-$ 214 level.
518.3279[o] 24	$5/2^-$[p]	<0.2 ns	AB E G K	Jπ: M1+E2 97.4γ to $3/2^-$ 421, M1+E2 304.0γ to $7/2^-$ 214. Nilsson orbital assignment based on rotational band structure. $T_{1/2}$: from ^{178}Hf(n,γ) E=thermal.
582.230[m] 3	$7/2^-$[n]		A E G K	Jπ: M1 105.9γ to $5/2^-$ 476; spectroscopic factor in (d,p) is consistent with $7/2^-$ 1/2[510]; continuation of band based on Jπ=$1/2^-$ 375 level.
614.204[q] 3	$1/2^-$[r]	0.50 ns 15	A E g	Jπ: M1+E2 193γ to $3/2^-$ 421; E2 138γ to $5/2^-$ 476. Nilsson orbital assignment based on rotational band structure with an experimental decoupling constant of a=+0.67. $T_{1/2}$: from centroid shift in ^{178}Hf(n,γ) E=thermal.
616.7562[o] 25	$7/2^-$[p]		AB E gH K	Jπ: M1+E2 98.4γ to $5/2^-$ 518; M1+E2 279.0γ to $9/2^-$ 338.
631.30[j] 10	$17/2^+$[k]		D FGH K	E(level): from ^{179}Hf IT decay (25.05 d). Jπ: intraband M1+E2 193γ to $15/2^+$ 439 and E2 362γ to $13/2^+$ 269.
664.3[l] 7	$(13/2^-)$		G KL	Jπ: continuation of band based on Jπ=$7/2^-$ 214 level.
679.516[q] 3	$3/2^-$[r]		A E G K	Jπ: M1 161.2γ to $5/2^-$ 518; M1 304.5γ to $1/2^-$ 375.
681.036[m] 3	$9/2^-$[n]		A KL	Jπ: E1 204.7γ to $5/2^-$ 476; 99γ to $7/2^-$ 582; continuation of band based on Jπ=$1/2^-$ 375 level.
701.0552[q] 25	$5/2^-$[r]		A E GH K	Jπ: M1 486.7γ to $7/2^-$ 214; M1+E2 280.2γ to $3/2^-$ 421.
720.613[s] 3	$3/2^-$[t]	≤0.3 ns	A E G K	Jπ: M1+E2 345.6γ to $1/2^-$ 375. Nilsson orbital assignment based on energy systematics of this orbital in ^{177}Yb and ^{181}W (N=107 isotones). $T_{1/2}$: from ^{178}Hf(n,γ) E=thermal.
732.2[c] 6			G	
742.710[o] 3	$9/2^-$[p]		A G K	Jπ: M1+E2 125.9γ to $7/2^-$ 617; 620γ to $11/2^+$ 123; continuation of 5/2[512] band.
788.185[s] 3	$5/2^-$[t]		A E GH KL	Jπ: M1+E2 171.4γ to $7/2^-$ 617; E2 173.9γ to $1/2^-$ 614.
842.9[m] 10	$11/2^-$[n]		K	Jπ: continuation of band based on Jπ=$1/2^-$ 375 level.
848.37[j] 12	$19/2^+$[k]		D F K	E(level): from ^{179}Hf IT decay (25.05 d). Jπ: intraband M1+E2 217γ to $17/2^+$ 631 and E2 410γ to $15/2^+$ 439.

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)†	Jπ‡	T1/2	XREF	Comments
849.200^q 3	7/2−^r		A GH	Jπ: M1+E2 106.5γ to 9/2− 743; M1 148.1γ to 5/2− 701; L(d,p)=2,3,5.
865.9^l 10	(15/2−)		G KL	XREF: G(860.3). Jπ: continuation of 7/2[514] band.
870.222^w 8	7/2−		AB E G K	Jπ: E2 588.8γ from 3/2−, E1 870.2γ to 9/2+ g.s. Spectroscopic factor in (d,p) is consistent with 7/2− 7/2[503].
889.1^c 10			G	
896.7^o 7	11/2−^p		G K	Jπ: continuation of 5/2[512] band.
912.0^q 10	9/2−^r		G K	Jπ: 9/2− 1/2[521] from band structure.
935.643^s 3	7/2−^t		A GH KL	XREF: H(908). Jπ: M1+E2 318.9γ to 7/2−; M1+E2 459.3γ to 5/2−; continuation of 3/2[512] band based on 3/2− 721 level. L(^{3}He,α)=(3) for a 908-keV level which 1981Th05 assign to the 3/2[512] band; the reason for the energy mismatch is not known.
958.6^c 14			G	
985.7^m 10	13/2−^n		K	Jπ: continuation of band based on Jπ=1/2− 375 level.
992.0^cw 15	(9/2−)		G	Jπ: observed in (d,p) with about the cross section expected for the 9/2− 7/2[503] level.
1003.650^u 4	5/2+		AB E G	Jπ: E2 1003.7γ to 9/2+ g.s. Populated by primary γ from 1/2+ in ^{178}Hf(n,γ) E=thermal. Configuration assignment based on γ-vibrational band observed at 1178 keV in ^{178}Hf.
1024.0^c 17			G	
1030.8^cs 6	9/2−^t		G L	
1073.565 13	7/2−		AB g L	Jπ: M1+E2 859.2γ to 7/2− 214; M1+E2 735.8γ to 9/2− 338; L(t,p)=0 for 7/2− target. Level presumed to differ from that proposed as 5/2[523] bandhead in ^{176}Yb(^{9}Be,α2nγ) (2000Mu06).
1074.7^v 10	(5/2−)		g K	E(level): presumed to differ from the 7/2− 1073.6 level because the 735.8γ which deexcites that level along with a 859.25γ in ε decay and (n,γ) E=thermal is absent in (^{9}Be,α2nγ), and its multipolarity is inconsistent with Jπ=(5/2−) proposed in 2000Mu06 for the 1074.9 level.
1076.6^o 8	13/2−^p		K	Jπ: continuation of band based on Jπ=5/2− 518 level.
1078.349^u 10	(7/2)+		A G	Jπ: E2(+M1) 1078.4γ to 9/2+ g.s.; band assignment. However, 357.7γ feeds 3/2− 721 level.
1080.4^c 13			G	
1084.73^j 15	21/2+^k		D F K	E(level): from ^{179}Hf IT decay (25.05 d). Jπ: intraband M1+E2 237γ to 19/2+ 848 and E2 453γ to 17/2+ 631.
1087.8^c 8			G	
1092.7^l 13	(17/2−)		G K	XREF: G(1096.8). Jπ: continuation of 7/2[514] band.
1105.74^i 16	25/2−	25.05 d 25	D K	%IT=100 μ=7.4 3 E(level),T1/2: from ^{179}Hf IT decay (25.05 d). Jπ: E3 257γ to 19/2+ 848; M2 21γ to 21/2+ 1085. Supported by experimental μ which is consistent with theoretical value (=7.33) for Jπ=25/2− and a three-quasiparticle Nilsson orbital configuration=π 7/2[404] + ν 9/2[514] + ν 9/2[624] (1975Hu15). μ: Static nuclear orientation (1989Ra17, from 1975Hu15); relative to ^{177}Hf(113 level).
1105.92^y 9	(7/2+)		B	E(level): from ^{179}Lu β− decay. Jπ: 891.5γ to 7/2− 214; 983.2γ to 11/2+ 123; band assignment. These γ rays were not observed in ^{178}Hf(n,γ) E=thermal, possibly due to

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)†	Jπ‡	$T_{1/2}$	XREF	Comments
				γ rays from ^{178}Hf contamination. Nilsson orbital assignment based on consistency of (^{3}He,α) spectroscopic factors for J^π=9/2$^+$ and 13/2$^+$ band members with theoretical values for 7/2[633].
				E(level): from ^{179}Lu β^- decay.
1120.816[z] *19*	9/2$^+$		AB G	Jπ: M1+E2 998.1γ to 11/2$^+$ 123; E2,M1 740.5γ from J≤5/2. M1+E0 1121γ to 9/2$^+$. Configuration assignment based on β-vibrational 0$^+$ state observed at 1199 keV in ^{178}Hf.
1138.8[c] *6*			G	
1150.411[1] *5*	1/2$^+$		A G	Jπ: E1 729.5γ to 3/2$^-$ 421; L=0,1 in (d,p). Configuration assignment based on strong E1 γ rays from all band members to the 1/2[510] rotational band.
1162.4[c] *7*			G L	Doublet.
1168.95[y] *3*	(9/2$^+$)		AB GH	XREF: H(1161).
				Jπ: 1046γ to 11/2$^+$ 123; 954γ to 7/2$^-$ 214; L(^{3}He,α)=(4); rotational structure in (d,p).
1176.2[cu] *9*	(9/2$^+$)		G	Jπ: band assignment.
1185.848[1] *5*	3/2$^+$		A G L	Jπ: E1 810.8γ to 1/2$^-$ 375; E1,E2 484.8γ to 5/2$^-$ 701.
1196.2[m] *15*	15/2$^-$[n]		K	Jπ: continuation of 1/2[510] band.
1198.4[v] *13*	(7/2$^-$)		g K	
1199.52 *14*	(7/2$^+$)		AB gH	XREF: H(1191).
				E(level): from ^{179}Lu β^- decay; 1199.34 *15* from (n,γ) E=thermal.
				Jπ: weak 680γ to 5/2$^-$ 518; 1077γ to 11/2$^+$ 123; log *ft*=7.7 from 7/2$^+$; L=(4) in (^{3}He,α).
1235.440[1] *4*	5/2$^+$		A G	Jπ: E1 653.2γ to 7/2$^-$ 582; primary γ from 1/2$^+$ in (n,γ) E=thermal.
1249.552[2] *6*	3/2$^-$		A G	Jπ: M1 548.5γ to 5/2$^-$ 701; M1 570.0γ to 3/2$^-$ 680; primary γ ray from 1/2$^+$ in ^{178}Hf(n,γ) E=thermal. Configuration assignment based on strong E2 γ rays from members of this band to the 7/2[514] rotational band.
1255.8[s] *10*	11/2$^-$[t]		K	
1269.445[3] *6*	3/2$^-$		A G	Jπ: M1+E2 655γ to 1/2$^-$ 614; M1 568γ to 5/2$^-$ 701. Nilsson orbital assignment based on approximate energy for this state expected from Nilsson diagram.
1282.5[cy] *9*	(11/2$^+$)		GH	XREF: H(1275).
				Jπ: L=(6) in (^{3}He,α); band assignment.
1283.7[o] *10*	15/2$^-$[p]		K	
1296.64 *12*	(3/2$^-$,5/2,7/2$^-$)		E	Jπ: 617γ to 3/2$^-$ 680; 1082γ to 7/2$^-$ 214.
1309.8[e] *6*	(17/2$^+$)	3 ns *1*	K	Jπ: gammas to 17/2$^+$ and 15/2$^+$ and 13/2$^+$ levels; level energy comparable to that calculated for lowest-energy K^π=17/2$^+$ three quasiparticle state (2000Mu06).
				$T_{1/2}$: from (^{9}Be,α2nγ).
1313.500[2] *13*	5/2$^-$		A G L	Jπ: M1+E2 634.0γ to 3/2$^-$ 680; E2 975.8γ to 9/2$^-$ 338.
1343.8[l] *15*	(19/2$^-$)		K	Jπ: continuation of 7/2[514] band.
1344.6[c] *6*	+		G	L=4,6 in (d,p); so J=7/2 to 13/2.
1348.6[v] *13*	(9/2$^-$)		K	
1350.7[j] *7*	23/2$^+$[k]		F K	
1359.0[cy] *5*	(13/2)$^+$		GH	Jπ: L=6 in (^{3}He,α); band assignment.
1372.3 *7*	(17/2$^+$)		K	Jπ: 933γ to 15/2$^+$ 439; 1104γ to 13/2$^+$ 269; band structure.
				Configuration=((ν 1/2[510])+(π 7/2[404])+(π 9/2][514])) (2000Mu06).
1375 *2*	7/2$^-$		L	Jπ: L(t,p)=0 for 7/2$^-$ target.
1381.9[m] *15*	17/2$^-$[n]		K	Jπ: continuation of 1/2[510] band.

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
1386.5[c] *6*			G	
1393.0[i] *8*	(27/2−)		K	
1404.5[g] *11*	(23/2+)	4 ns *1*	K	$T_{1/2}$: from γγ(t) in (^{9}Be,α2nγ).
1404.5+x[f] *11*	(21/2+)	14 ns *2*	K	E(level): x is expected to be small. $T_{1/2}$: from γγ(t) in (^{9}Be,α2nγ).
1405.2[c2] *6*	(7/2−)		G L	
1428.6[c3] *5*	(7/2−)		G	Jπ: rotational structure.
1433.189 *11*	3/2−		A E	Jπ: M1+E2 956.8γ to 5/2− 476; primary γ from 1/2+ in (n,γ) E=thermal.
1436.353 *6*	7/2−		A G L	Jπ: L(t,p)=0 for 7/2− target; 566γ M1+E0 to 7/2− 870; 918γ M1(+E2) to 5/2− 518; 315γ to 9/2+ 1121.
1437 *5*	11/2+,13/2+		H	E(level): from (^{3}He,α). Jπ: L=6 in (^{3}He,α).
1453.1[c] *7*			G	
1458.994[4] *9*	3/2−		A G	Jπ: L(d,p)=0,1; M1+E2 670.9γ to 5/2− 788. Nilsson orbital assignment based on the approximate energy for this state expected from Nilsson diagram.
1482.031[x] *5*	3/2+		A G	Jπ: E1 867.8γ to 1/2− 614; M1(+E2) 478.4γ to 5/2+ 1004. Configuration assignment based on strong γ rays to the 1/2[521] collective band, and to the vibrational state at 1003.7 keV.
1491.0 *7*	(17/2+)		K	Configuration=((ν 1/2[521])+(π 7/2[404])+(π 9/2][514])) (2000Mu06).
1498 *2*	7/2−		L	Jπ: L(t,p)=0 for 7/2− target.
1509.2[c] *8*			G	
1520.6[e] *10*	(19/2+)		K	
1529 *3*	7/2−		L	Jπ: L(t,p)=0 for 7/2− target.
1530.2[c] *5*	1/2+		G	Jπ: L=0 in (d,p).
1532.277[x] *5*	5/2+		A G	Jπ: M1 528.6γ to 5/2+ 1004; M1+E0 329γ from 5/2+ 1861.
1534.6[c4] *5*	(5/2−)		G	
1557.4[c] *5*	1/2,3/2−		G L	L=0,1 in (d,p).
1570.1[c] *7*	(9/2+)		GH	XREF: H(1573). L(^{3}He,α)=(4) and rotational structure.
1572.56 *3*	3/2−		A E	Jπ: M1(+E0) 1151γ to 3/2− 421; E2 955γ to 7/2− 617; primary γ from 1/2+ in (n,γ) E=thermal.
1580.5[c] *5*			G	
1582.4[c] *5*			G	Doublet.
1586.0[c] *6*			G L	
1598.4[c] *6*			G	
1602.3[c] *9*			G L	
1614.125 *13*	3/2−,1/2−		A G	Jπ: E2(+M1) 1096γ to 5/2− 518; M1,E2 1239γ to 1/2− 375; primary γ from 1/2+ in (n,γ) E=thermal.
1617.7[l] *16*	(21/2−)		K	Jπ: continuation of 7/2[514] band.
1624.3[j] *8*	25/2+[k]		F K	
1638.7[c] *6*	≤7/2		G L	Jπ: L(d,p)=0-3.
1658.4[c5] *5*	(1/2−)		G L	Jπ: L(d,p)=0,1,2; rotational band structure.
1665.7[c] *5*	1/2+		e G	Jπ: L=0 in (d,p).
1668.957 *6*	3/2+		A e	Jπ: M1 518γ to 1/2+ 1150; M1 434γ to 5/2+ 1235.
1672 *5*	(11/2+,13/2+)		H	E(level): from (^{3}He,α). Jπ: L=(6) in (^{3}He,α).
1675.3 *12*	(19/2+)		K	
1679.5+x[f] *8*	(23/2+)		K	
1687.13 *4*	(3/2)−		A G	Jπ: M1(+E0) 1007.6γ to 3/2− 680; 816.4γ to 7/2− 870; primary γ

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	XREF	Comments
			from 1/2^{+} in (n,γ) E=thermal.
1687.8+x[h] 10	(19/2^{-})	K	
1689 3	11/2^{-}	L	E(level): from (t,p). J$^{\pi}$: L(t,p)=2 for 7/2^{-} target. Configuration: probable K^{π}=11/2^{-} (7/2[514]+ 2^{+}) γ vibration bandhead (2005Bu07).
1698.6[c] 6		G	
1702.5[i] 8	(29/2^{-})	K	
1706.062[5] 10	(3/2)$^{-}$	A E G	J$^{\pi}$: M1 1092γ to 1/2^{-} 614; 1089γ to 7/2^{-} 617; the possibly-complex 1331γ is E2(+M1) to 1/2^{-}.
1713.0[g] 13	(25/2^{+})	K	
1715.935 5	1/2^{+},3/2^{+},5/2^{+}	A G	J$^{\pi}$: E1 466γ to 3/2^{-}.
1725.786 12	3/2^{-}	A E G	J$^{\pi}$: M1 1111γ to 1/2^{-} 614; M1 937.6γ to 5/2^{-} 788.
1731.438 11	3/2^{-}	A	J$^{\pi}$: M1 1356γ to 1/2^{-} 375; M1(+E2) 1030γ to 5/2^{-} 701 and (E2) 295γ to 7/2^{-} 1436. However, 1117γ to 1/2^{-} appears to include an E0 component.
1748 5	11/2^{+},13/2^{+}	gH	XREF: g(1752.8). E(level): from (^{3}He,α). J$^{\pi}$: L=6 in (^{3}He,α).
1753.1[e] 10	(21/2^{+})	K	
1755.337 17	3/2^{-}	A E g	XREF: g(1752.8). J$^{\pi}$: M1 1141γ to 1/2^{-} 614; M1+E2 1054γ to 5/2^{-} 701.
1756.02 8	3/2^{-}	A	J$^{\pi}$: E2(+M1) 1279γ to 5/2^{-} 476; M1 1381γ to 1/2^{-} 375.
1757.72 11	(3/2^{-},5/2^{+})	A g	J$^{\pi}$: 1544γ to 7/2^{-} 214; primary γ from 1/2^{+} in (n,γ) E=thermal.
1762.80 4	(3/2)$^{-}$	A E g L	J$^{\pi}$: M1 1149γ to 1/2^{-} 614; 1549γ to 7/2^{-}.
1771[c] 3		G	
1783.11 12	1/2,3/2,5/2^{+}	A E G	J$^{\pi}$: primary γ from 1/2^{+} in (n,γ) E=thermal. Strongest γ feeds 5/2^{-} so J^{π} probably not 1/2^{+}.
1796.5 4	1/2,3/2,5/2^{+}[b]	A g	E(level): from primary γ energy in (n,γ) E=thermal.
1800.52 7	3/2^{-}	A g	J$^{\pi}$: M1(+E2) 1324.2γ to 5/2^{-} 476; fed by primary γ in (n,γ) E=thermal.
1811.50 7	3/2^{-}	A G	J$^{\pi}$: M1(+E2) 1110γ to 5/2^{-} 701; fed by primary γ in (n,γ) E=thermal.
1816 4		L	E(level): from (t,p) for 7/2^{-} target.
1821.29 7	(1/2^{-},3/2)	A E	J$^{\pi}$: γ to 5/2^{-}; γ to 1/2^{-}; primary γ from 1/2^{+} in (n,γ) E=thermal.
1826.9+x 10	(21/2^{+})	K	Configuration=((ν 5/2[512])+(π 7/2[404])+(π 9/2][514])) (2000Mu06).
1829 5		H	E(level): from (^{3}He,α).
1839[c] 3		G	
1846.32 15	(3/2^{-})	A E g	E(level): from (n,γ) E=thermal; 1846.8 4 in (n,γ) E=7.78 eV res. J$^{\pi}$: 1232γ to 1/2^{-}; 976γ to 7/2^{-}; primary γ from 1/2^{+} in (n,γ) E=thermal.
1851.504 12	3/2^{+},5/2^{+}	A g	J$^{\pi}$: M1+E2 848γ to 5/2^{+} 1004; primary γ ray from 1/2^{+} in ^{178}Hf(n,γ) E=thermal.
1856.0[m] 18	21/2^{-}[n]	K	J$^{\pi}$: continuation of 1/2[510] band.
1859.2 12	(21/2^{+})	K	
1861.238 7	5/2^{+}	A G	J$^{\pi}$: M1(+E2) 858γ to 5/2^{+} 1004; primary γ ray from 1/2^{+} in ^{178}Hf(n,γ) E=thermal; E2,M1 740.5γ to 9/2^{+} 1120.
1877[c] 3		G	
1884[c] 3		G	
1893.9 5	1/2,3/2,5/2^{+}[b]	A g	E(level): from primary γ energy in (n,γ) E=thermal.
1899.66 24	1/2,3/2,5/2^{+}[b]	A g	E(level): from primary γ energy in (n,γ) E=thermal.
1904[c] 3	(5/2^{-},7/2^{-})	GH	J$^{\pi}$: L=(3) in (^{3}He,α).
1913.471 13	3/2^{-}	A E G	J$^{\pi}$: M1 600γ to 5/2^{-} 1314; primary γ from 1/2^{+} in (n,γ) E=thermal.
1915.0[l] 18	(23/2^{-})	K	J$^{\pi}$: continuation of 7/2[514] band.
1928.846 9	1/2^{+},3/2^{+}	A E G	J$^{\pi}$: M1(+E0) 778.4γ to 1/2^{+} 1150.
1941.6[j] 10	27/2^{+}[k]	F K	

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	J^{π}[‡]	XREF	Comments
1945.864 *14*	(1/2,3/2)[b]	A	J^{π}: fed by primary γ from $1/2^+$ in (n,γ) E=thermal; 1572γ to $1/2^-$ 375.
1956.1+x[h] *13*	($21/2^-$)	K	
1957.58 *9*	$1/2,3/2,5/2^+$[b]	A	E(level): from primary γ energy in (n,γ) E=thermal.
1965[c] *3*		G	
1974.1+x[f] *8*	($25/2^+$)	K	
1977[c] *3*		G	
1987[c] *3*		G	
2007.2[e] *12*	($23/2^+$)	K	
2009[c] *3*		G	
2011 *5*	$(13/2)^+$	H	E(level): from (^{3}He,α). J^{π}: L(^{3}He,α)=6 and rotational structure.
2021[c] *3*		G	
2032[c] *3*		G	
2033.6[i] *10*	($31/2^-$)	K	
2044.1[g] *13*	($27/2^+$)	K	
2047.0 *3*	(1/2,3/2)[a]	A E G	E(level): from E(1672γ). Other E(level): 2046.8 *15* from two-photon cascade data in (n,γ) E=thermal, 2042.5 *11* in (n,γ) E=7.78 eV res, 2040 *3* in (d,p).
2052.6 *15*	$1/2,3/2,5/2^+$[b]	A E G	E(level): from two-photon cascade data in (n,γ) E=thermal. Others: 2050 *3* in (d,p), 2050.0 *11* from (n,γ) E=7.78 eV res.
2070.7 *15*	(1/2,3/2)[a]	A G	E(level): from two-photon cascade data in (n,γ) E=thermal. E=2070.67 *10* if 1650γ is correctly placed.
2082.8 *15*	(1/2,3/2)[a]	A E	E(level): from two-photon cascade data in (n,γ) E=thermal.
2088.4 *15*	(1/2,3/2)[a]	A g	XREF: g(2089). E(level): from two-photon cascade data in (n,γ) E=thermal.
2093.40 *20*		E g	XREF: g(2089).
2133.2? *16*	($23/2^+$)	K	
2146.1 *15*	(1/2,3/2)[a]	A E G	E(level): from two-photon cascade data in (n,γ) E=thermal. Other: E=2142.0 *11* in (n,γ) E=7.78 eV res.
2150.3 *6*	$1/2^{(-)},3/2,5/2^+$	A g	XREF: g(2161). E(level): from two-photon cascade data in (n,γ) E=thermal. J^{π}: 1674γ to $5/2^-$ 476; primary γ from $1/2^+$ in (n,γ) E=thermal.
2168.2 *8*	$1/2,3/2,5/2^+$[b]	A E g	XREF: g(2161). E(level): from E(primary γ) in (n,γ) E=thermal.
2183.1 *7*	$1/2,3/2,5/2^+$[b]	A E G	E(level): from (n,γ) E=7.78 eV res. Other: 2183.1 *15* from two-photon cascade data in (n,γ) E=thermal.
2214.4 *3*	(1/2,3/2)[a]	A g	XREF: g(2220). E(level): from E(1600γ).
2228.1 *4*	$1/2,3/2,5/2^+$[b]	A g	XREF: g(2220). E(level): from E(primary γ) in (n,γ) E=thermal.
2242.5?[j] *11*	($29/2^+$)[k]	F	
2243.5+x?[h] *13*	($23/2^-$)	K	
2249.97 *20*	($3/2^-$)[&]	A g	E(level): from E(2035γ). Other: 2249.6 *15* from two-photon cascade data in (n,γ) E=thermal.
2254.2 *15*	$1/2^{(-)},3/2,5/2^+$	A g	J^{π}: 1736γ to $5/2^-$ 518; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from two-photon cascade data in (n,γ) E=thermal.
2281.1[e] *16*	($25/2^+$)	K	
2282[c] *3*		G	
2287.2+x[f] *10*	($27/2^+$)	K	
2297[c] *3*		G j	XREF: j(2310).
2309.2 *15*	$1/2,3/2,5/2^+$[b]	A j	XREF: j(2310). E(level): from two-photon cascade data in (n,γ) E=thermal.

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2354[c] 3			G	
2366.9 15	(1/2⁻,3/2)		A	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. E(level): from two-photon cascade data in (n,γ) E=thermal.
2386.3[i] 11	(33/2⁻)		K	
2394.2 15	1/2(−),3/2,5/2⁺		A G J	E(level): from two-photon cascade data in (n,γ) E=thermal. Jπ: γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. Excitation in (γ,γ′) favors Jπ=5/2⁺.
2395.1[m] 20	25/2⁻[n]		K	Jπ: continuation of 1/2[510] band.
2396.5[g] 14	(29/2⁺)		K	
2415.5 3	(1/2⁻,3/2)		A g	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. E(level): from E(primary γ) in (n,γ) E=thermal.
2425.3 7	(1/2⁻,3/2)		A g	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal.
2451.31 23	(3/2⁻)[&]		A g	E(level): from E(2237γ).
2456.7 11	(29/2⁻)		K	Suggested configuration=((ν 3/2[512])+(ν 9/2[624])+(ν 1/2[521])+(π 7/2[404])+ (π 9/2][514])) (2000Mu06).
2460.3 15	(1/2,3/2)[a]		A g	E(level): from two-photon cascade data in (n,γ) E=thermal.
2475.5 15	(3/2⁻)[&]		A	E(level): from two-photon cascade data in (n,γ) E=thermal.
2497[c] 3	7/2⁺,9/2⁺,11/2⁺		G J	XREF: J(2480). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
2509.5 15	(1/2,3/2)[a]		A	E(level): from two-photon cascade data in (n,γ) E=thermal.
2522.7 15	(1/2⁻,3/2)		A G	E(level): from two-photon cascade data in (n,γ) E=thermal. Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal.
2549.6[d] 13	(33/2⁻)	30 ns 10	K	$T_{1/2}$: from γγ(t) in (^{9}Be,α2nγ).
2556[c] 3	7/2⁺,9/2⁺,11/2⁺		G J	XREF: J(2565). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
2590[#]			G	
2601.2 3	(1/2⁻,3/2)		A g	E(level): from E(primary γ) in (n,γ) E=thermal. Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal.
2610.7 5	(1/2⁻,3/2)		A g	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. E(level): from (n,γ) E=thermal.
2617.6?[j] 15	(31/2⁺)[k]		F	
2638.8 3	(1/2,3/2)[a]		A	E(level): from E(1918γ).
2640 15			J	E(level): from (γ,γ′), (e,e′).
2654.13 24	(1/2⁻,3/2)		A G	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. E(level): from E(1866γ).
2655[#] 5	(13/2)⁺		GH	XREF: G(2665). E(level): from (^{3}He,α). Jπ: L(^{3}He,α)=6 and rotational structure.
2702.9 15	(1/2⁻,3/2)		A g	Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal. E(level): from two-photon cascade data in (n,γ) E=thermal.
2705[@] 15	7/2⁺,9/2⁺,11/2⁺		g J	E(level): from (γ,γ′), (e,e′). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
2727[#c]			G	
2743.69 21	(1/2⁻,3/2)		A G	E(level): from E(2127γ). Jπ: γ to 1/2⁻; γ to 5/2⁻; primary γ from 1/2⁺ in (n,γ) E=thermal.
2759.6[i] 12	(35/2⁻)		K	
2769.6[g] 15	(31/2⁺)		K	
2788[c] 3			G	
2857[#c]	9/2⁺		G J	XREF: J(2850). Jπ: E0 excitation mode, based on level′s excitation in (e,e′) but not in (γ,γ′).
2898.0[d] 15	(35/2⁻)		K	

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

E(level)[†]	Jπ[‡]	$T_{1/2}$	XREF	Comments
2905.2 *15*	(1/2,3/2)[a]		A	E(level): from two-photon cascade data in (n,γ) E=thermal.
2921[c] *3*			G j	
2950[c] *3*			G j	
2969[#c]			G	
2983.3 *15*	$1/2^{(-)},3/2,5/2^+$		A G	Jπ: γ to $5/2^-$; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from two-photon cascade data in (n,γ) E=thermal.
3030 *15*			J	E(level): from (γ,γ′), (e,e′).
3076.2 *3*	$(1/2^-,3/2)$		A	Jπ: γ to $1/2^-$; γ to $5/2^-$; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from E(primary γ) in (n,γ) E=thermal.
3095 *15*	$9/2^+$		J	E(level): from (γ,γ′), (e,e′). Jπ: E0 excitation mode, based on level′s excitation in (e,e′) but not in (γ,γ′).
3148.8 *5*	$(1/2^-,3/2)$[a]		A	Jπ: γ to $1/2^-$; γ to $5/2^-$; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from E(2445γ).
3151.5?[i] *13*	$(37/2^-)$		K	
3155 *15*	$7/2^+,9/2^+,11/2^+$		J	E(level): from (γ,γ′), (e,e′). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
3161.6?[g] *16*	$(33/2^+)$		K	
3177.9 *3*	$1/2^{(-)},3/2,5/2^+$		A	Jπ: γ to $5/2^-$; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from E(primary γ). Other: 3179.6 *15* from two-photon cascade data in (n,γ) E=thermal.
3240 *15*	$7/2^+,9/2^+,11/2^+$		J	E(level): from (γ,γ′), (e,e′). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
3268.2[d] *15*	$(37/2^-)$		K	
3345.4 *3*	$1/2^{(-)},3/2,5/2^+$		A	Jπ: γ to $5/2^-$; primary γ from $1/2^+$ in (n,γ) E=thermal. E(level): from E(2644γ).
3347.2 *4*	(1/2,3/2)[a]		A	E(level): from E(primary γ) in (n,γ) E=thermal.
3360 *15*	$7/2^+,9/2^+,11/2^+$		J	E(level): from (γ,γ′), (e,e′). Jπ: M1+E2 excitation mode from σ(γ,γ′)/σ(e,e′).
3373.6?[j] *18*	$(35/2^+)$[k]		F	
3409.5 *15*	(1/2,3/2)[a]		A	E(level): from two-photon cascade data in (n,γ) E=thermal.
3439.2 *18*	$(39/2^-)$	12 ns *6*	K	Suggested configuration=((ν 7/2[514])+(ν 9/2[624])+(ν 7/2[503])+(π 7/2[404])+ (π 9/2][514])) (2000Mu06). $T_{1/2}$: from γγ(t) in (^{9}Be,α2nγ).
3490 *15*			J	E(level): from (γ,γ′), (e,e′).
3659.1?[d] *17*	$(39/2^-)$		K	
3775.2 *21*	$(43/2^+)$	15 μs *5*	K	Suggested configuration=((ν 7/2[514])+(ν 9/2[624])+(ν 11/2[615])+(π 7/2[404]) +(π 9/2][514])) (2000Mu06). $T_{1/2}$: from beam-γ(t) in (^{9}Be,α2nγ).
4204.7?[j] *20*	$(39/2^+)$[k]		F	

[†] From least-squares fit to Eγ, assigning ΔE=1 keV to data for which authors did not state uncertainty and excluding uncertain or multiply-placed transitions, except as noted.
[‡] Assignments given without comment are based on γ multipolarities, γ decay patterns, g-factor analysis, calculated bandhead energies and observed band structure in ^{176}Yb(^{9}Be,α2nγ).
[#] ΔE>3 keV.
[@] ΔE>10 keV.
[&] Fed by primary γ from $1/2^+$ in (n,γ) E=thermal; γ to $1/2^-$ and to $7/2^-$.
[a] Fed by primary γ from $1/2^+$ in (n,γ) E=thermal; γ to $1/2^-$.
[b] Fed by primary γ from $1/2^+$ in (n,γ) E=thermal.
[c] From ^{178}Hf(d,p), ^{180}Hf(d,t). ΔE includes a systematic uncertainty of 0.5 keV (for E<1700) or 3 keV (for 1700<E<2050)

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Adopted Levels, Gammas (continued)

^{179}Hf Levels (continued)

combined in quadrature with the relevant statistical ΔE. If no uncertainty is stated, ΔE>3 keV.

[d] Band(A): K^{π}=(33/2⁻) band (2000Mu06). Configuration=((ν 7/2[514])+(ν 9/2[624])+(ν 1/2[510])+(π 7/2[404])+ (π 9/2][514])) (2000Mu06); supported by g_K(exp)=0.46 *4* cf. 0.45 from Nilsson model.

[e] Band(B): $K^{\pi}=17/2^+$ band (2000Mu06). Configuration=((ν 7/2[514])+(ν 9/2[624])+(ν 1/2][510])) (2000Mu06).

[f] Band(C): $K^{\pi}=(21/2^+)$ band (2000Mu06). Configuration=((ν 9/2[624])+(π 7/2[404])+(π 5/2][402])) (2000Mu06); supported by g_K(exp)=0.54 *5* cf. 0.48 from Nilsson model.

[g] Band(D): $K^{\pi}=23/2^+$ band (2000Mu06). Configuration=((ν 7/2[514])+(π 7/2[404])+(π 9/2][514])) (2000Mu06); supported by g_K(exp)=0.86 *20* cf. 0.78 from Nilsson model.

[h] Band(E): $K^{\pi}=(19/2^-)$ band (2000Mu06). Configuration=((ν 7/2[514])+(π 7/2[404])+(π 5/2][402])) (2000Mu06).

[i] Band(F): $K^{\pi}=25/2^-$ band (2000Mu06). Configuration=((ν 9/2[624])+(π 7/2[404])+(π 9/2][514])) (2000Mu06); supported by g_K(exp)=0.60 *7* cf. 0.55 from Nilsson model.

[j] Band(G): 9/2[624] band. g.s. band. Level spacings perturbed by Coriolis mixing (1981Th05). A=11.6, B=3.1. Configuration supported by g_K(exp)=−0.22 *4* cf. −0.245 from Nilsson model.

[k] Definite J^{π} assigned to J≤27/2 members of 9/2[624] band based on observed band structure combined with independently established $J^{\pi}=9/2^+$ and $11/2^+$ for the g.s. and 123 levels and mult=M1+E2 for the intraband 123γ connecting them. The existence of J≥29/2 levels is based on transitions whose placement is uncertain.

[l] Band(H): 7/2[514] band. Rotational parameters: A=13.8, B=−3.6. Configuration supported by g_K(exp)=0.31 *4* cf. 0.28 from Nilsson model.

[m] Band(I): 1/2[510] band. rotational parameters: A=13.2, B=−5.9, a=+0.16, B_{2K}=−3.9.

[n] Definite J^{π} assigned to J≤25/2 members of 1/2[510] band based on observed band structure combined with independently established $J^{\pi}=1/2^-$ for 375 level and mult=M1+E2 for intraband 46γ.

[o] Band(J): 5/2[512] band. Rotational parameters: A=14.1, B=−4.2. Configuration supported by g_K(exp)=−0.27 *12* cf. −0.38 from Nilsson model.

[p] Definite J^{π} assigned to J≤15/2 members of 5/2[512] band based on observed band structure combined with independently established $J^{\pi}=5/2^-$ for 518 level and mult=M1+E2 for intraband 98γ.

[q] Band(K): 1/2[521] band. Rotational parameters: A=13.1, a=+0.67.

[r] Definite J^{π} assigned to J≤9/2 members of 1/2[521] band based on observed band structure combined with independently established $J^{\pi}=3/2^-$ for 680 level and mult=M1 for intraband 148γ.

[s] Band(L): 3/2[512] band.

[t] Definite J^{π} assigned to J≤11/2 members of 3/2[512] band based on observed band structure combined with independently established $J^{\pi}=3/2^-$ for 721 level and mult=M1 for intraband 147γ.

[u] Band(M): $K^{\pi}=5/2^+$ K-2 γ-vibration band. $9/2^+$ g.s. γ vibration.

[v] Band(N): (ν 5/2[523])? band (2000Mu06). Deexcites to 7/2[514] band.

[w] Band(O): 7/2[503] band. Rotational parameters: A=10.5, B=12.3.

[x] Band(P): $K^{\pi}=3/2^+$ (1/2[521]+1⁻) band. Octupole vibration (1310(1⁻) in ^{178}Hf) coupled to 1/2[521].

[y] Band(Q): 7/2[633] band.

[z] Band(R): $K^{\pi}=9/2^+$ [9/2[624]+0⁺] g.s. β-vibrational band. β vibration (1199(0⁺) in ^{178}Hf) coupled to 9/2[624].

[1] Band(S): $K^{\pi}=1/2^+$ (1/2[510]−1⁻) band. Octupole vibration (1310(1⁻) in ^{178}Hf) coupled to 1/2[510]. See 1985Ri09 for a discussion of unusual decay between octupole and quadrupole vibrations built on different single-particle states. Rotational parameters: A=10.9, a=+0.09.

[2] Band(T): $K^{\pi}=3/2^-$ [7/2[514]−2⁺] γ-vibrational band. Quadrupole vibration (1175(2⁺) in ^{178}Hf) coupled to 7/2[514]. Rotational parameters: A=12.6, B=25.9.

[3] Band(U): 3/2[521] band.

[4] Band(V): 3/2[501] band.

[5] Band(W): 1/2[501] band.

$\gamma(^{179}Hf)$

E,RI,M,MR From $^{178}Hf(n,\gamma)$ E=thermal, unless otherwise specified. Multipolarity and δ are from α(K)exp and/or subshell ratios.

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	δ	α[c]	Comments
122.7904	11/2+	122.793 *3*	100	0.0	9/2+	M1+E2	−0.27 *3*	2.18 *4*	B(M1)(W.u.)=0.094 *8*; B(E2)(W.u.)=245 *14* δ: from $\gamma(\theta)$ in Coulomb excitation. Others: 0.309 *15* from B(E2) and $T_{1/2}$; 0.70 *+12−11* from α(K)exp in (n,γ) E=thermal; 0.22 *+20−22* from α(L)exp in Hf IT decay (25.05 d); 0.44 *6* from α(K)exp in Coulomb excitation; 0.44 *9* from ce(K)/ce(L) in Coulomb excitation. B(E2)(W.u.): from measured B(E2)=1.76 *10* for 122 level.
214.3395	7/2−	214.335 *3*	100	0.0	9/2+	E1		0.063 *4*	B(E1)(W.u.)=1.110×10^{-5} *25* α: experimental value from (n,γ). Anomalous E1 transition. α(E1 theory)=0.0494.
268.92	13/2+	146.15 *7*	100 *4*	122.7904	11/2+	M1+E2	−0.39 *4*	1.291 *22*	B(M1)(W.u.)=0.106 *17*; B(E2)(W.u.)=320 *80* E_γ,Mult.: from ^{179}Hf IT decay (25.05 d). I_γ: from (^{9}Be,α2nγ). δ: weighted average of −0.41 *5* from $\gamma(\theta)$ in Coulomb excitation and −0.33 *8* from $\gamma(\theta)$ in Hf IT decay (25.05 d). Other: 0.26 *+12−26* from α(K)exp in Coulomb excitation; inconsistent α(K)exp in ^{179}Hf IT decay (25.05 d) may result from contaminated ce line. δ<0.38 from RUL.
		268.85 *14*	39.4 *4*	0.0	9/2+	E2		0.1107	B(E2)(W.u.)=49 *6* E_γ,Mult.: from ^{179}Hf IT decay (25.05 d). I_γ: from (^{9}Be,α2nγ). From B(E2)↑=0.41 *5* in Coulomb excitation.
337.7178	9/2−	123.3790 *20*	100 *4*	214.3395	7/2−	E2		1.582	
		214.930 *3*	78 *4*	122.7904	11/2+	[E1]		0.0491	
		337.713 *5*	21.2 *9*	0.0	9/2+	E1		0.01607	
375.0352	1/2−	160.696 *2*	100	214.3395	7/2−	M3		34.1	B(M3)(W.u.)=0.0364 *9* I_γ: From ^{179}Hf IT decay (18.67 s).
		≈375	≈0.2	0.0	9/2+	[M4]		3.57	B(M4)(W.u.)≈0.14 E_γ,I_γ: From ^{179}Hf IT decay (18.67 s).
420.8943	3/2−	45.8610 *10*	100	375.0352	1/2−	M1+E2	0.117 *+22−26*	7.9 *6*	
438.68	15/2+	169.77[#] *9*	96 *4*	268.92	13/2+	M1+E2	−0.33 *5*	0.852 *17*	I_γ,Mult.,δ: from ^{179}Hf IT decay (25.05 d).
		315.88[#] *11*	100	122.7904	11/2+	E2		0.0679	I_γ,Mult.: from ^{179}Hf IT decay (25.05 d).
476.3341	5/2−	55.4420 *10*	100 *1*	420.8943	3/2−	M1		3.74	
		101.2980 *10*	90 *5*	375.0352	1/2−	E2		3.35	

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Adopted Levels, Gammas (continued)

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

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
476.3341	5/2⁻	262.02 *3*	0.22 *6*	214.3395	7/2⁻				
487.709	(11/2⁻)	150.019 *15*	21.5 *15*	337.7178	9/2⁻				I_γ: from (^{9}Be,α2nγ); 30 *6* from (n,γ) E=thermal.
		273.368 *4*	100 *5*	214.3395	7/2⁻				
		487.704 *11*	52 *17*	0.0	9/2⁺				Not reported in (^{9}Be,α2nγ).
518.3279	5/2⁻	41.9960 *10*	0.26 *6*	476.3341	5/2⁻	M1(+E2)	0.13 *+6−11*	11 *3*	B(M1)(W.u.)>0.0023
		97.4350 *20*	0.89 *4*	420.8943	3/2⁻	M1+E2	0.28 *+10−14*	4.29 *7*	B(M1)(W.u.)>0.00074; B(E2)(W.u.)>0.93
		143.301 *9*	0.11 *3*	375.0352	1/2⁻	(E2)		0.914	B(E2)(W.u.)>0.68 Mult.: α(K)exp in (n,γ) E=thermal consistent with E1 or E2; $\Delta\pi$=no from level scheme.
		180.613 *2*	0.79 *4*	337.7178	9/2⁻	E2		0.406	B(E2)(W.u.)>1.6
		303.977 *4*	100.0 *22*	214.3395	7/2⁻	M1+E2	0.62 *+7−6*	0.151 *5*	B(M1)(W.u.)>0.0021; B(E2)(W.u.)>3.4
582.230	7/2⁻	105.899 *3*	100 *2*	476.3341	5/2⁻	M1		3.40	
		161.3390 *20*	19.0 *8*	420.8943	3/2⁻	(E2)		0.600	
		367.891 *17*	0.55 *9*	214.3395	7/2⁻				
614.204	1/2⁻	137.873 *2*	0.72 *4*	476.3341	5/2⁻	E2		1.051	B(E2)(W.u.)=1.5 *5*
		193.310 *2*	100.0 *21*	420.8943	3/2⁻	M1+E2	0.59 *4*	0.543 *11*	B(M1)(W.u.)=0.0025 *8*; B(E2)(W.u.)=10 *4*
		239.165 *3*	16.4 *12*	375.0352	1/2⁻	M1		0.344	B(M1)(W.u.)=0.00030 *10*
616.7562	7/2⁻	98.433 *2*	100 *1*	518.3279	5/2⁻	M1+E2	0.35 *4*	4.14	
		140.4260 *20*	10.8 *7*	476.3341	5/2⁻	M1+E2	0.40 *+15−19*	1.45 *6*	
		195.861 *6*	2.05 *24*	420.8943	3/2⁻				
		279.029 *4*	75.9 *8*	337.7178	9/2⁻	M1+E2	0.69 *+12−11*	0.185 *10*	I(279γ):I(98γ)=133 *17*:100 *8* in (^{9}Be,α2nγ).
		402.409 *6*	37.2 *7*	214.3395	7/2⁻	M1+E2	1.28 *8*	0.0534 *18*	
		616.768 *9*	22.9 *19*	0.0	9/2⁺				
631.30	17/2⁺	192.62[#] *11*	54 *5*	438.68	15/2⁺	M1+E2	−0.26 *6*	0.607 *13*	I_γ,Mult.,δ: from ^{179}Hf IT decay (25.05 d). Other Iγ: 78 *4* in (^{9}Be,α2nγ).
		362.39[#] *13*	100.0 *22*	268.92	13/2⁺	E2		0.0457	I_γ,Mult.: from ^{179}Hf IT decay (25.05 d).
664.3	(13/2⁻)	176.3[a]	0.7[a] *7*	487.709	(11/2⁻)				
		326.8[a]	100[a] *5*	337.7178	9/2⁻				
679.516	3/2⁻	161.191 *2*	100 *3*	518.3279	5/2⁻	M1		1.030	
		203.182 *3*	16.7 *3*	476.3341	5/2⁻	M1+E2	0.70 *6*	0.452 *12*	
		258.615 *3*	75 *5*	420.8943	3/2⁻	M1+E2	0.53 *13*	0.244 *14*	
		304.465 *7*	7.3 *7*	375.0352	1/2⁻	M1		0.1785	
681.036	9/2⁻	98.808 *12*	15 *4*	582.230	7/2⁻				Other Iγ: 5.3 *26* in (^{9}Be,α2nγ).
		204.696 *3*	100.0 *22*	476.3341	5/2⁻	E2		0.266	
701.0552	5/2⁻	84.2970 *10*	13.2 *8*	616.7562	7/2⁻	M1+E2	2.6 *3*	6.93	
		86.857 *5*	5.5 *7*	614.204	1/2⁻	E2		6.18	
		118.8260 *10*	100 *3*	582.230	7/2⁻	M1+E2	0.36 *8*	2.37 *5*	
		182.7350 *20*	25.2 *5*	518.3279	5/2⁻	M1+E2	0.67 *6*	0.621 *16*	
		224.715 *3*	6.5 *7*	476.3341	5/2⁻	M1(+E0)			
		280.154 *4*	4.82 *15*	420.8943	3/2⁻	M1+E2	0.5 *+3−4*	0.198 *25*	
		326.010 *14*	35.6 *15*	375.0352	1/2⁻	E2		0.0619	

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$^{179}_{72}Hf_{107}$-13

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
701.0552	5/2⁻	486.735 14	12.6 11	214.3395	7/2⁻	M1		0.0516	
720.613	3/2⁻	106.409 1	2.64 15	614.204	1/2⁻	M1(+E2)	≤0.37	3.32 6	B(M1)(W.u.)>0.00060
		202.283 3	100 2	518.3279	5/2⁻	M1+E2	0.57 4	0.480 10	B(M1)(W.u.)>0.0028; B(E2)(W.u.)>8.7
		244.278 8	10.6 10	476.3341	5/2⁻	M1(+E2)	≤0.7	0.30 3	B(M1)(W.u.)>0.00014
		299.716 4	38.7 8	420.8943	3/2⁻	M1+E2	1.53 6	0.1114 24	B(M1)(W.u.)>0.00013; B(E2)(W.u.)>1.5
		345.575 5	9.60 10	375.0352	1/2⁻	M1+E2	0.64 4	0.1054 25	B(M1)(W.u.)>5.0×10^{-5}; B(E2)(W.u.)>0.070 Other Iγ: 7.1 14 in (n,γ) E=7.78 eV res.
		506.299[f] 20	4.6[f] 15	214.3395	7/2⁻	(E2)		0.0187	B(E2)(W.u.)>0.019
742.710	9/2⁻	125.957 1	100 9	616.7562	7/2⁻	M1+E2	0.67 +20−19	1.88 8	
		224.367 4	23.4 19	518.3279	5/2⁻				
		619.90 5	12 6	122.7904	11/2⁺				
788.185	5/2⁻	87.127 13	2.6 13	701.0552	5/2⁻				
		108.678 4	3.6 6	679.516	3/2⁻				
		171.432 2	100 1	616.7562	7/2⁻	M1+E2	0.67 4	0.748 15	
		173.977 3	5.0 3	614.204	1/2⁻	E2		0.461	
		205.950 3	53.3 10	582.230	7/2⁻	M1+E2	0.84 6	0.412 11	
		269.857 4	94 7	518.3279	5/2⁻	M1+E0			Other I(270γ):I(171γ)=194 31:100 19 in (^{9}Be,α2nγ).
		311.844 4	21.4 9	476.3341	5/2⁻	M1(+E2)	≤0.43	0.160 8	
		413.132 7	43.6 9	375.0352	1/2⁻	E2		0.0318	
		450.47 3	2.9 3	337.7178	9/2⁻				
		573.825 22	41.1 24	214.3395	7/2⁻	M1		0.0337	Other I(574γ):I(171γ)=14 5:100 36 in (n,γ) E=7.78 eV res.
842.9	11/2⁻	260.7[a]	100	582.230	7/2⁻				
848.37	19/2⁺	217.07[#] 13	42 3	631.30	17/2⁺	M1+E2	−0.37 3	0.421 8	I_γ,Mult.,δ: from ^{179}Hf IT decay (25.05 d). Other Iγ: 53 3 from (^{9}Be,α2nγ).
		409.68[#] 15	100.0 25	438.68	15/2⁺	E2		0.0325	I_γ,Mult.: from ^{179}Hf IT decay (25.05 d).
849.200	7/2⁻	106.492 1	12.4 15	742.710	9/2⁻	M1+E2	1.0 +4−3	3.05 11	
		148.148 4	6.8 15	701.0552	5/2⁻	M1		1.306	
		168.162 2	13.8 7	681.036	9/2⁻				
		169.675 4	15.0 9	679.516	3/2⁻	E2		0.503	
		232.439 3	47.6 18	616.7562	7/2⁻	M1+E2	1.04 +14−12	0.270 13	
		266.974 4	35.9 18	582.230	7/2⁻	M1(+E2)		0.18 7	
		330.856 9	10.6 5	518.3279	5/2⁻				
		372.853 5	71.4 7	476.3341	5/2⁻	M1		0.1038	
		428.292 6	12.9 15	420.8943	3/2⁻	(E2)		0.0289	δ(M1,E2)>1.3 from α(K)exp=0.029 7 in (n,γ) E=thermal.
		634.94 4	100 12	214.3395	7/2⁻	M1+E2		0.018 8	
865.9	(15/2⁻)	378.2[a]	100	487.709	(11/2⁻)	(E2)		0.0405	Mult.: Q intraband γ from γ(θ) in (^{9}Be,α2nγ).
870.222	7/2⁻	532.49 4	7.5 5	337.7178	9/2⁻	M1		0.0409	Other Iγ: 41 9 in (^{9}Be,α2nγ).

From ENSDF

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γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
870.222	7/2⁻	655.888 *20*	45.6 *19*	214.3395	7/2⁻	M1(+E2)		0.017 *7*	
		870.243 *13*	100.0 *20*	0.0	9/2⁺	E1		0.00212 *3*	
896.7	11/2⁻	153.5[a]	88[a] *13*	742.710	9/2⁻				
		280.1[a]	100[a] *13*	616.7562	7/2⁻				
912.0	9/2⁻	210.9[a]	100	701.0552	5/2⁻				
935.643	7/2⁻	147.458 *3*	33 *5*	788.185	5/2⁻	M1		1.324	
		192.933 *3*	43 *4*	742.710	9/2⁻				
		215[g]	<10	720.613	3/2⁻				E_γ,I_γ: transition reported in (^{9}Be,α2nγ) only; there, I(215γ):I(319γ)=0.1 *1*:2.1 *6*.
		318.887 *4*	100.0 *24*	616.7562	7/2⁻	M1+E2	0.71 *+20−18*	0.127 *11*	
		353.425 *6*	76 *4*	582.230	7/2⁻	M1		0.1197	
		459.287 *9*	30.1 *24*	476.3341	5/2⁻	M1(+E2)		0.042 *18*	
985.7	13/2⁻	304.7[a]	100	681.036	9/2⁻				
1003.650	5/2⁺	386.898 *9*	0.54 *4*	616.7562	7/2⁻				
		485.323 *7*	2.7 *6*	518.3279	5/2⁻				
		789.188[g] *20*	2.05 *13*	214.3395	7/2⁻	(E1)		0.00256 *4*	
		1003.690 *23*	100 *6*	0.0	9/2⁺	E2		0.00406 *6*	
1073.565	7/2⁻	735.83 *5*	26.8 *14*	337.7178	9/2⁻	M1+E2	1.1 *+9−4*	0.012 *3*	Other Iγ: 17 *3* in β^- decay.
		859.254 *16*	100 *2*	214.3395	7/2⁻	M1+E2	0.43 *+11−13*	0.0111 *5*	
1074.7	(5/2⁻)	860.4[a]	100	214.3395	7/2⁻				
1076.6	13/2⁻	179.5[a]	83[a] *17*	896.7	11/2⁻				
		334.2[a]	100[a] *17*	742.710	9/2⁻				
1078.349	(7/2)⁺	357.731 *11*	2.71 *22*	720.613	3/2⁻				
		863.98 *15*	7.1 *21*	214.3395	7/2⁻				
		1078.37 *8*	100 *4*	0.0	9/2⁺	E2(+M1)		0.0052 *17*	
1084.73	21/2⁺	236.36[#] *14*	27.7 *8*	848.37	19/2⁺	M1+E2	−0.30 *3*	0.340 *6*	I_γ,δ: from ^{179}Hf IT decay (25.05 d). Other Iγ: 33 *3* from (^{9}Be,α2nγ).
		453.43[#] *17*	100 *4*	631.30	17/2⁺	E2		0.0249	
1092.7	(17/2⁻)	428.4[a]	100	664.3	(13/2⁻)				
1105.74	25/2⁻	21.01[#] *12*	0.254 *13*	1084.73	21/2⁺	M2		1.15×10^4 *4*	B(M2)(W.u.)=9.1×10^{-12} *10* I_γ: from I(γ+ce)=2917 *104* from ^{179}Hf IT decay (25.05 d) and α=11500. Mult.: from ^{179}Hf IT decay (25.05 d).
		257.37[#] *15*	100 *17*	848.37	19/2⁺	E3		0.669	B(E3)(W.u.)=1.28×10^{-10} *23* I_γ,Mult.: from ^{179}Hf IT decay (25.05 d).
1105.92	(7/2⁺)	891.5[‡] *3*	8.1 *20*	214.3395	7/2⁻				I_γ: from β^- decay.
		983.17[‡] *20*	33 *6*	122.7904	11/2⁺				I_γ: from β^- decay.
		1105.92[‡] *10*	100 *10*	0.0	9/2⁺				I_γ: from β^- decay.
1120.816	9/2⁺	906.44 *6*	11.2 *9*	214.3395	7/2⁻				

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

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
1120.816	9/2+	998.06 *10*	25 *4*	122.7904	11/2+	M1+E2	0.9 *+13−6*	0.0065 *17*	
		1120.833 *24*	100	0.0	9/2+	M1+E0			
1150.411	1/2+	429.800 *6*	14.4 *12*	720.613	3/2−	(E1)		0.00919 *13*	
		470.891 *7*	43 *4*	679.516	3/2−	E1		0.00749 *11*	
		536.195 *10*	2.1 *3*	614.204	1/2−				
		729.517 *10*	100 *3*	420.8943	3/2−	E1		0.00299 *5*	
		775.35 *8*	1.85 *25*	375.0352	1/2−				
1168.95	(9/2+)	831.24 *3*	67.0 *26*	337.7178	9/2−				
		953.9[‡] *3*	35 *11*	214.3395	7/2−				I_γ: from β^- decay. γ absent in (n,γ) E=thermal.
		1046.16[f] *6*	100[f] *21*	122.7904	11/2+				I_γ: from β^- decay. Mult=M1+E2 for doublet in which 70% of Iγ arises from this transition.
		1168.4[‡] *3*	36 *11*	0.0	9/2+				I_γ: from β^- decay. γ absent in (n,γ) E=thermal.
1185.848	3/2+	182.178 *11*	1.19 *16*	1003.650	5/2+				
		397.67 *3*	0.70 *13*	788.185	5/2−				
		465.222 *6*	18.8 *10*	720.613	3/2−	(E1)		0.00769 *11*	
		484.799 *15*	17.8 *18*	701.0552	5/2−	(E1)		0.00702 *10*	Mult.: α(K)exp<α(K)(E2) for transition with possible ce contamination in (n,γ) E=thermal; $\Delta\pi$=yes from level scheme.
		506.299[f] *20*	≤4.4[f]	679.516	3/2−				
		571.653 *14*	53 *3*	614.204	1/2−	E1+M2	0.10 *3*	0.0059 *7*	
		709.527 *18*	9.3 *4*	476.3341	5/2−				
		764.968 *11*	91 *3*	420.8943	3/2−	E1		0.00272 *4*	
		810.831 *12*	100.0 *22*	375.0352	1/2−	E1		0.00243 *4*	
1196.2	15/2−	353.3[a]	100	842.9	11/2−				
1198.4	(7/2−)	123.3[a]	100	1074.7	(5/2−)				
1199.52	(7/2+)	680.2 *5*	7 *3*	518.3279	5/2−				E_γ,I_γ: from ^{179}Lu β^- decay.
		1076.9 *2*	100 *20*	122.7904	11/2+				E_γ,I_γ: from ^{179}Lu β^- decay.
		1199.5 *2*	60 *13*	0.0	9/2+				E_γ,I_γ: from ^{179}Lu β^- decay.
1235.440	5/2+	231.809 *6*	3.66 *25*	1003.650	5/2+				
		386.244 *6*	17.3 *3*	849.200	7/2−	(E1)		0.01173	
		514.827 *10*	9.1 *26*	720.613	3/2−				
		534.394 *12*	6.2 *3*	701.0552	5/2−				
		555.888 *11*	6.5 *6*	679.516	3/2−				
		653.190 *13*	100 *4*	582.230	7/2−	E1		0.00374 *6*	
		759.060 *14*	22.9 *7*	476.3341	5/2−	(E1)		0.00277 *4*	
1249.552	3/2−	548.508 *15*	4.7 *4*	701.0552	5/2−	M1		0.0379	
		570.036 *8*	9.5 *6*	679.516	3/2−	M1		0.0343	

$^{179}_{72}Hf_{107}$-15

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
1249.552	3/2⁻	635.26 *4*	29.4 *14*	614.204	1/2⁻	M1(+E2)		0.018 *8*	
		731.22[e] *3*	15.6[e] *8*	518.3279	5/2⁻				
		773.15 *5*	5.6 *6*	476.3341	5/2⁻	E2+M1	0.9 *+13−7*	0.012 *4*	
		1035.197 *15*	100 *6*	214.3395	7/2⁻	E2		0.00381 *6*	
1255.8	11/2⁻	320.2[a]	100	935.643	7/2⁻				
1269.445	3/2⁻	399.17 *4*	1.79 *14*	870.222	7/2⁻				
		548.858 *21*	26.1 *18*	720.613	3/2⁻	M1+E2		0.027 *12*	
		568.382 *8*	10.6 *9*	701.0552	5/2⁻	M1		0.0345	
		589.923 *8*	29.2 *20*	679.516	3/2⁻	M1+E2	0.55 *23*	0.027 *3*	
		655.256 *19*	92 *4*	614.204	1/2⁻	M1+E2	0.70 *+10−9*	0.0194 *9*	
		751.14 *3*	10.8 *5*	518.3279	5/2⁻	M1		0.01699	
		1055.06 *5*	100 *6*	214.3395	7/2⁻	(E2)		0.00367 *6*	
1283.7	15/2⁻	207.2[a]	100[a] *60*	1076.6	13/2⁻				
		387[a]	60[a] *20*	896.7	11/2⁻				
1296.64	(3/2⁻,5/2,7/2⁻)	596.0[&] *2*	34 *7*	701.0552	5/2⁻				
		616.6[&] *2*	23 *5*	679.516	3/2⁻				
		1082.4[&] *2*	100 *20*	214.3395	7/2⁻				
1309.8	(17/2⁺)	678.4[a]	2.3[a] *12*	631.30	17/2⁺	[M1]		0.0220	B(M1)(W.u.)=9.E−7 *6*
		871.1[a]	53[a] *5*	438.68	15/2⁺	[M1]		0.01172	B(M1)(W.u.)=1.0×10^{-5} *4*
		1041.0[a]	100[a] *7*	268.92	13/2⁺	[E2]		0.00377 *6*	B(E2)(W.u.)=0.00019 *7*
1313.500	5/2⁻	633.967 *22*	15.0 *14*	679.516	3/2⁻	M1+E2		0.019 *8*	
		696.74 *5*	12.3 *10*	616.7562	7/2⁻				
		699.15 *8*	5.6 *10*	614.204	1/2⁻				
		731.22[e] *3*	57[e] *3*	582.230	7/2⁻				
		795.27 *6*	13.8 *24*	518.3279	5/2⁻				
		975.72 *6*	100 *6*	337.7178	9/2⁻	E2		0.00430 *6*	
		1099.26 *7*	92 *12*	214.3395	7/2⁻	E2(+M1)		0.0050 *16*	
1343.8	(19/2⁻)	477.9[a]	100	865.9	(15/2⁻)				
1348.6	(9/2⁻)	149.9[a]	42[a] *25*	1198.4	(7/2⁻)				
		274.2[a]	100[a] *50*	1074.7	(5/2⁻)				
1350.7	23/2⁺	266.0[a]	33[a] *3*	1084.73	21/2⁺				
		502.3[a]	100[a] *7*	848.37	19/2⁺				
1372.3	(17/2⁺)	933.4[a]	18[a] *9*	438.68	15/2⁺				
		1103.5[a]	100[a] *18*	268.92	13/2⁺				
1381.9	17/2⁻	396.2[a]	100	985.7	13/2⁻				
1393.0	(27/2⁻)	287.0[a]	100	1105.74	25/2⁻	(M1+E2)		0.15 *6*	Mult.: D+Q intraband γ from (^{9}Be,α2nγ).
1404.5	(23/2⁺)	298.8[a]	100	1105.74	25/2⁻	(E1(+M2))	<0.09	0.025 *3*	B(E1)(W.u.)>1.4×10^{-6} Mult.: D+Q from $\gamma(\theta)$ in (^{9}Be,α2nγ); $\Delta\pi$=(yes) from level scheme; δ(E1,M2)<0.09 from RUL.

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Adopted Levels, Gammas (continued)

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
1404.5+x	(21/2+)	(x)		1404.5	(23/2+)				
1433.189	3/2−	753.48 *16*	4.5 *8*	679.516	3/2−				
		816.42[e] *5*	12.9[e] *17*	616.7562	7/2−				
		914.867 *18*	38.0 *15*	518.3279	5/2−	E2(+M1)		0.008 *3*	
		956.79 *3*	39 *13*	476.3341	5/2−	M1		0.00928 *13*	
		1012.296 *18*	100 *7*	420.8943	3/2−	M1+E2	0.81 *+27−23*	0.0065 *6*	
1436.353	7/2−	315.49 *8*	1.1 *4*	1120.816	9/2+				
		357.999 *16*	4.5 *4*	1078.349	(7/2)+				
		432.701 *6*	7.0 *7*	1003.650	5/2+	(E1)		0.00905 *13*	
		566.159 *15*	4.9 *5*	870.222	7/2−	M1+E0			
		819.66 *9*	23.3 *14*	616.7562	7/2−	M1		0.01365	
		918.029 *14*	100 *2*	518.3279	5/2−	M1(+E2)	≤0.32	0.0100 *3*	
1458.994	3/2−	588.774 *8*	100 *4*	870.222	7/2−	E2		0.01298	
		670.89 *6*	23.3 *18*	788.185	5/2−	M1+E2	0.7 *+5−4*	0.018 *4*	
		738.388 *22*	22.3 *16*	720.613	3/2−	M1(+E0)			
		779.41 *3*	37 *3*	679.516	3/2−	M1+E2		0.011 *5*	
		1038.11 *4*	75 *4*	420.8943	3/2−	E2(+M1)		0.0057 *19*	
		1083.93 *6*	76 *4*	375.0352	1/2−	M1		0.00682 *10*	
		1244.73[f] *6*	67[f]	214.3395	7/2−				
1482.031	3/2+	478.369 *7*	36 *3*	1003.650	5/2+	M1(+E2)		0.038 *17*	
		693.89 *4*	20.4 *11*	788.185	5/2−				
		761.413 *11*	100 *3*	720.613	3/2−	E1		0.00275 *4*	
		867.816 *13*	78.9 *15*	614.204	1/2−	E1		0.00213 *3*	
1491.0	(17/2+)	1052.4[a]	53[a] *6*	438.68	15/2+				
		1222.0[a]	100[a] *18*	268.92	13/2+				
1520.6	(19/2+)	210.9[a]	100	1309.8	(17/2+)				
1532.277	5/2+	528.626 *7*	100 *4*	1003.650	5/2+	M1		0.0416	
		744.079 *15*	23.1 *12*	788.185	5/2−				
		811.65 *5*	12.4 *21*	720.613	3/2−				
		852.798 *16*	47.8 *23*	679.516	3/2−				
		1014.06 *13*	34 *3*	518.3279	5/2−				
1572.56	3/2−	955.82 *3*	100 *10*	616.7562	7/2−	E2		0.00448 *7*	
		1053.2[b]	<105[b]	518.3279	5/2−				Iγ: from I(1053γ):I(1197γ) for two-photon cascade data in (n,γ) E=thermal assuming 1197γ is not a doublet there.
		1151.63 *15*	36 *4*	420.8943	3/2−	M1(+E0)			Other Iγ: at least 47 *14* from (n,γ) E=7.78 eV res.
		1197.46[dg] *8*	<123	375.0352	1/2−				All or most of Iγ deexcites 1811 level.
1614.125	3/2−,1/2−	463.710 *12*	13.5 *10*	1150.411	1/2+				
		825.98 *5*	25 *3*	788.185	5/2−				
		1095.77 *8*	100 *17*	518.3279	5/2−	E2(+M1)		0.0050 *17*	

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γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
1614.125	3/2⁻,1/2⁻	1138.03 16	48 8	476.3341	5/2⁻				
		1239.18 23	92 33	375.0352	1/2⁻	M1,E2		0.0038 12	
1617.7	(21/2⁻)	525.0[a]	100	1092.7	(17/2⁻)				
1624.3	25/2⁺	273.4[a]	25[a] 6	1350.7	23/2⁺				
		539.6[a]	100[a] 13	1084.73	21/2⁺				
1668.957	3/2⁺	433.520 9	15.1 7	1235.440	5/2⁺	M1		0.0698	
		483.106 7	59 8	1185.848	3/2⁺	M1		0.0526	
		518.544 9	100 8	1150.411	1/2⁺	M1		0.0438	
		1293.49[f] 18	15[f]	375.0352	1/2⁻				
1675.3	(19/2⁺)	365.5[a]	100	1309.8	(17/2⁺)				
1679.5+x	(23/2⁺)	275.0[a]	100	1404.5+x	(21/2⁺)				
1687.13	(3/2)⁻	816.42[e] 5	35[e] 5	870.222	7/2⁻				
		966.53 4	70 3	720.613	3/2⁻	M1(+E0)			
		1007.57 7	100 14	679.516	3/2⁻	M1(+E0)			
		1072.93[e] 9	32[e] 7	614.204	1/2⁻				
1687.8+x	(19/2⁻)	283.3	100	1404.5+x	(21/2⁺)				
1702.5	(29/2⁻)	309.6[a]	100[a] 7	1393.0	(27/2⁻)				
		597.0[a]	83[a] 10	1105.74	25/2⁻				
1706.062	(3/2)⁻	247.069 4	5.3 3	1458.994	3/2⁻	M1+E2	1.2 +18−6	0.21 6	
		436.59 4	2.2 7	1269.445	3/2⁻				
		985.458 25	45 3	720.613	3/2⁻	M1+E2	1.2 +7−4	0.0060 9	Other Iγ: 67 14 in (n,γ) E=7.78 eV res.
		1024.71 8	17	681.036	9/2⁻				
		1089.40 17	12.4 26	616.7562	7/2⁻				
		1092.00 13	16.9 25	614.204	1/2⁻	M1		0.00670 10	Other Iγ: 36 from two-photon cascade data in (n,γ) E=thermal.
		1187.83 13	70 2	518.3279	5/2⁻	E2		0.00291 4	Other Iγ: 89 from two-photon cascade data in (n,γ) E=thermal; 93 in (n,γ) E=7.78 eV res.
		1330.95 20	100 5	375.0352	1/2⁻	E2(+M1)		0.0033 9	Possible multiplet; see comment in (n,γ) E=thermal.
		1492.6[e] 7	5.5[e] 24	214.3395	7/2⁻				
1713.0	(25/2⁺)	308.6[a]	100	1404.5	(23/2⁺)				
1715.935	1/2⁺,3/2⁺,5/2⁺	183.661 3	22.1 11	1532.277	5/2⁺				
		233.900 4	38.1 12	1482.031	3/2⁺	M1+E2	1.1 +4−3	0.26 3	
		466.380 6	100 6	1249.552	3/2⁻	E1		0.00765 11	
		565.51 4	13.9 18	1150.411	1/2⁺				
1725.786	3/2⁻	456.346 16	16.3 6	1269.445	3/2⁻				
		876.56 7	14.0 15	849.200	7/2⁻				
		937.55 3	27.9 23	788.185	5/2⁻	M1		0.00976 14	
		1005.24 3	98 15	720.613	3/2⁻	M1		0.00821 12	
		1024.71 8	31	701.0552	5/2⁻				

γ(^{179}Hf) (continued)

E$_i$(level)	J$^\pi_i$	E$_\gamma$	I$_\gamma$	E$_f$	J$^\pi_f$	Mult.	δ	α[c]	Comments
1725.786	3/2$^-$	1046.16[f] *6*	25[f]	679.516	3/2$^-$				Eγ: for doublet in (n,γ) E=thermal.
		1111.55 *7*	100 *15*	614.204	1/2$^-$	M1		0.00641 *9*	
		1350.75 *9*	48	375.0352	1/2$^-$				
1731.438	3/2$^-$	158.94 *6*	2.5 *11*	1572.56	3/2$^-$				
		295.104 *14*	11.7 *17*	1436.353	7/2$^-$	(E2)		0.0832	
		461.935 *23*	12.8 *8*	1269.445	3/2$^-$	M1(+E2)		0.041 *18*	
		1030.39 *4*	56 *11*	701.0552	5/2$^-$	M1(+E2)		0.0058 *20*	
		1051.87 *4*	65 *5*	679.516	3/2$^-$	M1(+E2)		0.0055 *19*	
		1117.23 *3*	100 *11*	614.204	1/2$^-$	(M1)		0.00633 *9*	Mult.: M1+E0 from α(K)exp, but E0 component inconsistent with adopted J^π; it could conceivably arise from an undetected impurity in ce spectrum in (n,γ) E=thermal.
		1310.70 *8*	94 *8*	420.8943	3/2$^-$	(E2)		0.00242 *4*	
		1356.34 *10*	67 *6*	375.0352	1/2$^-$	M1		0.00398 *6*	Mult.: M1(+E0) from α(K)exp, but E0 component inconsistent with placement.
1753.1	(21/2$^+$)	232.9[a]	100[a] *11*	1520.6	(19/2$^+$)				
		443.2[a]	21[a] *11*	1309.8	(17/2$^+$)				
1755.337	3/2$^-$	1054.25 *3*	100 *5*	701.0552	5/2$^-$	M1+E2		0.0055 *19*	
		1141.16 *3*	76.4 *20*	614.204	1/2$^-$	M1		0.00601 *9*	Other Iγ: 41 *8* in (n,γ) E=7.78 eV res relative to possible 1055γ doublet Iγ.
		1334.23 *8*	72 *7*	420.8943	3/2$^-$	E2		0.00234 *4*	Other Iγ: 23 *10* in (n,γ) E=7.78 eV res relative to possible 1055γ doublet Iγ.
1756.02	3/2$^-$	1036.1[b]	28[b]	720.613	3/2$^-$				
		1076.70 *20*	39	679.516	3/2$^-$				I$_\gamma$: from (n,γ) E=thermal; doublet Iγ suitably divided.
		1237.84 *12*	63	518.3279	5/2$^-$				Doublet; intensity suitably divided.
		1279.45 *11*	100 *8*	476.3341	5/2$^-$	E2(+M1)		0.0035 *11*	
		1381.2 *3*	97 *22*	375.0352	1/2$^-$	M1		0.00382 *6*	
1757.72	(3/2$^-$,5/2$^+$)	969.49 *11*	82 *8*	788.185	5/2$^-$				
		1543.7 *3*	100 *21*	214.3395	7/2$^-$				
1762.80	(3/2)$^-$	1042.28 *7*	15.6 *17*	720.613	3/2$^-$	M1,E2		0.0056 *19*	
		1061.63 *5*	39	701.0552	5/2$^-$				Doublet; branching deduced from suitably divided Iγ. Other Iγ: 133 *27* in (n,γ) E=7.78 eV res; probably for doublet.
		1148.50 *16*	23.2 *19*	614.204	1/2$^-$	M1		0.00592 *9*	
		1244.73[f] *6*	37[f]	518.3279	5/2$^-$				
		1342.6 *3*	49 *17*	420.8943	3/2$^-$	M1		0.00407 *6*	Other Iγ: 87 *20* in (n,γ) E=7.78 eV res.
		1387.84 *6*	100 *10*	375.0352	1/2$^-$	M1+E2	1.0 *+6−4*	0.0030 *4*	
		1548.78[f] *12*	34[f]	214.3395	7/2$^-$				

$^{179}_{72}$Hf$_{107}$-19

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

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	δ	α[c]	Comments
1783.11	1/2,3/2,5/2+	779.1[&] 2	65 13	1003.650	5/2+				
		1082.4[&] 2	100 20	701.0552	5/2−				
		1103.6[&] 2	38 15	679.516	3/2−				
1800.52	3/2−	1324.36 13	52 6	476.3341	5/2−	M1(+E2)		0.0033 10	
		1379.43 13	100 11	420.8943	3/2−				
		1425.49 9	52 6	375.0352	1/2−				
1811.50	3/2−	941.17 13	6.2 11	870.222	7/2−				
		1110.38 10	78 7	701.0552	5/2−	M1(+E2)		0.0049 16	
		1131.86 18	21 3	679.516	3/2−				
		1197.46[d] 8	100 13	614.204	1/2−				Mult.: M1+E0 for doubly−placed 1197γ.
		1293.49[f] 18	24[f]	518.3279	5/2−				
		1336.6[bg]	70[b]	476.3341	5/2−				
		1391.09 17	36 4	420.8943	3/2−	E2(+M1)		0.0030 8	
1821.29	(1/2−,3/2)	1121.0[&] 2	100 20	701.0552	5/2−				
		1141.3[&g] 2	125 25	679.516	3/2−				Doubly-placed γ in (n,γ) E=7.78 eV res only; Eγ does not fit this placement in (n,γ) E=thermal.
		1207.0[&] 2	80 16	614.204	1/2−				From (n,γ) E=7.78 eV res only.
		1446.16 7		375.0352	1/2−				Branching: 60 12 from (n,γ) E=7.78 eV res, 387 from (n,γ) E=thermal.
1826.9+x	(21/2+)	422.4[a]	100	1404.5+x	(21/2+)				
1846.32	(3/2−)	975.7[&] 2	52 11	870.222	7/2−				
		1167.2[&] 2	100 21	679.516	3/2−				
		≈1231.6[&]	16 6	614.204	1/2−				
1851.504	3/2+,5/2+	319.216 13	21.8 9	1532.277	5/2+	M1(+E2)		0.11 5	
		847.877 20	100 4	1003.650	5/2+	M1+E2	0.8 +5−4	0.0099 18	
1856.0	21/2−	474.1[a]	100	1381.9	17/2−				
1859.2	(21/2+)	549.4[a]	100	1309.8	(17/2+)				
1861.238	5/2+	328.955 5	14.3 11	1532.277	5/2+	M1+E0			
		547.86 5	13.9 15	1313.500	5/2−				
		740.48 4	24.8 26	1120.816	9/2+	(E2)		0.00769 11	Mult.: E2,M1 from α(K)exp in (n,γ) E=thermal; ΔJ≥2 from placement.
		782.78 7	17 3	1078.349	(7/2)+				
		787.732 23	30.8 23	1073.565	7/2−				
		857.601 21	100 4	1003.650	5/2+	M1(+E2)		0.009 4	
		926.4 3	12 4	935.643	7/2−				
		1072.93[e] 9	33[e] 7	788.185	5/2−				
1913.471	3/2−	480.268 20	9.2 16	1433.189	3/2−				

From ENSDF

$^{179}_{72}Hf_{107}$-20

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	α[c]	Comments
1913.471	3/2⁻	599.965 *8*	49.2 *10*	1313.500	5/2⁻	M1	0.0301	
		644.09 *5*	9.8 *14*	1269.445	3/2⁻	M1	0.0251	
		678.18 *8*	5.7 *6*	1235.440	5/2⁺			
		1192.95 *4*	100 *14*	720.613	3/2⁻			
		1492.6[e] *7*	10[e] *4*	420.8943	3/2⁻			
1915.0	(23/2⁻)	571.2[a]	100	1343.8	(19/2⁻)			
1928.846	1/2⁺,3/2⁺	259.889 *7*	30.4 *16*	1668.957	3/2⁺			
		396.602 *25*	7.7 *9*	1532.277	5/2⁺			
		742.91 *6*	75 *5*	1185.848	3/2⁺	M1+E2	0.013 *5*	
		778.39 *5*	100 *6*	1150.411	1/2⁺	M1(+E0)		Mult.: M1+E0 from α(K)exp in (n,γ) E=thermal is deduced from ce doublet; evaluator does not consider E0 component sufficiently certain to constitute the basis for a J assignment.
		1507.66[g] *18*	85 *11*	420.8943	3/2⁻			Doubly-placed line; little of Iγ belongs here.
1941.6	27/2⁺	317[†g]		1624.3	25/2⁺			
		591.1[a]	100	1350.7	23/2⁺			
1945.864	(1/2,3/2)	190.513 *21*	7 *5*	1755.337	3/2⁻			
		220.080 *9*	8.0 *18*	1725.786	3/2⁻			
		676.13 *18*	18 *4*	1269.445	3/2⁻			
		1267.0[bg]	[b]	679.516	3/2⁻			I_γ: I(1267γ)/I(1332γ)=0.77.
		1332.3[bg]	[b]	614.204	1/2⁻			
		1525.5 *3*	100 *17*	420.8943	3/2⁻			
		1571.7 *7*	67 *20*	375.0352	1/2⁻			
1956.1+x	(21/2⁻)	268[a]	100	1687.8+x	(19/2⁻)			
1974.1+x	(25/2⁺)	294.9[a]	100[a] *14*	1679.5+x	(23/2⁺)			
		569.6[a]	36[a] *14*	1404.5+x	(21/2⁺)			
2007.2	(23/2⁺)	254.3[a]	100[a] *25*	1753.1	(21/2⁺)			
		486.4[a]	75[a] *25*	1520.6	(19/2⁺)			
2033.6	(31/2⁻)	331.3[a]	100[a] *13*	1702.5	(29/2⁻)			
		640.4[a]	22[a] *9*	1393.0	(27/2⁻)			
2044.1	(27/2⁺)	331.2[a]	100[a] *13*	1713.0	(25/2⁺)			
		639.4[a]	25[a] *13*	1404.5	(23/2⁺)			
2047.0	(1/2,3/2)	1625.9[b]	77[b]	420.8943	3/2⁻			
		1672.0 *3*	100	375.0352	1/2⁻			
2052.6	1/2,3/2,5/2⁺	1332.0[b]	100[b]	720.613	3/2⁻			
		1351.5[b]	68[b]	701.0552	5/2⁻			
2070.7	(1/2,3/2)	1350.4 *3*	88[@]	720.613	3/2⁻			
		1456.5[b]	86[b]	614.204	1/2⁻			
		1649.78 *10*	100[@]	420.8943	3/2⁻			

$^{179}_{72}$Hf$_{107}$-21

Adopted Levels, Gammas (continued)

γ(^{179}Hf) (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Comments
2070.7	(1/2,3/2)	1695.7[b]	79[b]	375.0352	1/2$^-$	
2082.8	(1/2,3/2)	1078.1[&g] *2*	<333	1003.650	5/2$^+$	I_γ: from I(1078γ doublet):I(1606γ) in (n,γ) E=7.78 eV res. γ placed elsewhere in (n,γ) E=thermal.
		1381.7[b]	23[b]	701.0552	5/2$^-$	Eγ=1381.1 *2* for doublet in (n,γ) E=7.78 eV res.
		1403.3[bg]	32[b]	679.516	3/2$^-$	
		1606.5[b]	100[b]	476.3341	5/2$^-$	Other Eγ: 1605.0 *2* from (n,γ) E=7.78 eV res.
		1661.9[b]	99[b]	420.8943	3/2$^-$	I_γ: 76 *15* from (n,γ) E=7.78 eV res. Other Eγ: 1660.5 *2* from (n,γ) E=7.78 eV res.
		1707.8[b]	47[b]	375.0352	1/2$^-$	
2088.4	(1/2,3/2)	1408.9[b]	43[b]	679.516	3/2$^-$	
		1713.4[b]	100[b]	375.0352	1/2$^-$	
2093.40		1305.3[&g] *2*	27 *6*	788.185	5/2$^-$	I_γ: from ^{178}Hf(n,γ) E=7.78 eV res.
		1672.5[&] *2*	100 *21*	420.8943	3/2$^-$	I_γ: from ^{178}Hf(n,γ) E=7.78 eV res.
2133.2?	(23/2$^+$)	274[ag]	100	1859.2	(21/2$^+$)	
2146.1	(1/2,3/2)	1445.0[b]	57[b]	701.0552	5/2$^-$	
		1531.9[b]	100[b]	614.204	1/2$^-$	
2150.3	1/2$^{(-)}$,3/2,5/2$^+$	1429.7[b]	39[b]	720.613	3/2$^-$	
		1674.0[b]	100[b]	476.3341	5/2$^-$	
		1729.4[b]	92[b]	420.8943	3/2$^-$	
2183.1	1/2,3/2,5/2$^+$	1462.5[b]	100[b]	720.613	3/2$^-$	
		1503.6[b]	71[b]	679.516	3/2$^-$	
		≈1707.0[g]		476.3341	5/2$^-$	E_γ: from (n,γ) E=7.78 eV res. Similar Eγ placed from 2083 level in (n,γ) E=thermal.
2214.4	(1/2,3/2)	1600.1 *3*	83[@]	614.204	1/2$^-$	
		1840.6[b]	100[b]	375.0352	1/2$^-$	
2228.1	1/2,3/2,5/2$^+$	1507.66 *18*	78	720.613	3/2$^-$	E_γ: for doubly-placed γ.
		1548.78[f] *12*	34[f]	679.516	3/2$^-$	
		1807.3[b]	100[b]	420.8943	3/2$^-$	
2242.5?	(29/2$^+$)	301[†g]		1941.6	27/2$^+$	
		618[†g]		1624.3	25/2$^+$	
2243.5+x?	(23/2$^-$)	287[ag]	≤100[a]	1956.1+x	(21/2$^-$)	
		556[ag]	≤100[a]	1687.8+x	(19/2$^-$)	
2249.97	(3/2$^-$)	1461.4[b]	41[b]	788.185	5/2$^-$	
		1529.0[b]	36[b]	720.613	3/2$^-$	
		1875.3 *4*	95[@]	375.0352	1/2$^-$	

$^{179}_{72}Hf_{107}$-22

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

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f
2249.97	(3/2⁻)	2035.53 *23*	100[@]	214.3395	7/2⁻
2254.2	1/2$^{(-)}$,3/2,5/2⁺	1735.9[b]	100[b]	518.3279	5/2⁻
		1833.3[b]	99[b]	420.8943	3/2⁻
2281.1	(25/2⁺)	273.9[a]	100	2007.2	(23/2⁺)
2287.2+x	(27/2⁺)	313.2[a]	100[a] *17*	1974.1+x	(25/2⁺)
		607.5[a]	100[a] *33*	1679.5+x	(23/2⁺)
2309.2	1/2,3/2,5/2⁺	1588.6[b]	91[b]	720.613	3/2⁻
		1888.3[b]	100[b]	420.8943	3/2⁻
2366.9	(1/2⁻,3/2)	1646.3[b]	20[b]	720.613	3/2⁻
		1687.4[b]	12[b]	679.516	3/2⁻
		1752.7[b]	13[b]	614.204	1/2⁻
		1848.6[b]	13[b]	518.3279	5/2⁻
		1890.6[b]	100[b]	476.3341	5/2⁻
		1946.0[b]	22[b]	420.8943	3/2⁻
		1991.9[b]	28[b]	375.0352	1/2⁻
2386.3	(33/2⁻)	352.8[a]	100[a] *25*	2033.6	(31/2⁻)
		683.9[a]	100[a] *25*	1702.5	(29/2⁻)
2394.2	1/2$^{(-)}$,3/2,5/2⁺	1606.0[b]	21[b]	788.185	5/2⁻
		1714.7 *3*	19[@]	679.516	3/2⁻
		1973.3[b]	100[b]	420.8943	3/2⁻
2395.1	25/2⁻	539.1[a]	100	1856.0	21/2⁻
2396.5	(29/2⁺)	352.5[a]	100[a] *14*	2044.1	(27/2⁺)
		683.5[a]	29[a] *14*	1713.0	(25/2⁺)
2415.5	(1/2⁻,3/2)	1627.7 *5*	28[@]	788.185	5/2⁻
		1800.7[b]	77[b]	614.204	1/2⁻
		1938.6[b]	60[b]	476.3341	5/2⁻
		1994.0[b]	100[b]	420.8943	3/2⁻
2425.3	(1/2⁻,3/2)	1724.2[b]	92[b]	701.0552	5/2⁻
		1811.1[b]	100[b]	614.204	1/2⁻
2451.31	(3/2⁻)	1771.5[b]	23[b]	679.516	3/2⁻
		1836.8[b]	64[b]	614.204	1/2⁻
		2030.1[b]	100[b]	420.8943	3/2⁻
		2236.97 *23*	24[@]	214.3395	7/2⁻
2456.7	(29/2⁻)	1351[a]	100	1105.74	25/2⁻

From ENSDF

$^{179}_{72}Hf_{107}$-23

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	α[c]	Comments
2460.3	(1/2,3/2)	2039.4[b]	100[b]	420.8943	3/2⁻			
		2085.3[b]	73[b]	375.0352	1/2⁻			
2475.5	(3/2⁻)	1774.4[b]	18[b]	701.0552	5/2⁻			
		1861.3[b]	35[b]	614.204	1/2⁻			
		2054.6[b]	100[b]	420.8943	3/2⁻			
		2100.5[b]	87[b]	375.0352	1/2⁻			
		2261.2[b]	12[b]	214.3395	7/2⁻			
2509.5	(1/2,3/2)	1830.0[b]	30[b]	679.516	3/2⁻			
		2088.6[b]	86[b]	420.8943	3/2⁻			
		2134.5[b]	100[b]	375.0352	1/2⁻			
2522.7	(1/2⁻,3/2)	2046.4[b]	76[b]	476.3341	5/2⁻			
		2101.8[b]	56[b]	420.8943	3/2⁻			
		2147.7[b]	100[b]	375.0352	1/2⁻			
2549.6	(33/2⁻)	91[ag]		2456.7	(29/2⁻)	[E2]	5.12	
		516[ag]	<6[a]	2033.6	(31/2⁻)	[M1]	0.0443	B(M1)(W.u.)=1.5×10^{-7} *+17−15*
		847.1[a]	100[a] *13*	1702.5	(29/2⁻)	[E2]	0.00576 *8*	B(E2)(W.u.)=0.0007 *3*
2601.2	(1/2⁻,3/2)	2124.9[b]	29[b]	476.3341	5/2⁻			
		2180.3[b]	93[b]	420.8943	3/2⁻			
		2226.2[b]	100[b]	375.0352	1/2⁻			
2610.7	(1/2⁻,3/2)	1996.6 *3*	21[@]	614.204	1/2⁻			
		2092.4[b]	20[b]	518.3279	5/2⁻			
		2189.66 *19*	29[@]	420.8943	3/2⁻			
		2235.7[b]	100[b]	375.0352	1/2⁻			
2617.6?	(31/2⁺)	676[†g]	100	1941.6	27/2⁺			
2638.8	(1/2,3/2)	1918.2 *3*	66[@]	720.613	3/2⁻			
		2263.3[b]	100[b]	375.0352	1/2⁻			
2654.13	(1/2⁻,3/2)	1865.94 *24*	97[@]	788.185	5/2⁻			
		1932.5[b]	72[b]	720.613	3/2⁻			
		2134.8[b]	92[b]	518.3279	5/2⁻			
		2278.1[b]	100[b]	375.0352	1/2⁻			
2702.9	(1/2⁻,3/2)	2184.6[b]	61[b]	518.3279	5/2⁻			
		2327.9[b]	100[b]	375.0352	1/2⁻			
2743.69	(1/2⁻,3/2)	2042.7[b]	61[b]	701.0552	5/2⁻			

$^{179}_{72}$Hf$_{107}$-24

γ(^{179}Hf) (continued)

E_i(level)	J^π_i	E_γ	I_γ	E_f	J^π_f	Mult.	α[c]	Comments
2743.69	(1/2⁻,3/2)	2126.96 *21*	62[@]	616.7562	7/2⁻			
		2321.9[b]	100[b]	420.8943	3/2⁻			
2759.6	(35/2⁻)	373.5[a]	100[a] *50*	2386.3	(33/2⁻)			
		725.8[a]	50[a] *50*	2033.6	(31/2⁻)			
2769.6	(31/2⁺)	373.2[a]	25[a] *25*	2396.5	(29/2⁺)			
		725.5[a]	100[a] *25*	2044.1	(27/2⁺)			
2898.0	(35/2⁻)	348.4[a]	100	2549.6	(33/2⁻)			
2905.2	(1/2,3/2)	2184.5[b]	50[b]	720.613	3/2⁻			
		2225.7[b]	42[b]	679.516	3/2⁻			
		2484.3[b]	92[b]	420.8943	3/2⁻			
		2530.2[b]	100[b]	375.0352	1/2⁻			
2983.3	1/2$^{(-)}$,3/2,5/2⁺	2303.8[b]	38[b]	679.516	3/2⁻			
		2507.0[b]	100[b]	476.3341	5/2⁻			
3076.2	(1/2⁻,3/2)	2397.7[b]	38[b]	679.516	3/2⁻			
		2463.0[b]	42[b]	614.204	1/2⁻			
		2559.7 *5*	100[@]	518.3279	5/2⁻			
3148.8	(1/2⁻,3/2)	2447.7 *5*	55[@]	701.0552	5/2⁻			
		2534.9[b]	100[b]	614.204	1/2⁻			
3151.5?	(37/2⁻)	392[eag]	[e]	2759.6	(35/2⁻)			
		765[eag]	[e]	2386.3	(33/2⁻)			
3161.6?	(33/2⁺)	392[eag]	[e]	2769.6	(31/2⁺)			
		765[eag]	[e]	2396.5	(29/2⁺)			
3177.9	1/2$^{(-)}$,3/2,5/2⁺	2459.0[b]	87[b]	720.613	3/2⁻			
		2703.3[b]	100[b]	476.3341	5/2⁻			
3268.2	(37/2⁻)	370.4[a]	100[a] *25*	2898.0	(35/2⁻)			
		718.5[a]	50[a] *25*	2549.6	(33/2⁻)			
3345.4	1/2$^{(-)}$,3/2,5/2⁺	2644.3 *3*	62[@]	701.0552	5/2⁻			
		2924.3[b]	100[b]	420.8943	3/2⁻			
3347.2	(1/2,3/2)	2668.2[b]	58[b]	679.516	3/2⁻			
		2972.7[b]	100[b]	375.0352	1/2⁻			
3373.6?	(35/2⁺)	756[†g]	100	2617.6?	(31/2⁺)			
3409.5	(1/2,3/2)	2729.9[b]	100[b]	679.516	3/2⁻			
		3034.4[b]	79[b]	375.0352	1/2⁻			
3439.2	(39/2⁻)	171.0[a]	100	3268.2	(37/2⁻)	(M1,E2)	0.68 *20*	Mult.: from α(exp) in (^{9}Be,α2nγ). B(M1)(W.u.)=0.00019 *10* if pure M1.

$^{179}_{72}$Hf$_{107}$-25

Adopted Levels, Gammas (continued)

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

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α[c]	Comments
3659.1?	$(39/2^-)$	391[ag]		3268.2	$(37/2^-)$			
		761[ag]		2898.0	$(35/2^-)$			
3775.2	$(43/2^+)$	336.0[a]	100	3439.2	$(39/2^-)$	(M2)	0.518	B(M2)(W.u.)=0.010 *4* Mult.: from α(exp) in (^{9}Be,α2nγ).
4204.7?	$(39/2^+)$	831[†g]	100	3373.6?	$(35/2^+)$			

[†] From Coulomb excitation; uncertainty unstated by authors.

[‡] From ^{179}Lu β^- decay.

[#] From ^{179}Hf IT decay (25.05 d).

[@] From two-photon cascade data in (n,γ) E=thermal.

[&] From ^{178}Hf(n,γ) E=7.78 eV res.

[a] From (^{9}Be,α2nγ).

[b] Eγ from level energy difference in (n,γ) E=thermal. Iγ is relative to 100 for strongest transition observed; stronger transition(s) from level may exist. Transition is deduced from two-photon cascade data of 1988Bo44, assuming that authors′ cascade γ order is correct, that cascade γ rays are consecutive and that only two-photon cascades were identified.

[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] Multiply placed.

[e] Multiply placed with undivided intensity.

[f] Multiply placed with intensity suitably divided.

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

$^{179}_{72}Hf_{107}$-26

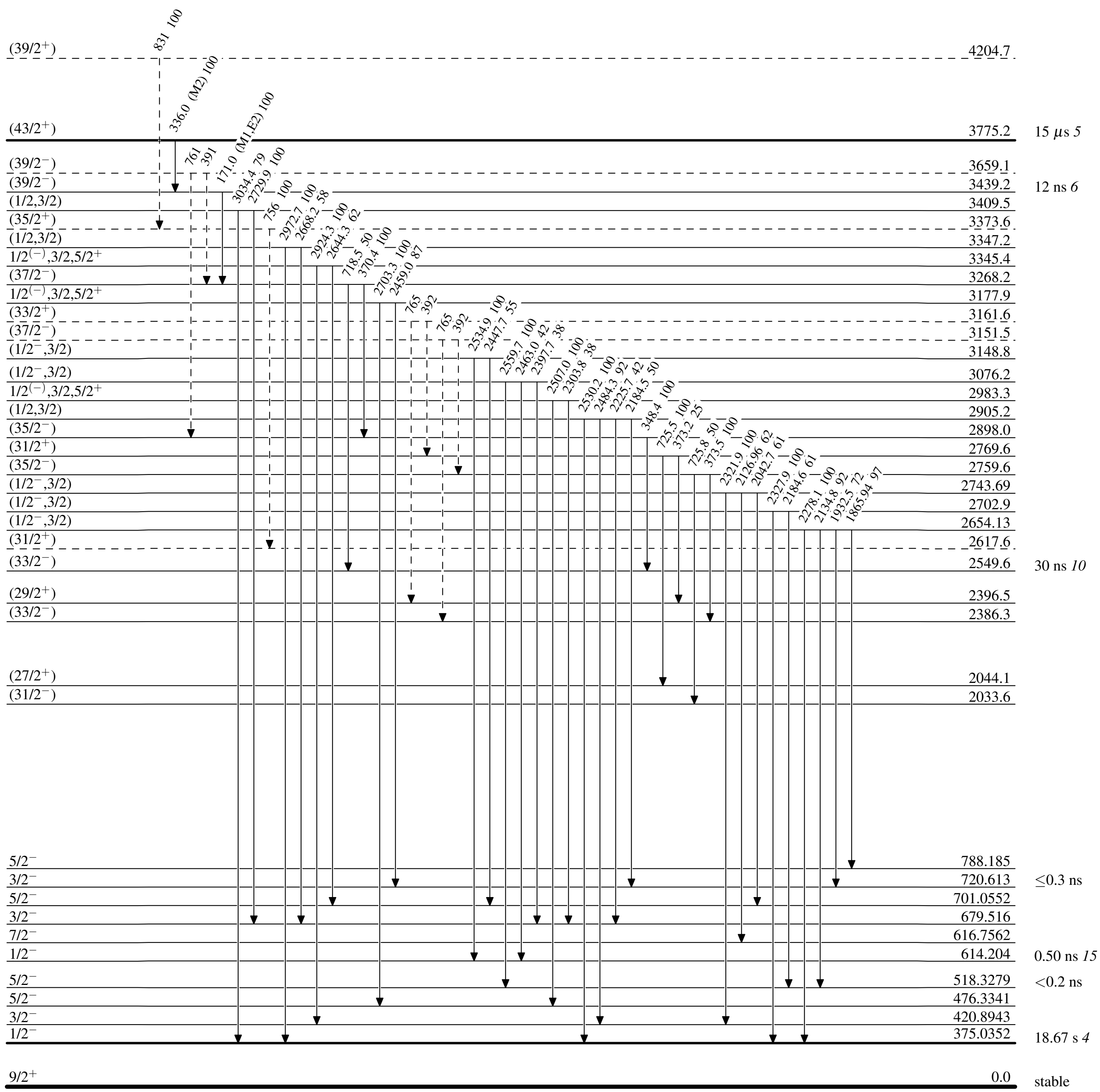
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

- - - - - ▶ γ Decay (Uncertain)

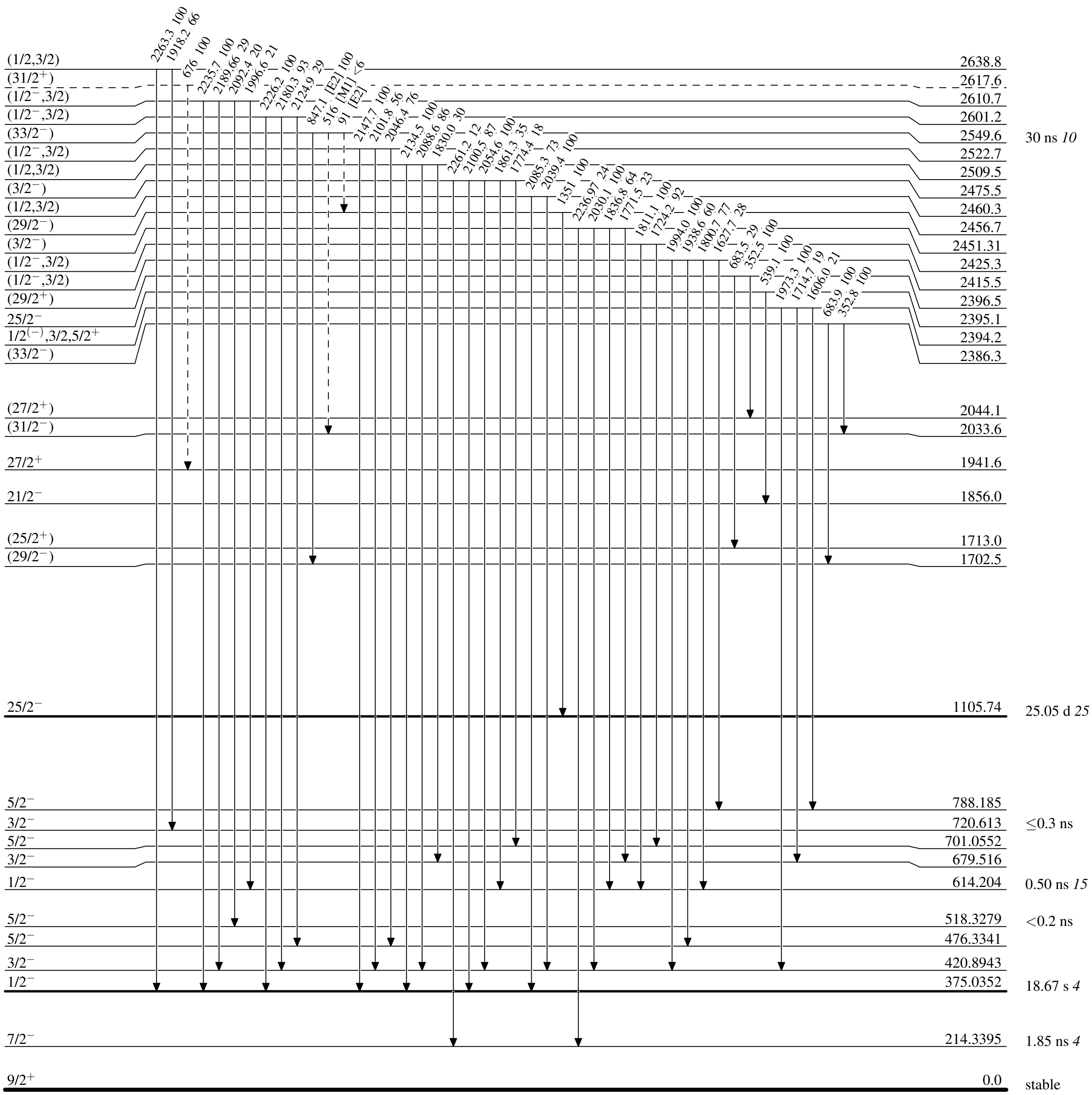


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level

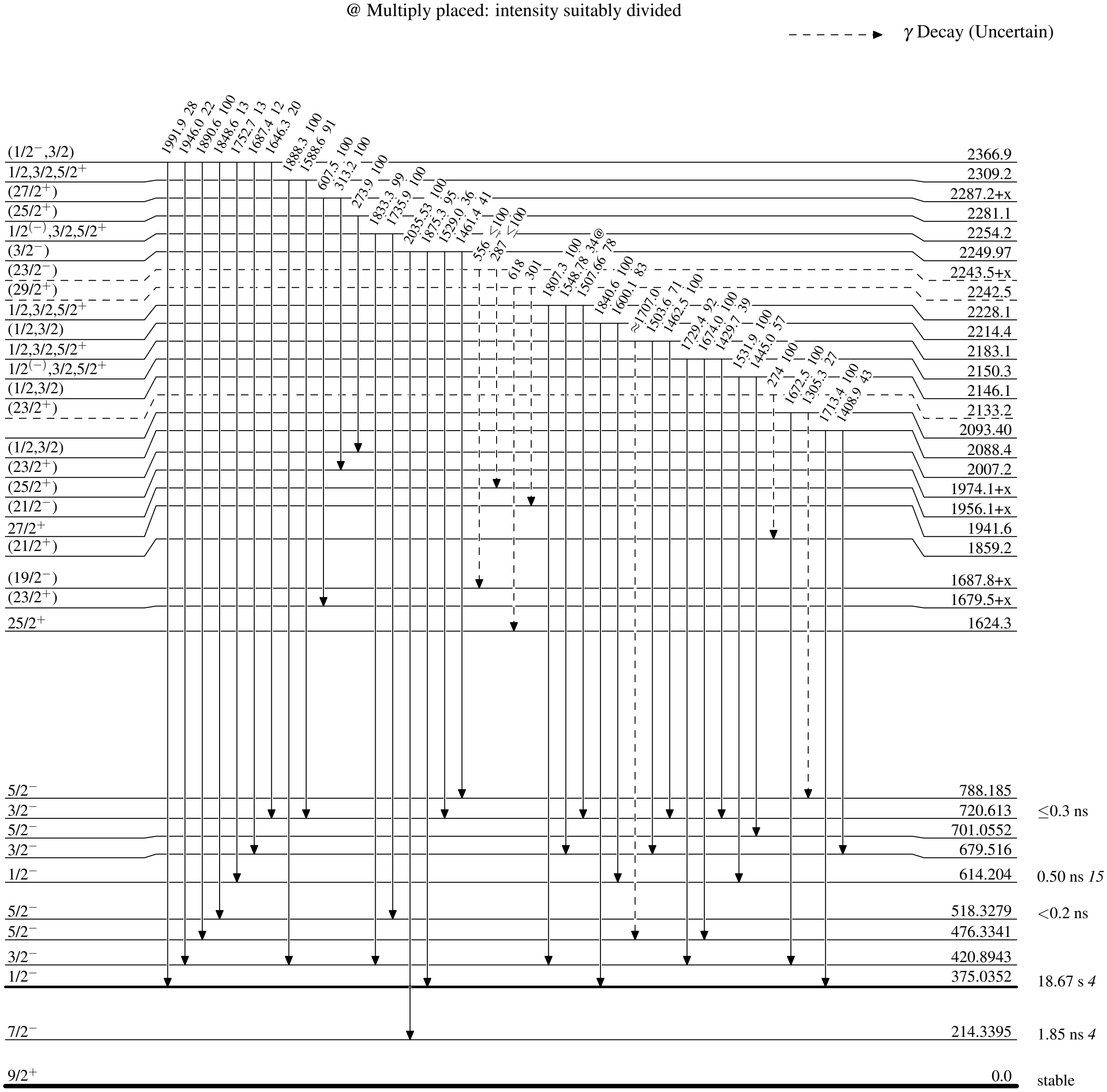


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



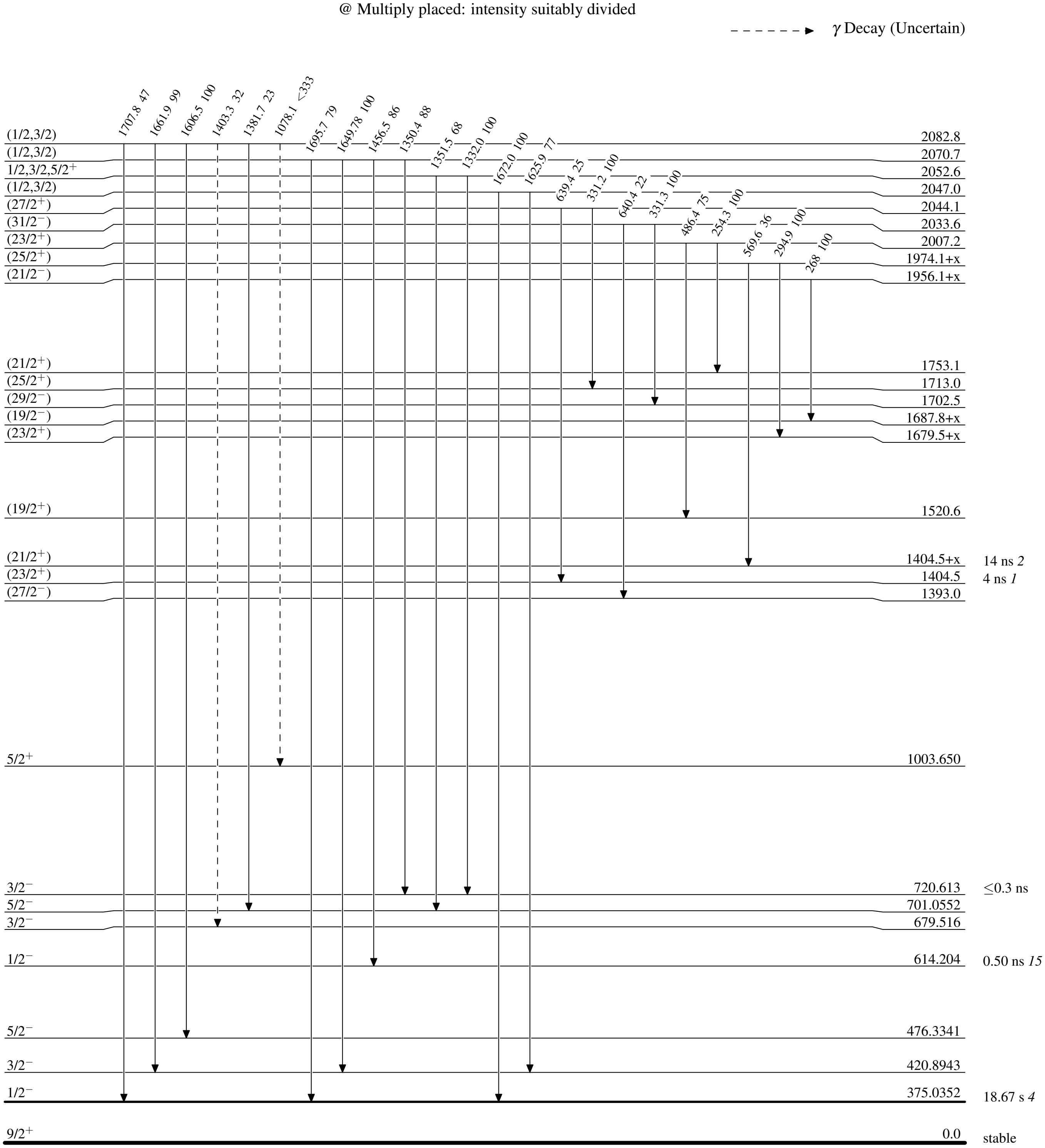
$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level
@ Multiply placed: intensity suitably divided



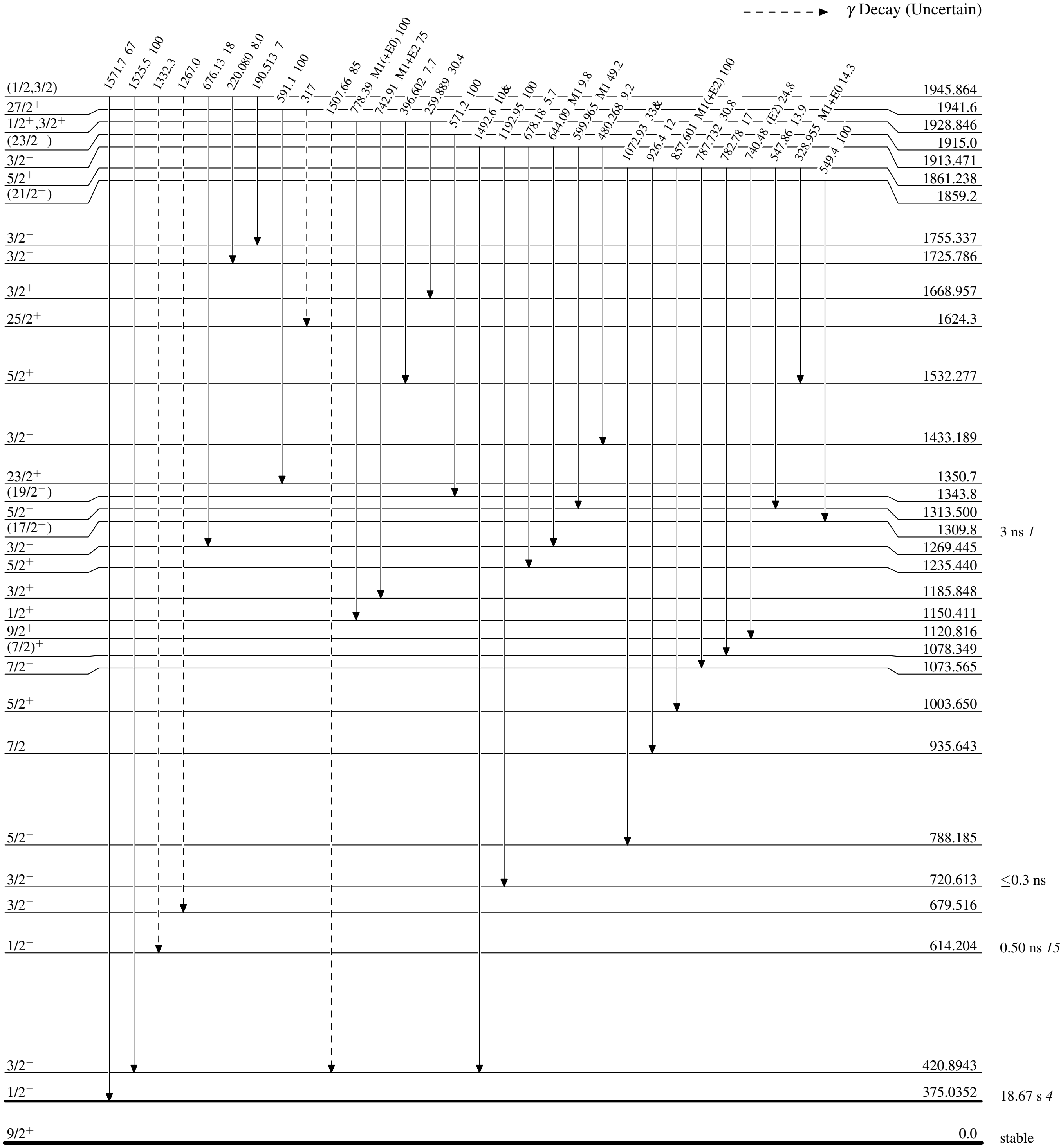
$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

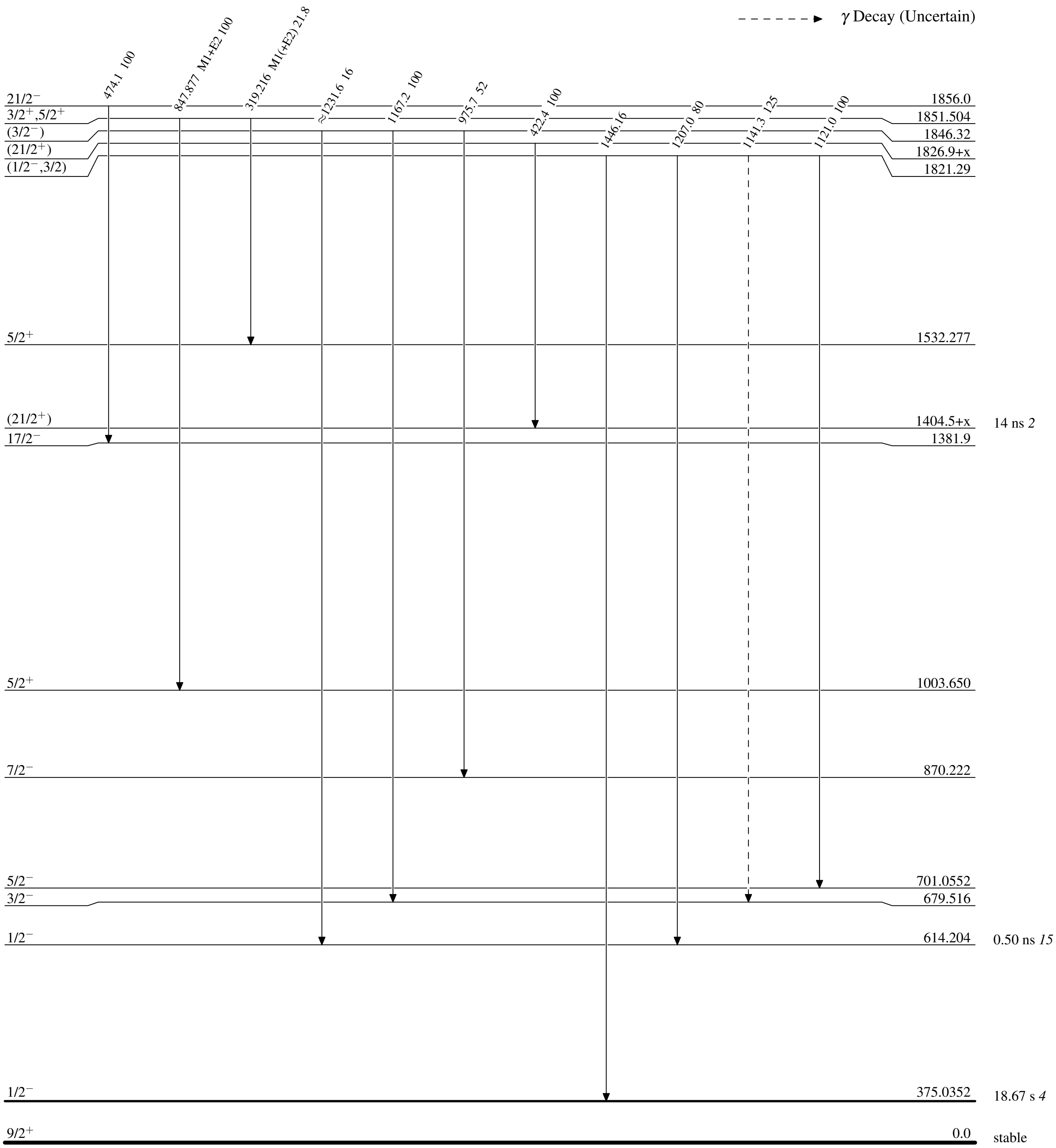


Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend



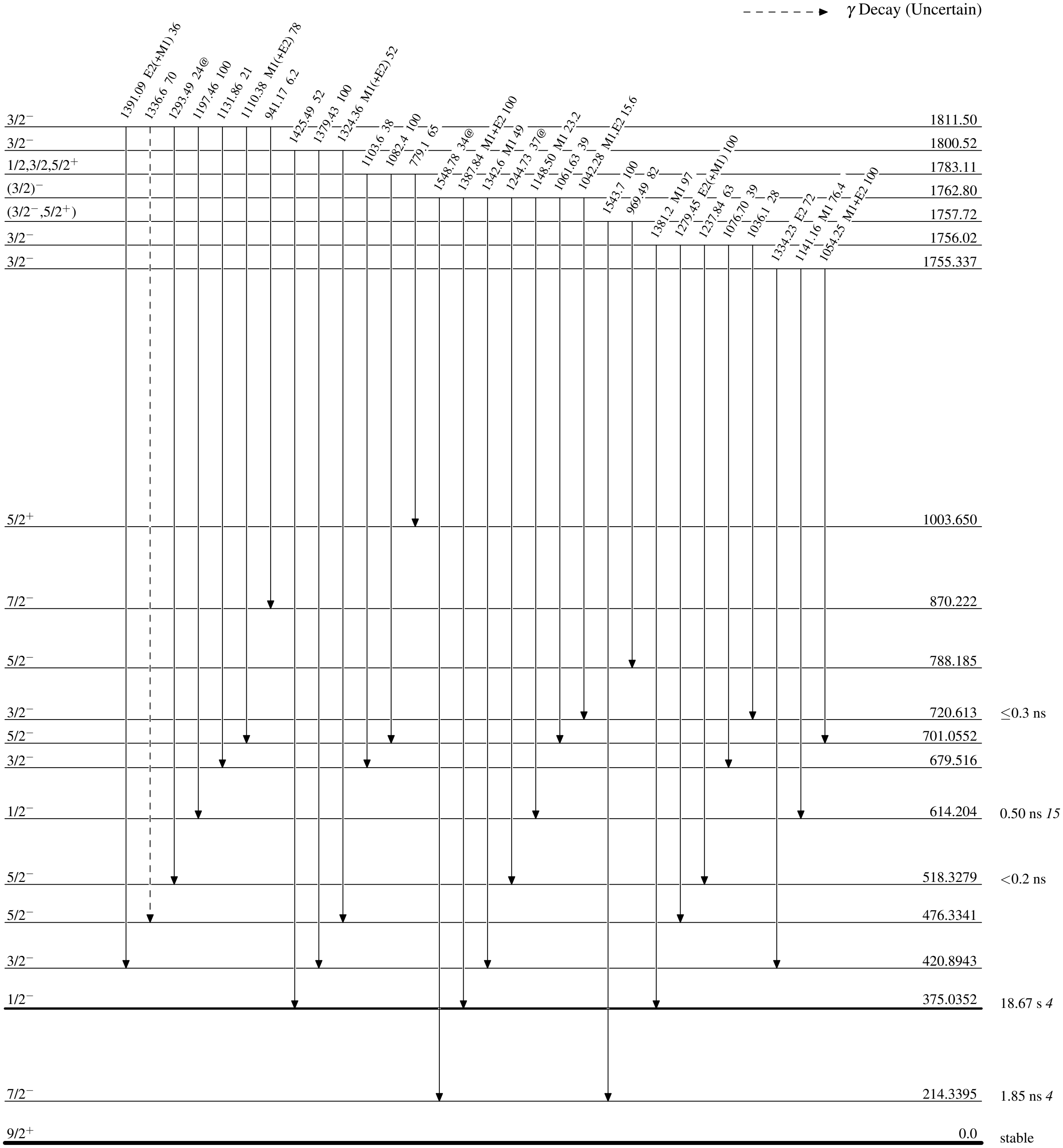
Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

- - - - - ► γ Decay (Uncertain)

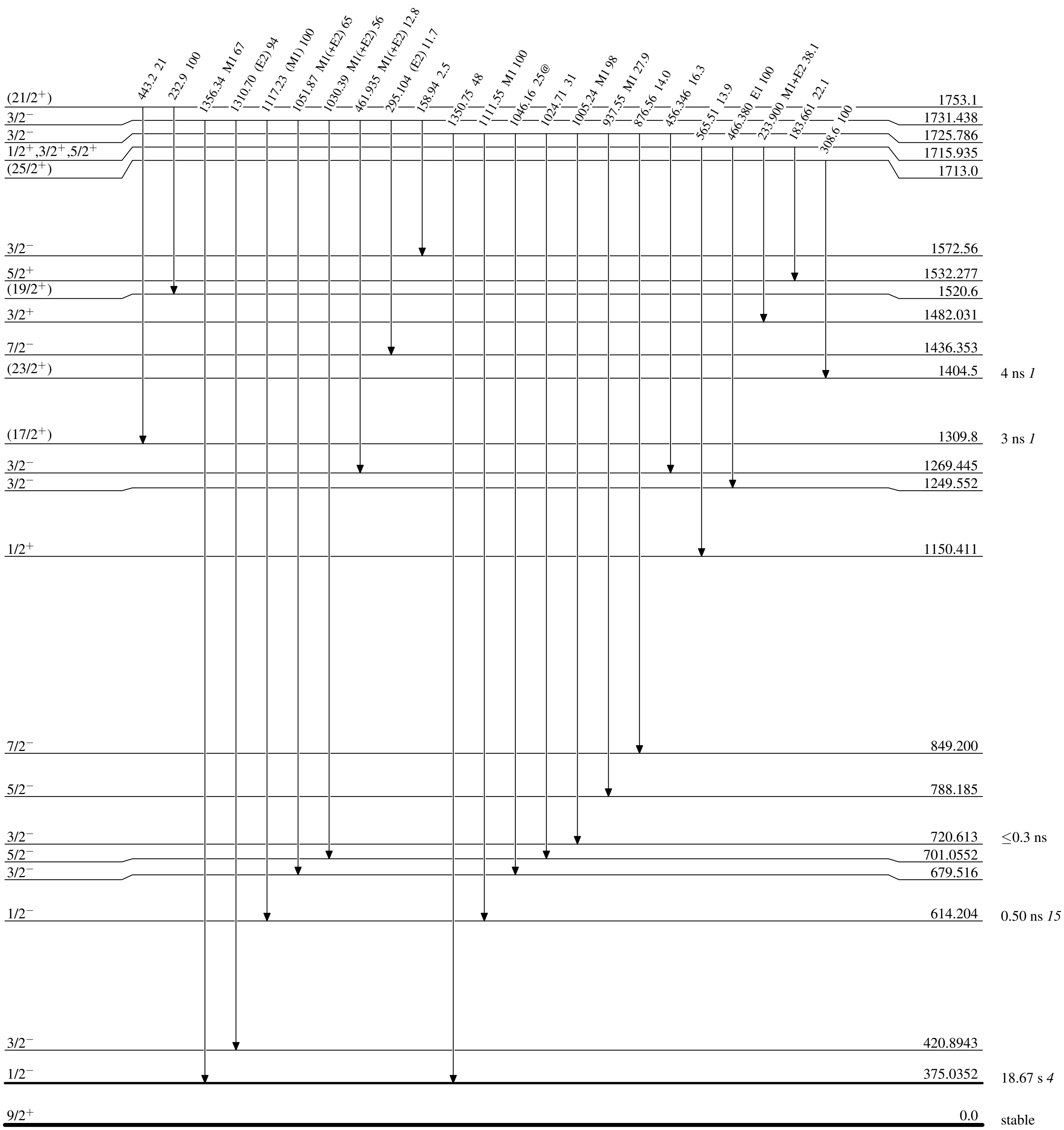


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

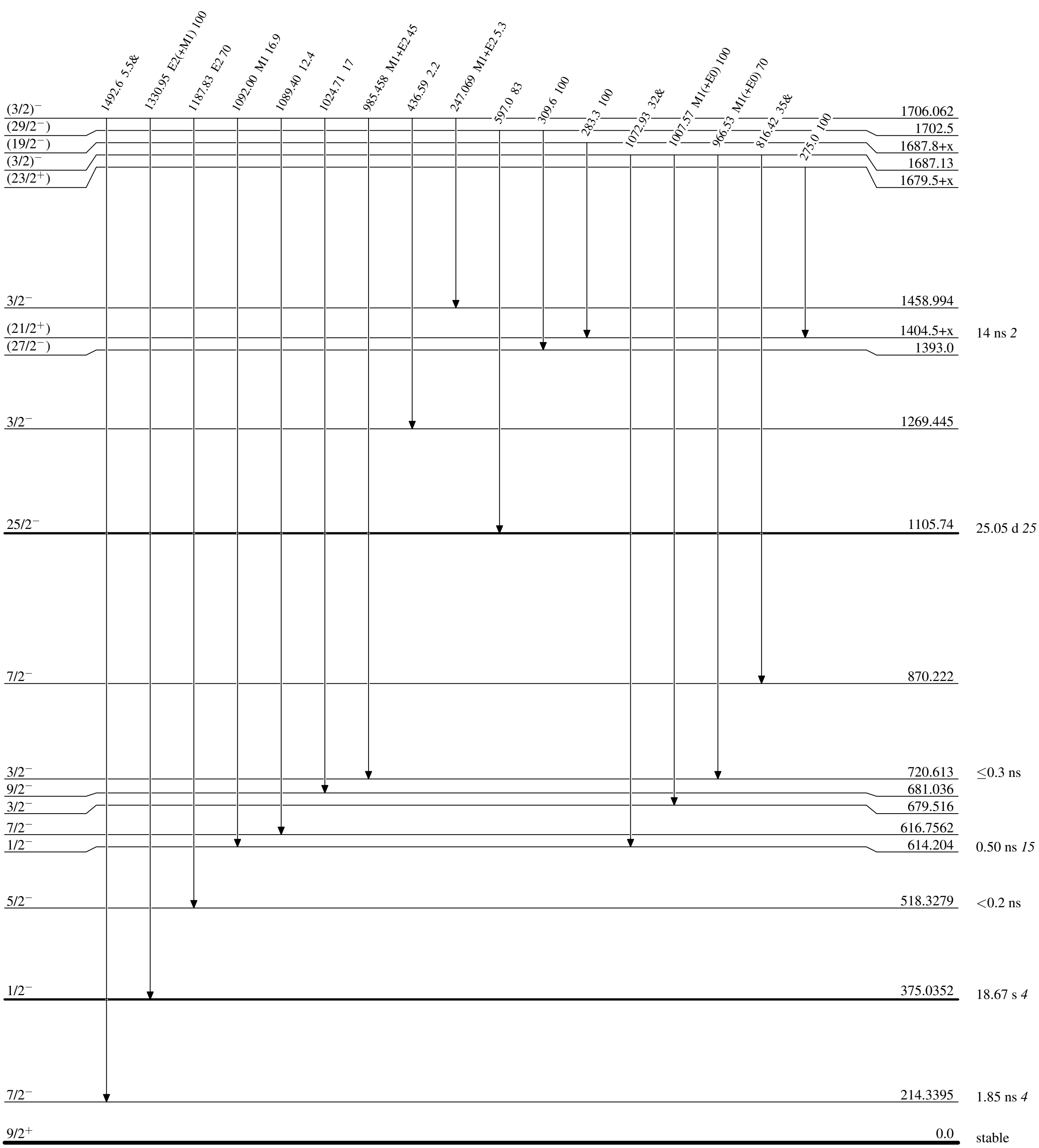


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



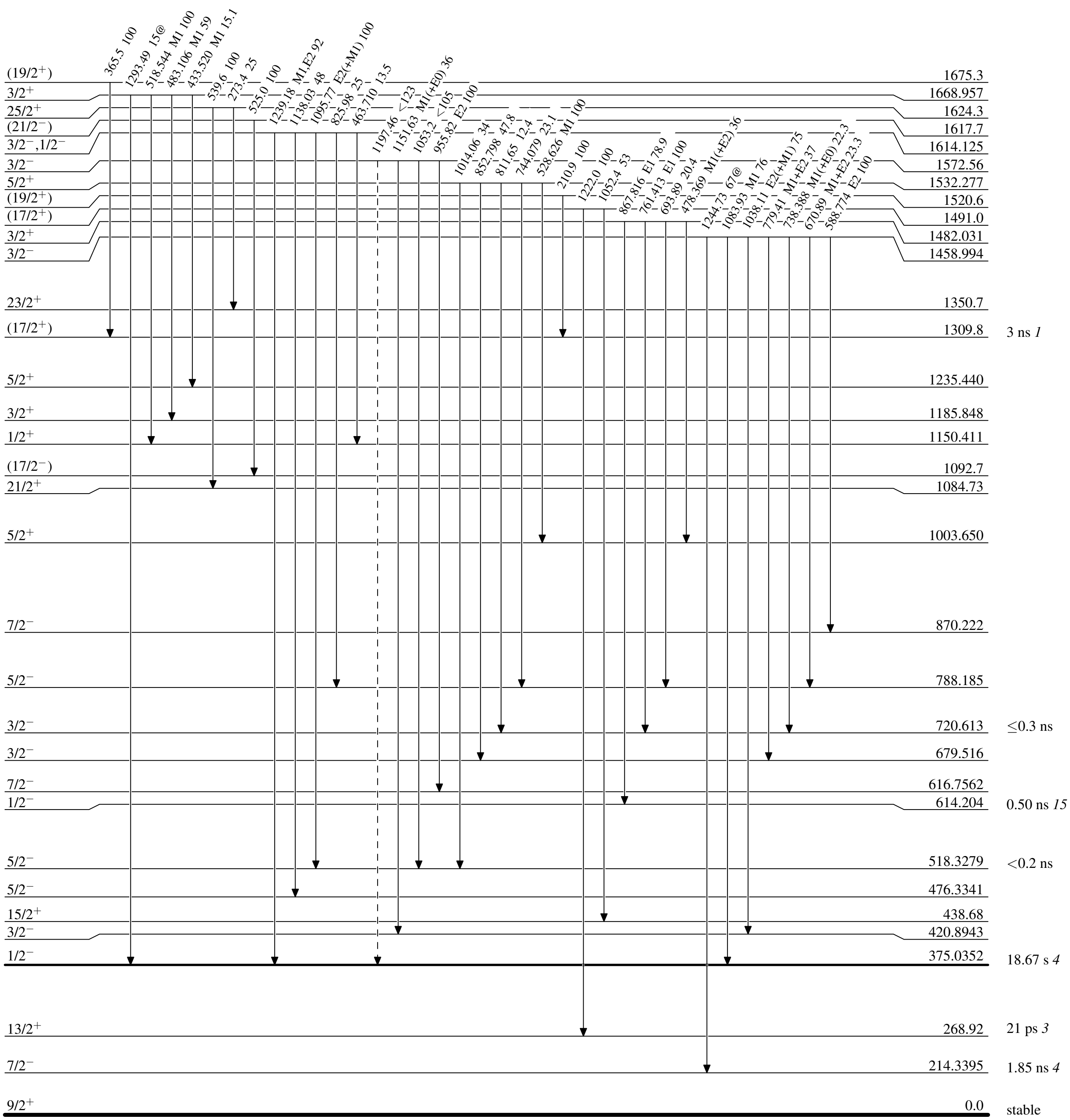
Adopted Levels, Gammas

Level Scheme (continued)

Legend

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

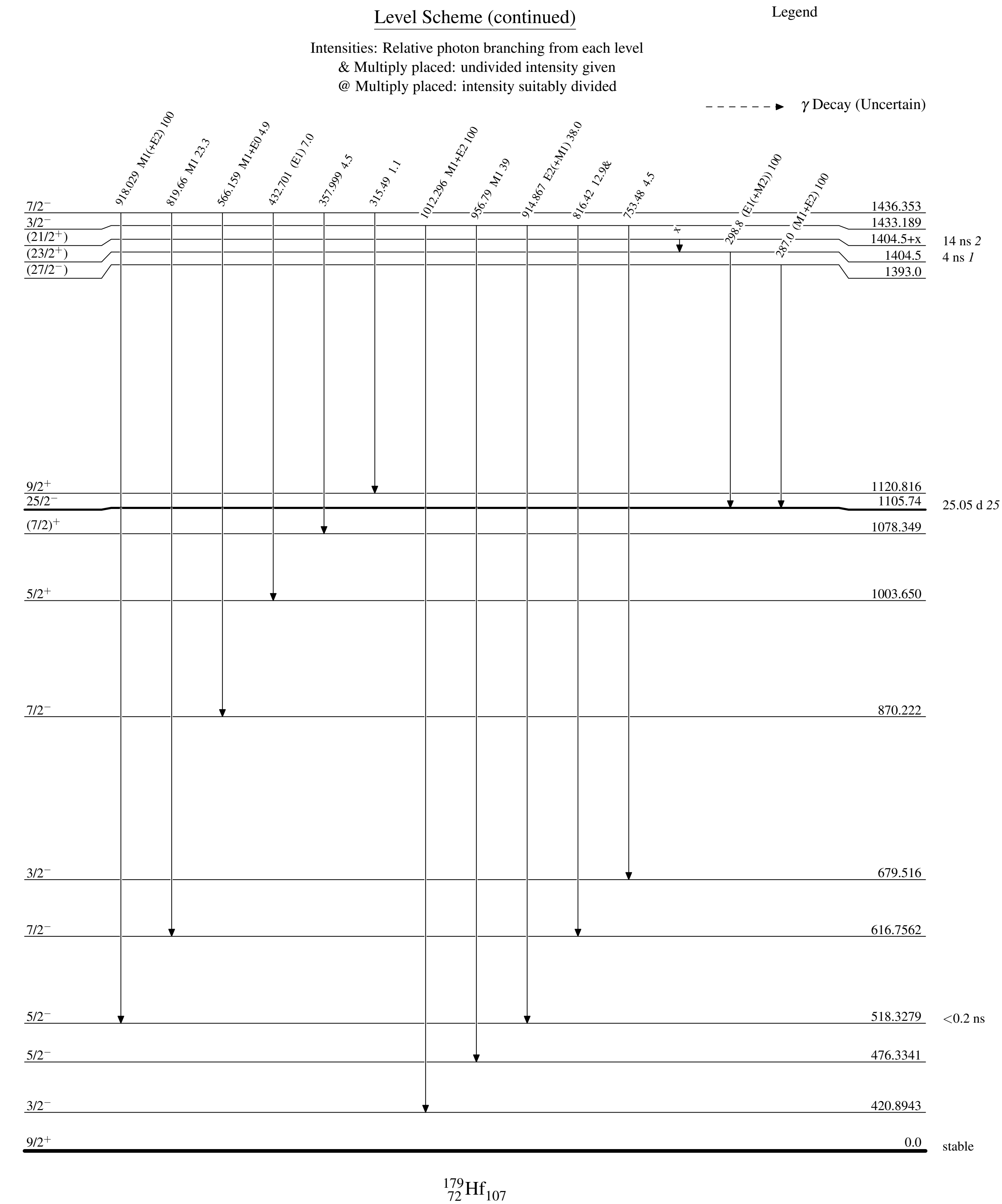
γ Decay (Uncertain)



$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

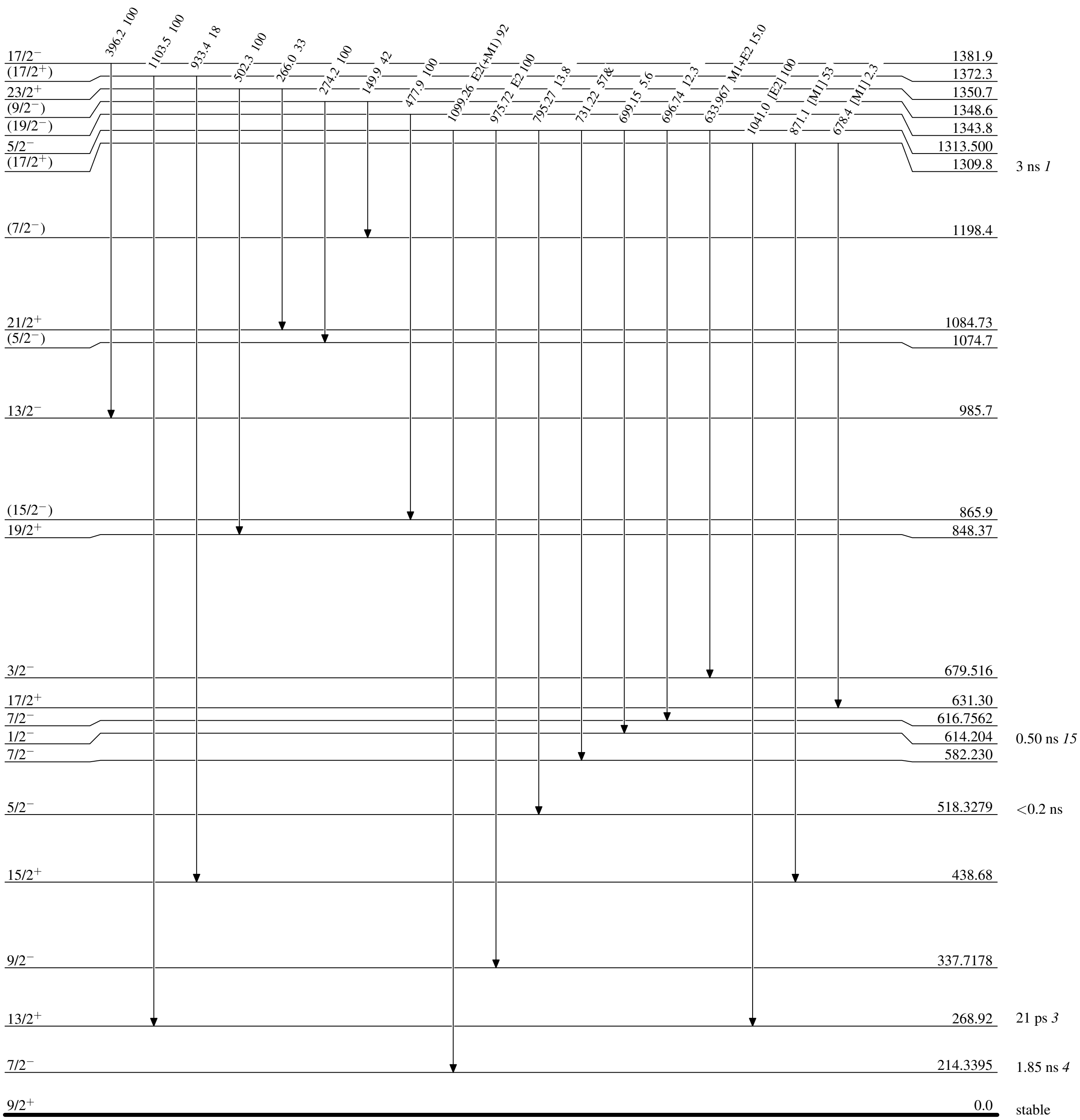
Level Scheme (continued)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

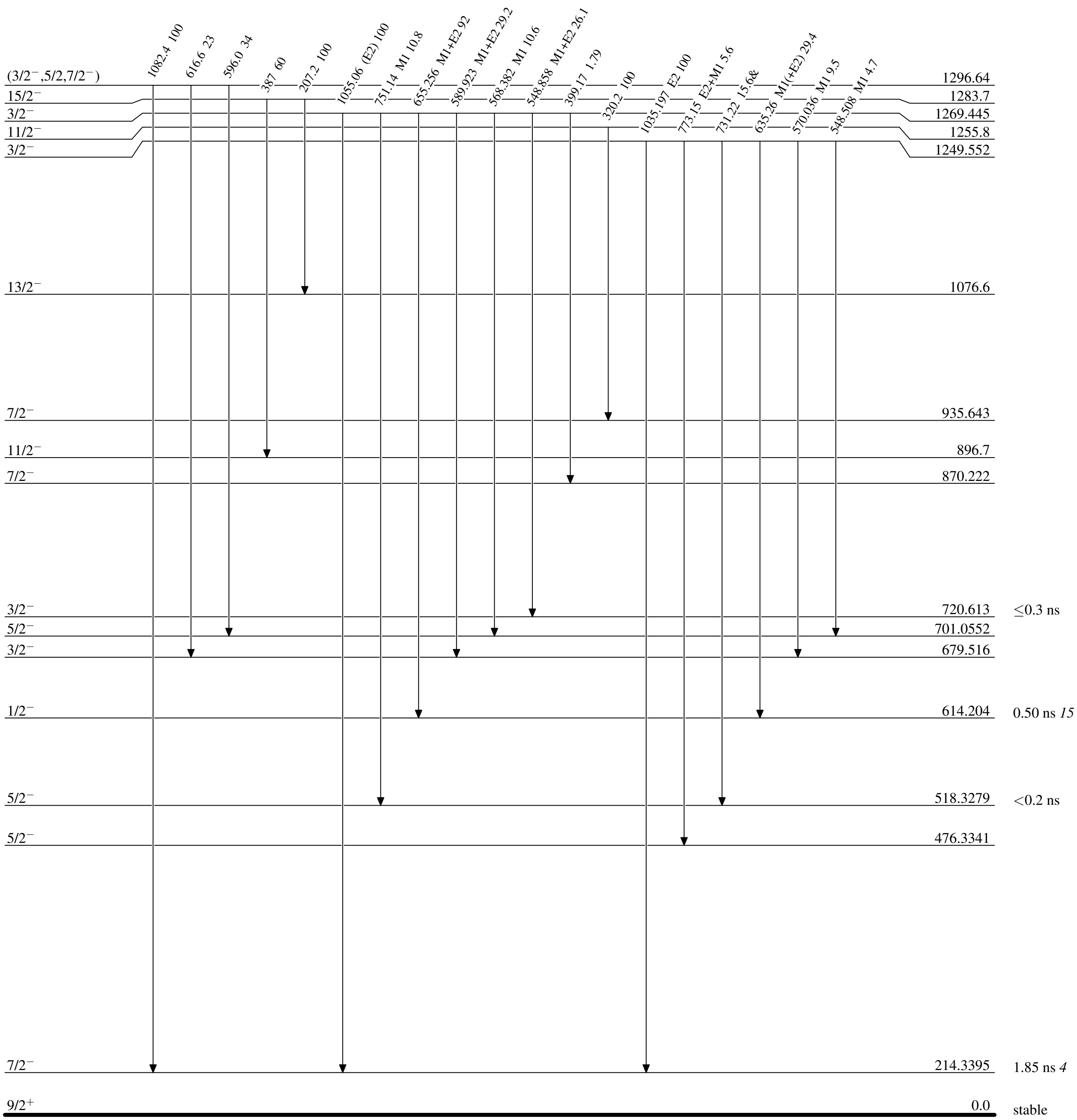


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

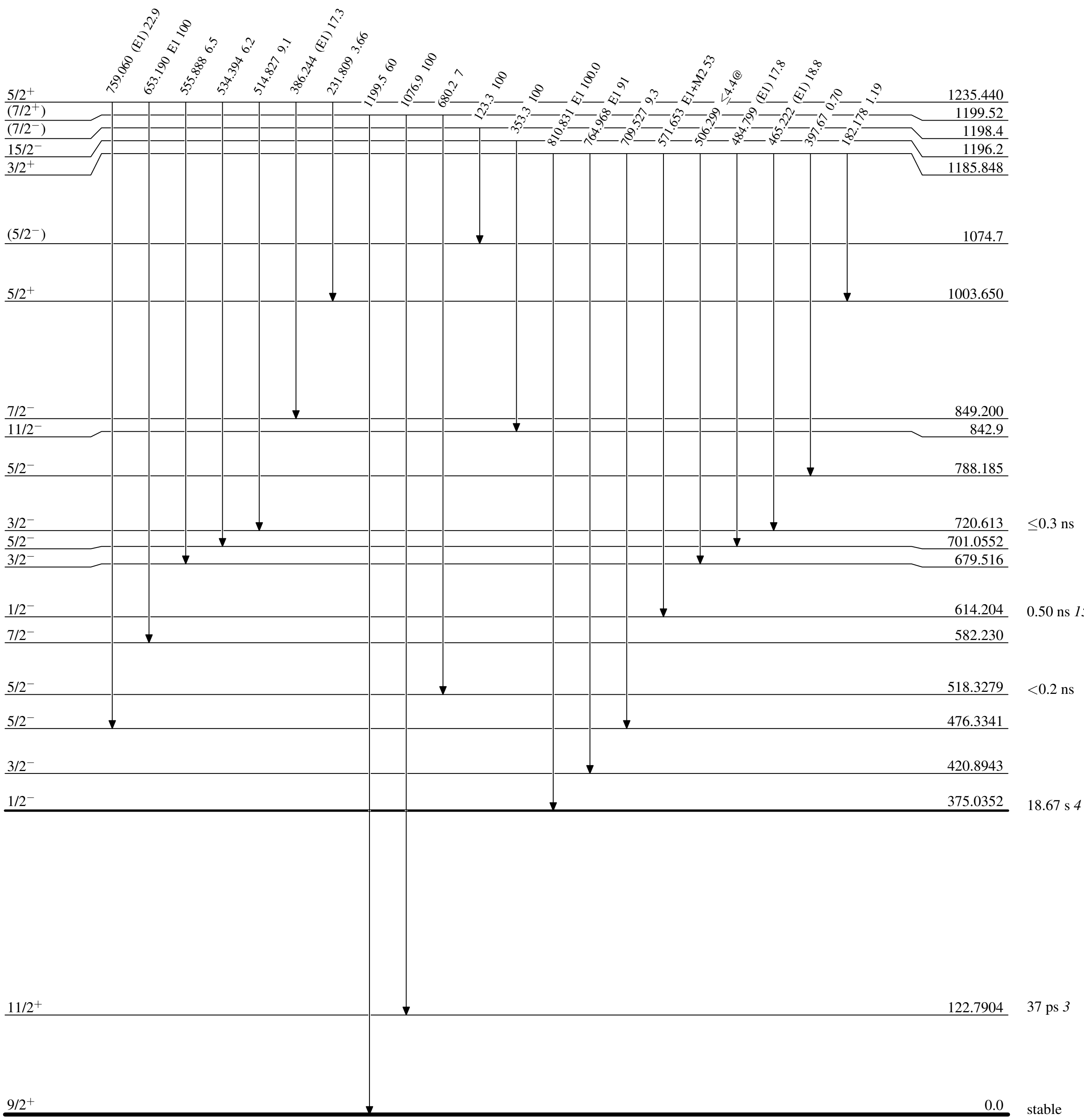
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

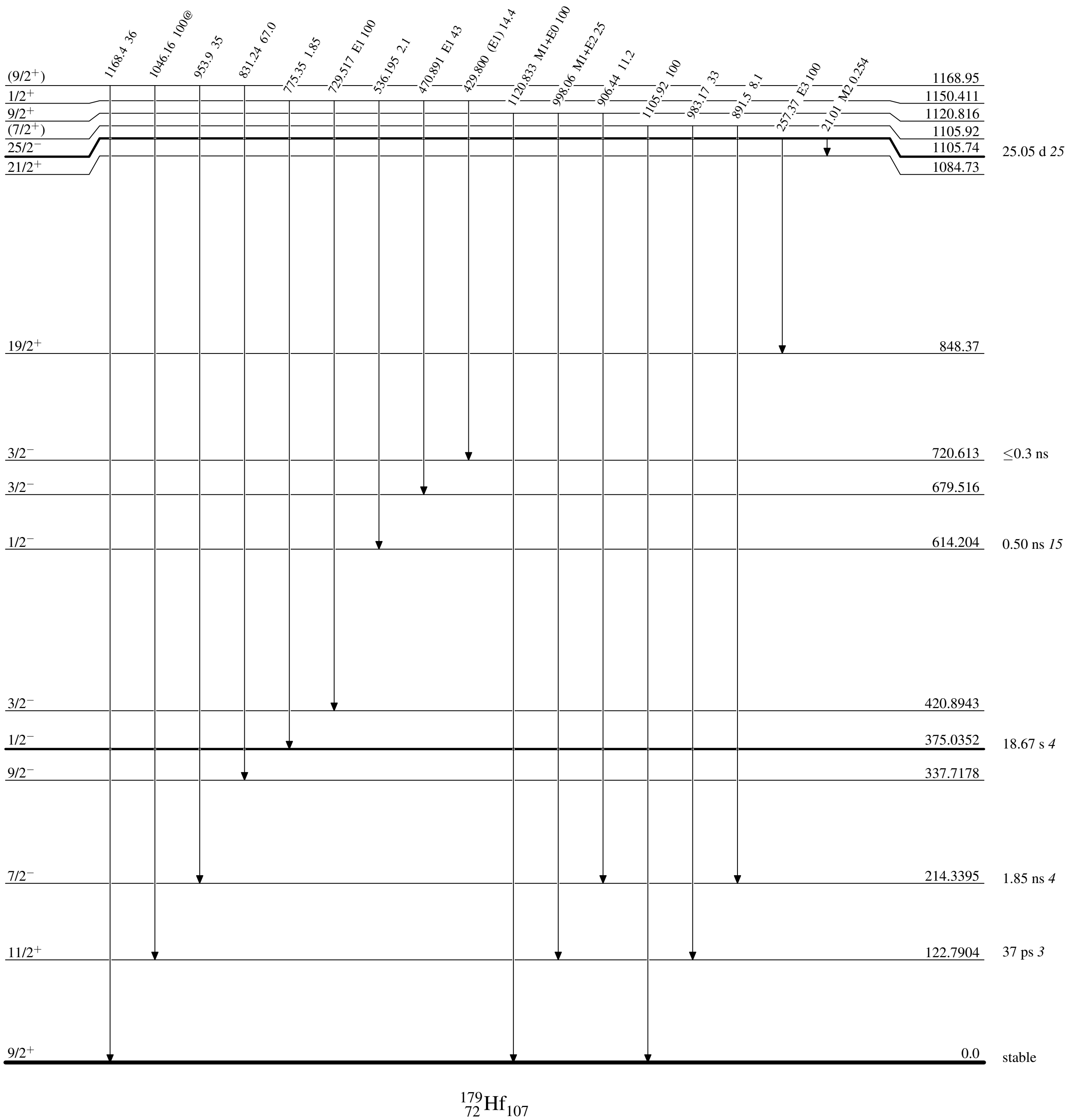


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

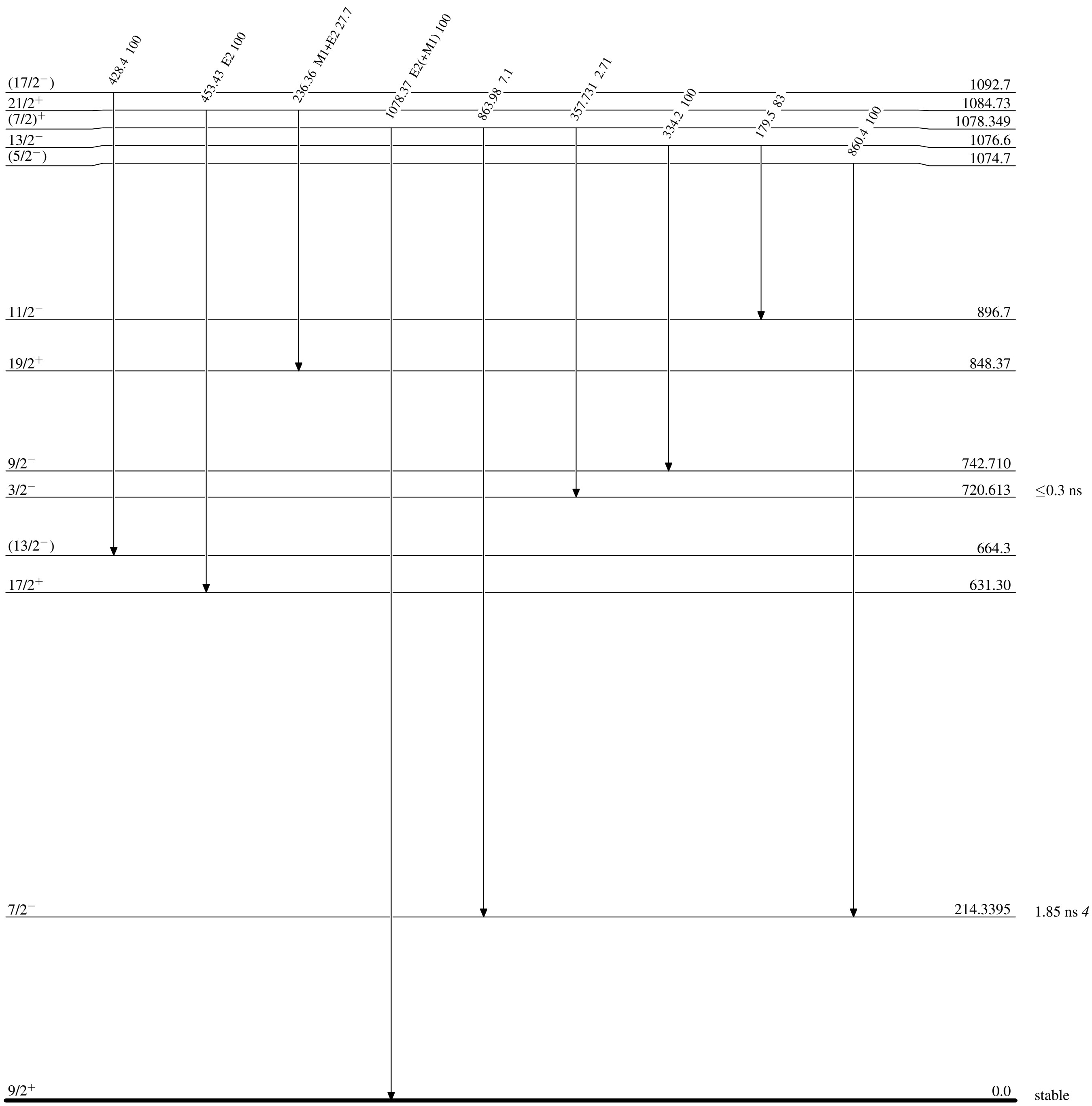
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided



$^{179}_{72}Hf_{107}$

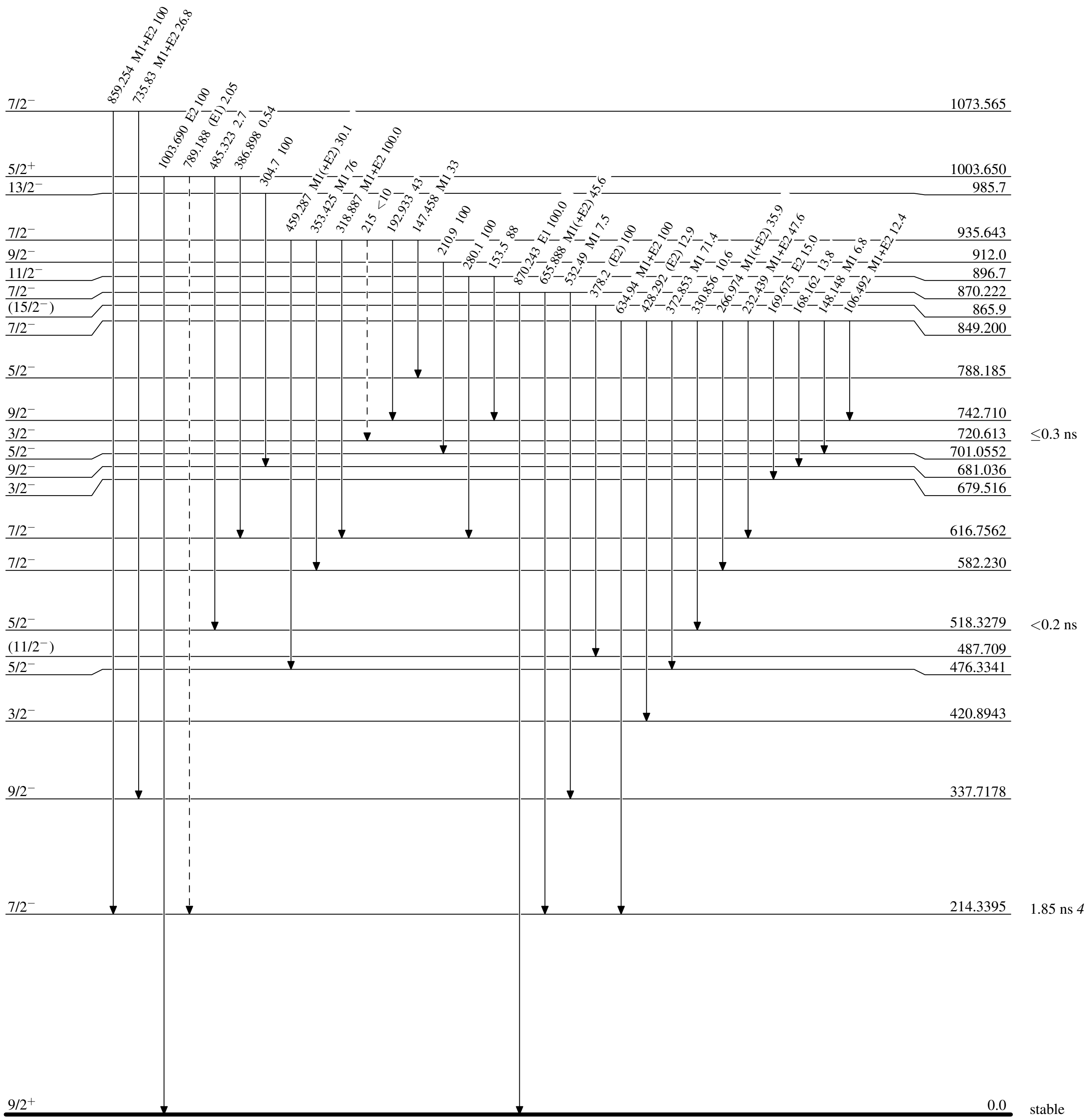
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

Legend

γ Decay (Uncertain)

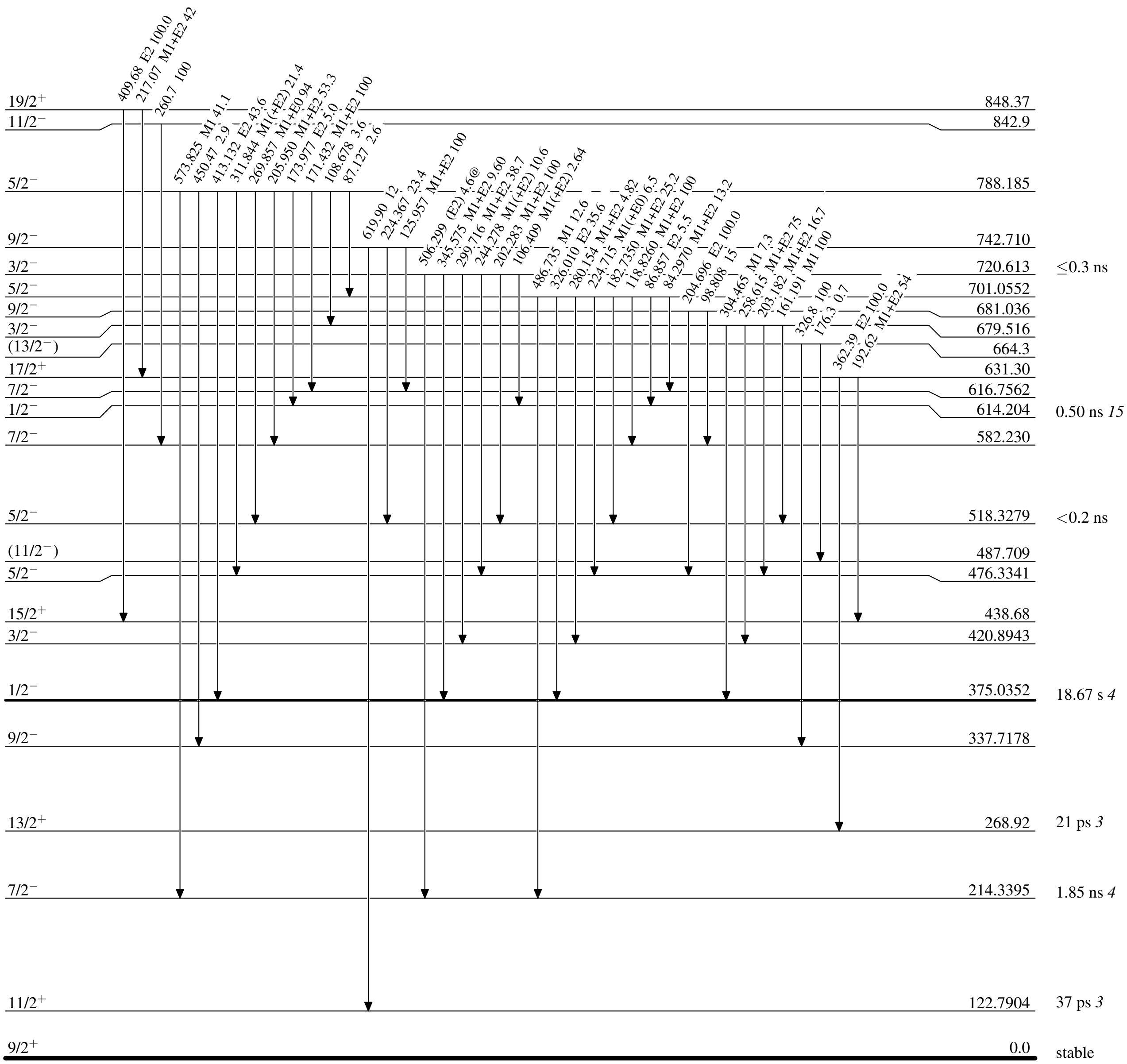


$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

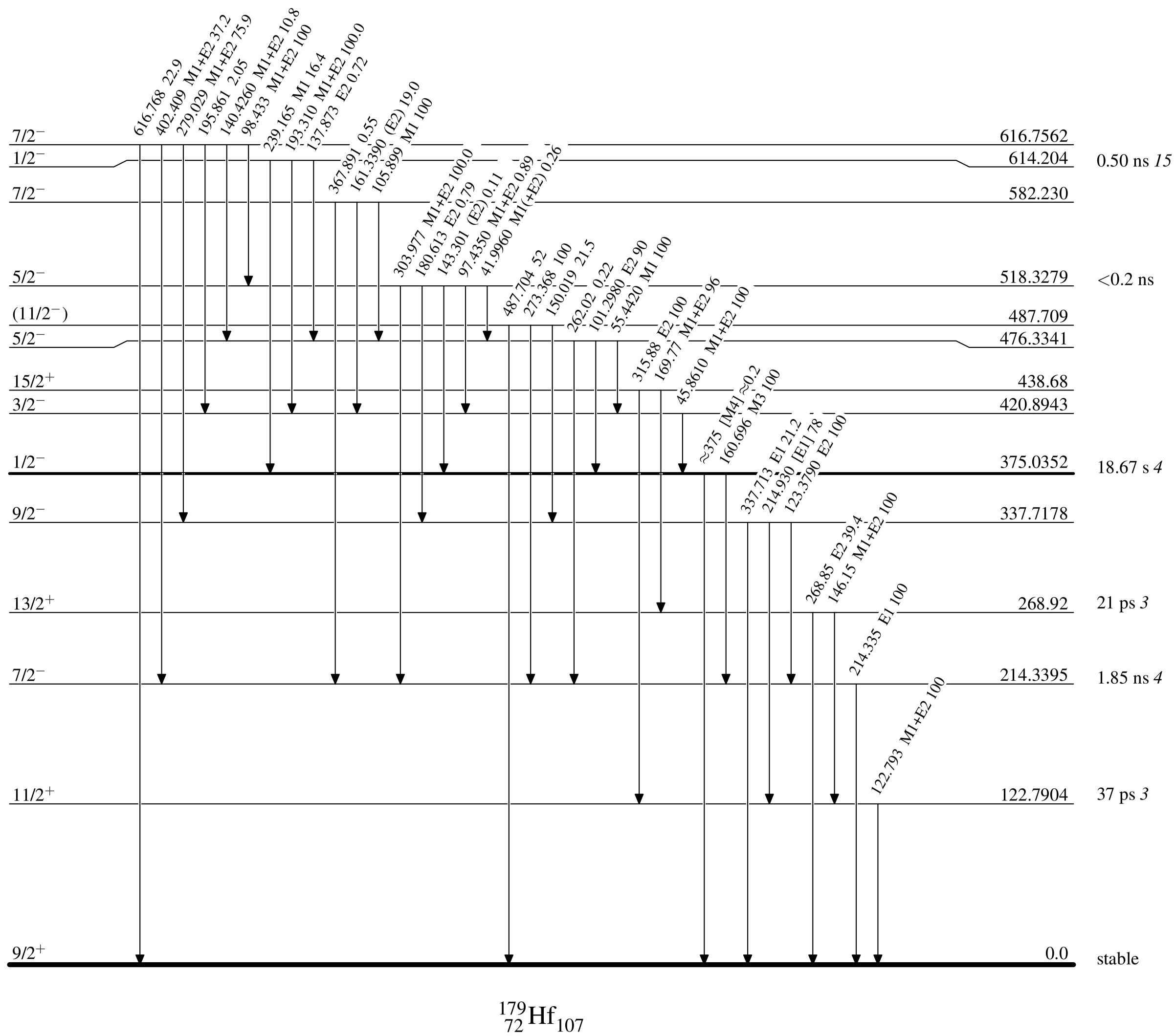


$^{179}_{72}Hf_{107}$

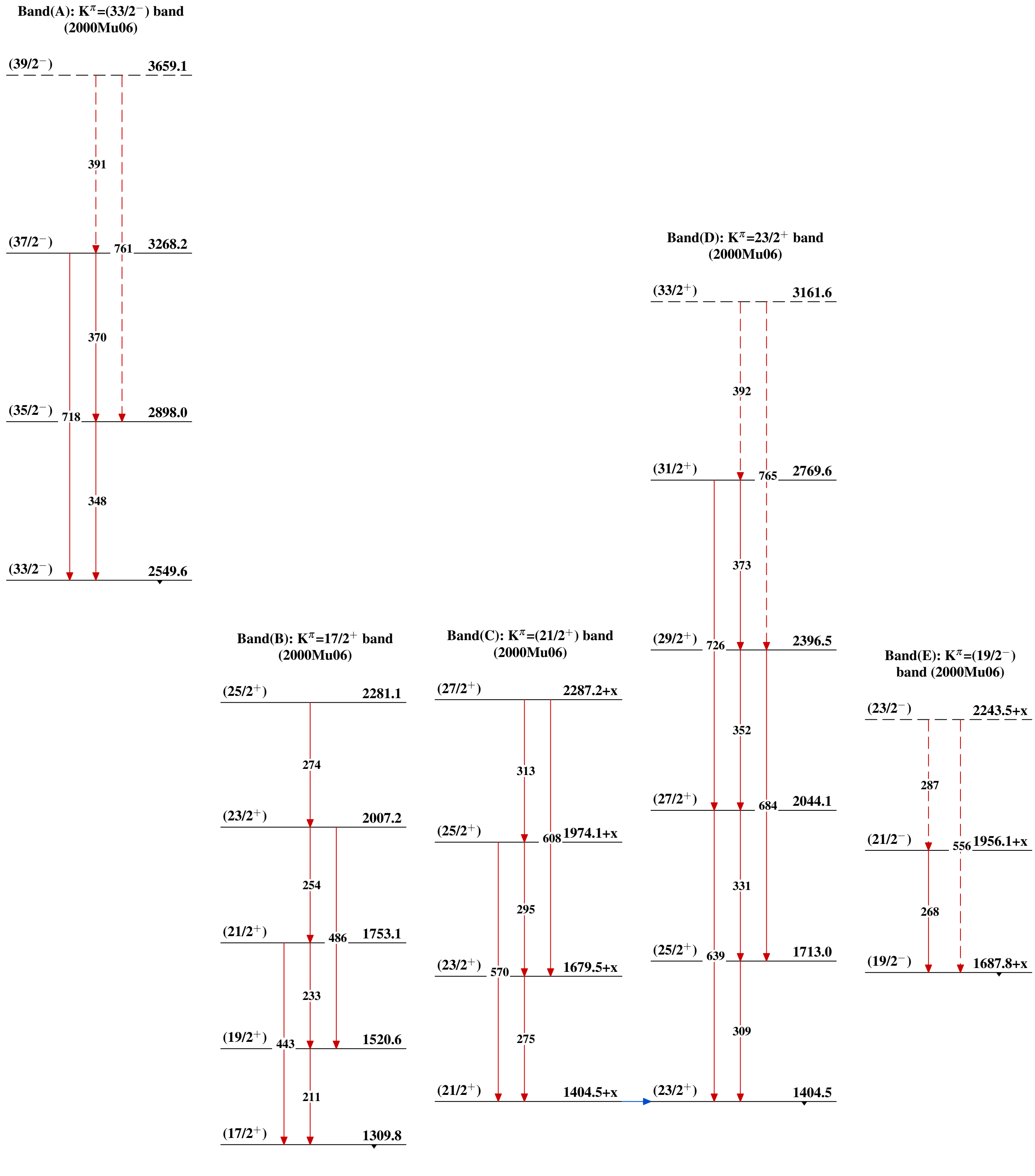
Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given
@ Multiply placed: intensity suitably divided

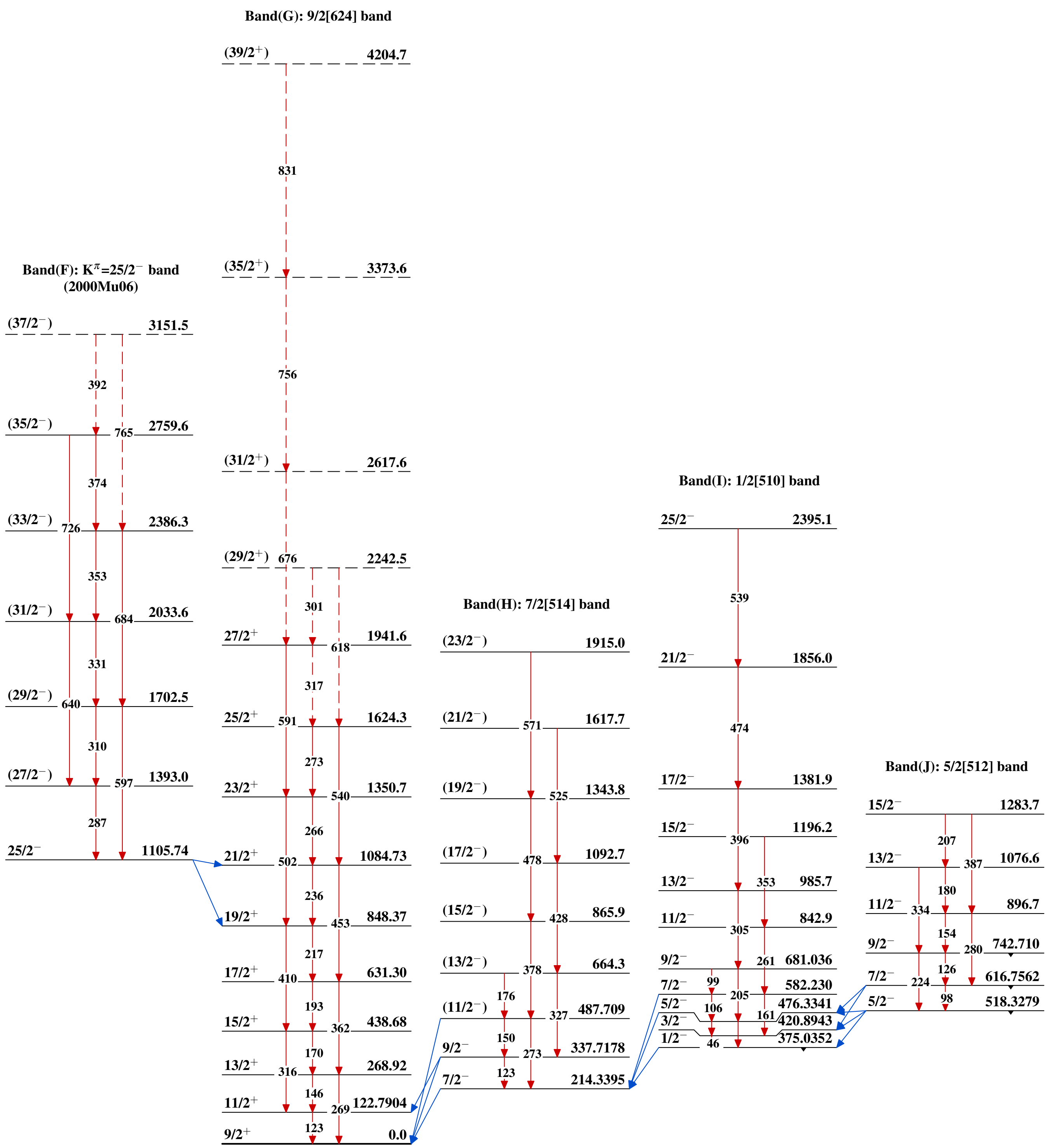


Adopted Levels, Gammas



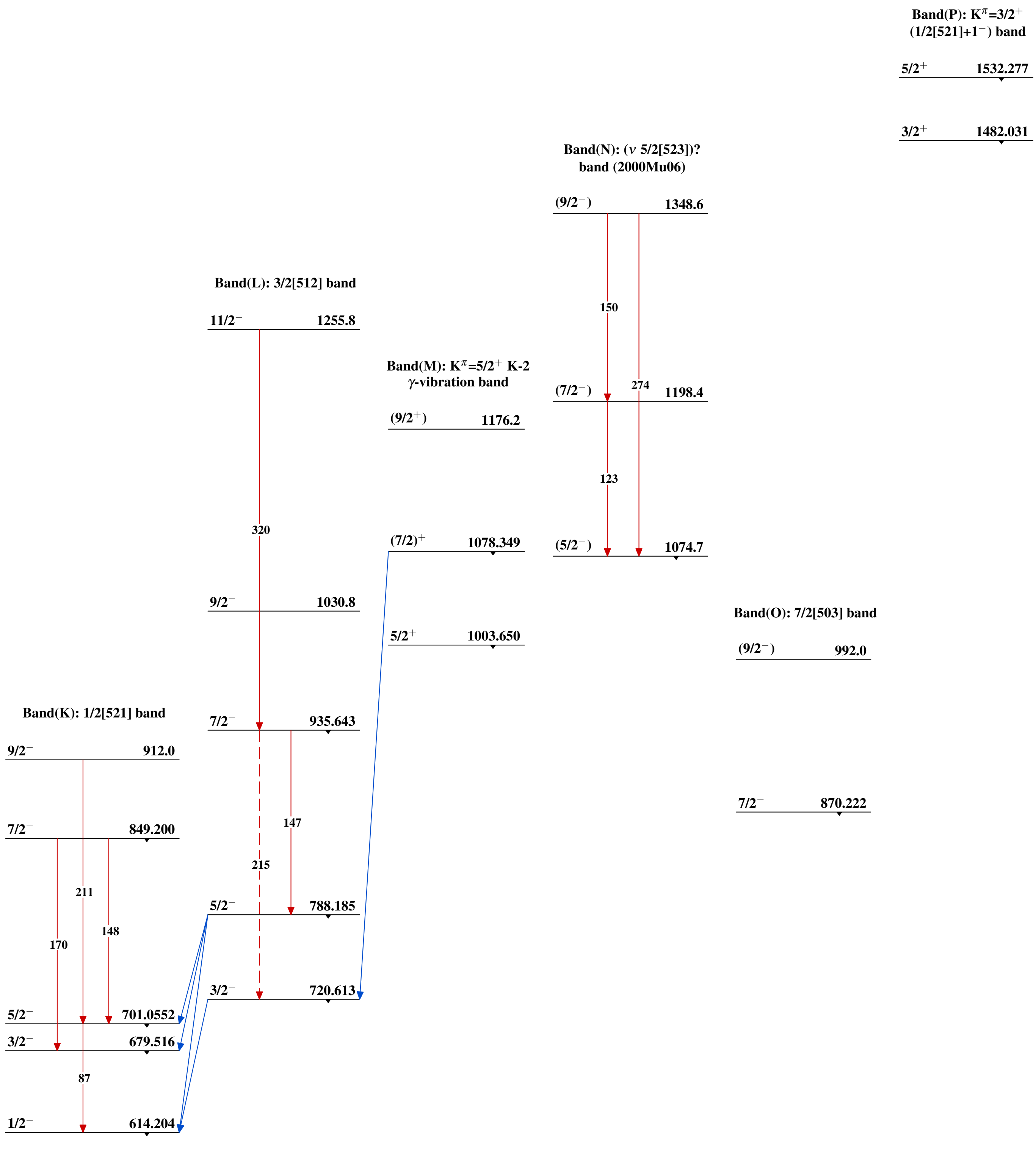
$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas (continued)



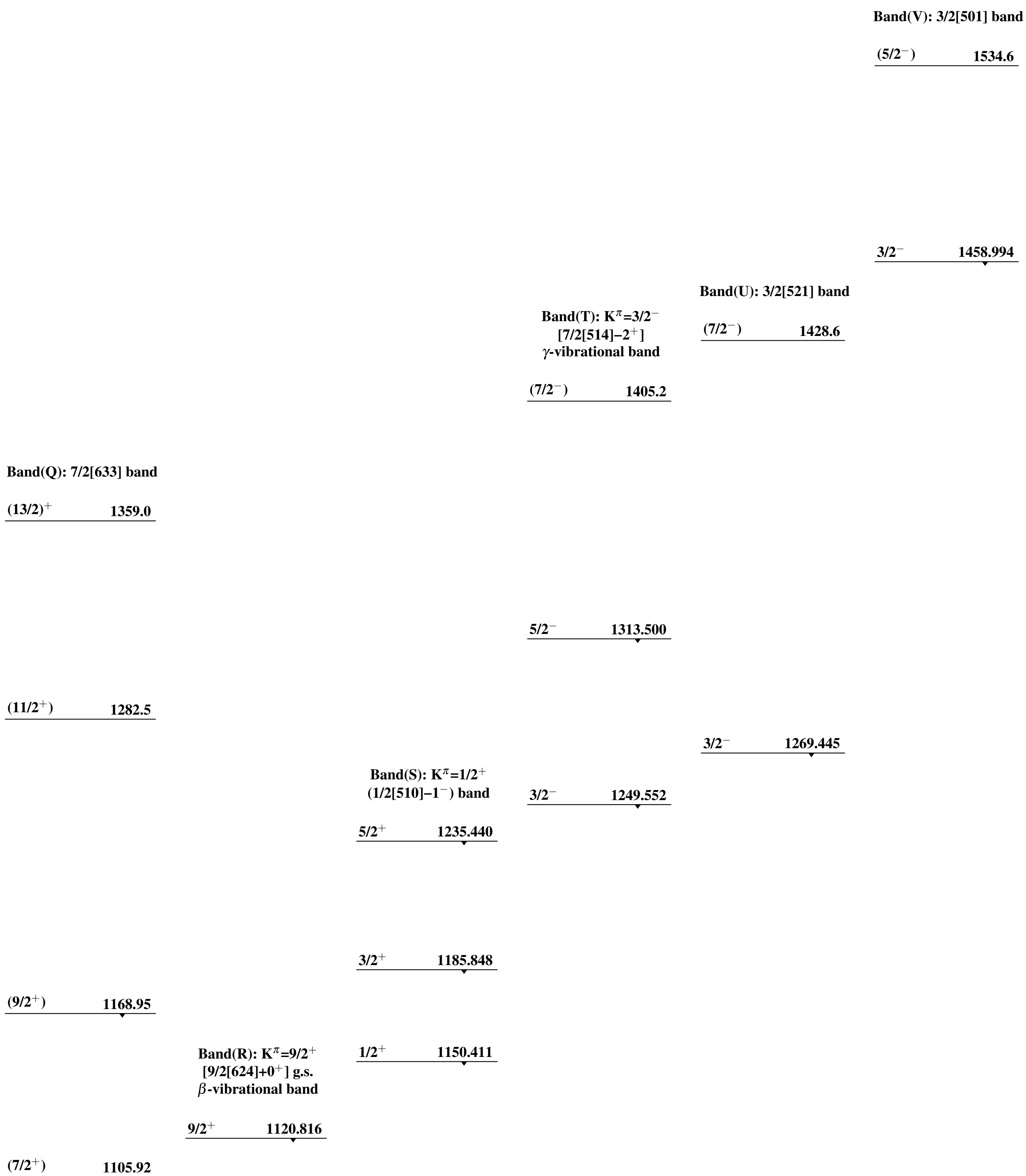
$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas (continued)



$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas (continued)



$^{179}_{72}Hf_{107}$

Adopted Levels, Gammas (continued)

Band(W): 1/2[501] band

(3/2)$^-$ 1706.062

(1/2$^-$) 1658.4

$^{179}_{72}Hf_{107}$