

Adopted Levels, Gammas

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

Q(β⁻)=-3.57×10³ 3; S(n)=9.00×10³ 4; S(p)=3.46×10³ 3; Q(α)=3.40×10³ 4 [2012Wa38](#)

Note: Current evaluation has used the following Q record -3570 309000 403459 293400 40 [2003Au03](#).

¹⁷⁹Re Levels

Cross Reference (XREF) Flags

A	¹⁸¹ Ta(α,6nγ)	D	¹⁷³ Yb(¹¹ B,5nγ)
B	¹⁷⁹ Os ε decay	E	¹⁷² Yb(¹¹ B,4nγ)
C	¹⁶⁵ Ho(¹⁸ O,4nγ), ¹⁷⁰ Er(¹⁴ N,5nγ)		

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
0.0 ^l	5/2 ⁺	19.5 min <i>l</i>	ABCDE	%ε+%β ⁺ =100 μ=2.8 4 μ: from on-line nuclear orientation (1992Bo39). J ^π : log ft=5.3 to 3/2 ⁺ 720; log f ^A u _t <8.5 to 7/2 ⁺ 531 in ¹⁷⁹ Re ε decay. T _{1/2} : from 1975Me20 . Other values: 20 min 4 (1971NaZV), 19.7 min 5 (1966Ho16), 20 min 5 (1960Ha18).
65.35 ^j 9	(5/2 ⁻)	95 μs 25	ABCDE	J ^π : (E1) 65γ to 5/2 ⁺ g.s.; band assignment. T _{1/2} : from (¹¹ B,4nγ) (1972Le04).
87.54 ^g 23	(9/2 ⁻)		A CDE	XREF: A(0+X)C(0+X)E(0+X).
115.59 ^j 16	(9/2 ⁻)		A CDE	J ^π : E2 50γ to (5/2 ⁻) 65; band assignment.
118.39 ^j 19	(1/2 ⁻)		B	J ^π : E2 53γ to (5/2 ⁻) 65; band assignment.
124.07 ^k 10	(7/2 ⁺)		A CDE	J ^π : D+Q intraband 124γ to 5/2 ⁺ g.s.
253.05 ^h 22	(11/2 ⁻)		A CDE	J ^π : intraband D(+Q) 166γ to (9/2 ⁻) 88.
279.71 ^l 10	(9/2 ⁺)		A CDE	J ^π : intraband D(+Q) 156γ to (7/2 ⁺) 124; intraband 280γ to 5/2 ⁺ g.s.
283.98 17	(3/2 ⁻)		B	J ^π : (1/2 ⁻ , 3/2, 5/2 ⁻) from 166γ to (1/2 ⁻) 118, 219γ to (5/2 ⁻) 65; proposed as J=3/2 member of 1/2[541] band by 1976Be62 in ε decay.
284.28 ^j 16	(13/2 ⁻)		A C E	J ^π : stretched Q intraband 169γ to (9/2 ⁻) 115.
447.24 ^g 22	(13/2 ⁻)	8.1 ps 6	A CDE	J ^π : intraband D+Q 194γ to (11/2 ⁻) 253; intraband Q 360γ to (9/2 ⁻) 88.
465.83 ^k 12	(11/2 ⁺)	11.4 ps +8-11	A CDE	J ^π : intraband D+Q 186γ to (9/2 ⁺) 280; intraband Q 342γ to (7/2 ⁺) 124.
570.14 ^j 16	(17/2 ⁻)	18.7 ps +4-6	A CDE	J ^π : stretched Q intraband 286γ to (13/2 ⁻) 284.
593.89 25	(1/2 ⁺ , 3/2, 5/2 ⁻)		B	J ^π : 476γ to (1/2 ⁻) 118 and 594γ to 5/2 ⁺ g.s. Absence of γ to (5/2 ⁻) may favor J ^π =(1/2 ⁺).
664.99 ^h 22	(15/2 ⁻)	4.9 ps +4-5	A CDE	J ^π : D+Q intraband 218γ to (13/2 ⁻) 447; intraband Q 412γ to (11/2 ⁻) 253.
676.98 ^l 13	(13/2 ⁺)	4.4 ps 3	A CDE	J ^π : intraband D 211γ to (11/2 ⁺) 466; intraband Q 397γ to (9/2 ⁺) 280.
816.61 23	(1/2 ⁻ , 3/2, 5/2 ⁻)		B	J ^π : 751γ to (5/2 ⁻) 65; 533γ to (3/2 ⁻) 284; possible 698γ to (1/2 ⁻) 118.
817.83 25			B	J ^π : deexcites to (1/2 ⁺ , 3/2, 5/2 ⁻) 594 and 5/2 ⁺ g.s. so J≤(7/2).
877.7 3	(1/2, 3/2, 5/2 ⁻)		B	J ^π : 759γ to (1/2 ⁻) 118.
906.25 ^g 22	(17/2 ⁻)	2.36 ps +2I-28	A CDE	J ^π : intraband D 241γ to (15/2 ⁻) 665; intraband Q 459γ to (13/2 ⁻) 447.

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Adopted Levels, Gammas (continued) ^{179}Re Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
913.81 ^k 14	(15/2 ⁺)	3.12 ps 21	A CDE	J ^π : intraband D+Q 236γ to (13/2 ⁺) 677; intraband Q 448γ to (11/2 ⁺) 466.
927.64 ⁱ 20	(15/2 ⁻)		C	J ^π : 358γ to (17/2 ⁻) 270; D 643γ to (13/2 ⁻) 284; band assignment.
962.19 ^j 17	(21/2 ⁻)	3.3 ps +3-4	A CDE	J ^π : stretched Q intraband 392γ to (17/2 ⁻) 570.
1164.04 ^h 23	(19/2 ⁻)	1.66 ps 14	A CDE	J ^π : intraband D+Q 258γ to (17/2 ⁻) 906; intraband 499γ to (15/2 ⁻) 665.
1166.41 ^l 15	(17/2 ⁺)	1.59 ps 7	A CDE	J ^π : intraband D 253γ to (15/2 ⁺) 914; intraband Q 489γ to (13/2 ⁺) 677.
1202.2 6	(21/2)	≈21 ns	A	J ^π : stretched Q 296γ to (17/2 ⁻) 906. T _{1/2} : from γ(t) (1976RoYE) in ¹⁸¹ Ta(α,6nγ). However, this isomer could not be identified in (¹⁸ O,4nγ) study by 1989Ve08.
1208.70 19	(15/2 ⁻)		C	J ^π : D 638γ to (17/2 ⁻) 570; (D) 925γ to (13/2 ⁻) 284.
1297.89 21	(15/2 ⁻)		CD	J ^π : 727γ to (17/2 ⁻) 570; (Q) 1045γ to (11/2 ⁻) 253; suggested configuration=((π 9/2[514])+(ν 7/2[514])-(ν 1/2[521])) (2002Th12).
1315.08 21	(19/2 ⁺)		C	J ^π : (Q) 401γ to (15/2 ⁺) 914; (D) 322γ from (21/2 ⁺) 1637.
1330.41 ⁱ 21	(19/2 ⁻)		C	J ^π : (Q) intraband 403γ to (15/2 ⁻) 928; D 760γ to (17/2 ⁻) 570.
1429.28 23	(3/2)		B	J ^π : γ to (1/2 ⁻) and (5/2 ⁻) and (5/2 ⁺); ε feeding from (1/2 ⁻) parent.
1436.57 ^k 15	(19/2 ⁺)	<1.2 ps	A CDE	J ^π : intraband D 270γ to (17/2 ⁺) 1166; intraband Q 523γ to (15/2 ⁺) 914.
1440.83 ^g 25	(21/2 ⁻)	1.32 ps +21-35	A C E	J ^π : intraband D 276γ to (19/2 ⁻) 1164; intraband Q 534γ to (17/2 ⁻) 906.
1445.87 ^j 18	(25/2 ⁻)	1.46 ps +21-28	A CDE	J ^π : Q intraband 484γ to (21/2 ⁻) 962; band assignment.
1448.93 23	(3/2)		B	J ^π : γ to (1/2 ⁻) and (5/2 ⁻) and (5/2 ⁺); ε feeding from (1/2 ⁻) parent.
1478.6 8	(23/2)		A	J ^π : (D+Q) 276γ to (21/2) 1202.
1490.77 ⁿ 16	(17/2 ⁻)		C	J ^π : (D) 282γ to (15/2 ⁻) 1209; D 921γ to (17/2 ⁻) 570; 529γ to (21/2 ⁻) 962.
1545.67 23	(17/2 ⁻)		CD	J ^π : stretched (Q) 1098γ to (13/2 ⁻) 447; 640γ to (17/2 ⁻) 906. Possible J=17/2 member of band built on 1298 level; supported by implied moment of inertia for band. However, 1618 level could alternatively be that member (2002Th12).
1562.3 3			B	J ^π : 1279γ to (3/2 ⁻) 284; fed in ε decay from 1/2 ⁻ . Possible J ^π =(3/2 ⁻), three-quasiparticle state, based on γ-ray decay pattern and ε population from 1/2 ⁻ parent (1976Be62) in ε decay.
1618.15 22	(17/2 ⁻)		CD	J ^π : stretched (Q) 1171γ to (13/2 ⁻) 447; (D) 953γ to (15/2 ⁻) 665.
1636.95 ^m 22	(21/2 ⁺)		C	J ^π : (D) 322γ to (19/2 ⁺) 1315; Q 471γ to (17/2 ⁺) 1166.
1714.07 ^l 17	(21/2 ⁺)	<0.90 ps	CD	J ^π : D intraband 278γ to (19/2 ⁺) 1437; intraband 548γ to (17/2 ⁺) 1166.
1724.4 ^h 3	(23/2 ⁻)		C	J ^π : intraband D 284γ to (21/2 ⁻) 1441; intraband Q 560γ to (19/2 ⁻) 1164.
1772.20 22	(19/2 ⁻)		CD	J ^π : (Q) 1107γ to (15/2 ⁻) 665; D 608γ to (19/2 ⁻) 1164; D 866γ to (17/2 ⁻) 906. Suggested configuration=((π 5/2[402])+(ν 7/2[514])+(ν 7/2[633])) (2002Th12), analogous to 1603 level in ¹⁷⁷ Ta; calculated E(level)=1753.
1772.20+x ^e 22	(23/2 ⁺)	0.408 μs 12	CD	XREF: C(0.0+Y). Additional information 1. J ^π : band assignment. T _{1/2} : from time spectrum measured with gates on 866γ and 1107γ below level, using pulsed beam (0.54 μs on, 19.8 μs off) in (¹¹ B,5nγ). Other: >0.4 μs in (¹⁸ O,4nγ). E(level): x≤140 (estimate from (¹⁸ O,4nγ) based on absence of deexciting transition in prompt-delayed and delayed-delayed spectra (1989Ve08)). However, B(M2)(W.u.) exceeds RUL, unless x>240 keV.

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Adopted Levels, Gammas (continued)

^{179}Re Levels (continued)					
E(level) [†]	J^π [‡]	$T_{1/2}$ [#]	XREF	Comments	
1814.57 ^f 24	(17/2 ⁺)		D	J^π : 909 γ to (17/2 ⁻) 906; 1149 γ to (15/2 ⁻) 665; band assignment.	
1820.05 ⁱ 23	(23/2 ⁻)		C	J^π : intraband 490 γ to (19/2 ⁻) 1330; (D) 858 γ to (21/2 ⁻) 962; band assignment.	
1826.7 ^c 4	(19/2 ⁺)		CD	J^π : based on absence of γ rays to levels below $J^\pi=19/2^-$ 1771 level in ($^{18}\text{O},4n\gamma$).	
				$T_{1/2}$: level found to Be isomeric but $T_{1/2}$ could not Be determined in ($^{18}\text{O},4n\gamma$) (1989Ve08).	
1857.97 ⁿ 20	(19/2 ⁻)		C	J^π : intraband (D) 237 γ to (17/2 ⁻) 1491; 421 γ to (19/2 ⁺) 1437; band assignment.	
1858.7 ^p 3			C	J^π : 897 γ to (21/2 ⁻) 962.	
1894.7 ^p 3			C	J^π : 932 γ to (21/2 ⁻) 962.	
1902.29+x ^d 12	(25/2 ⁺)		CD	J^π : intraband D 130 γ to (23/2 ⁺) 1772+x.	
1978.5 ^c 3	(21/2 ⁺)		CD	J^π : intraband 152 γ to (19/2 ⁺) 1827; 206 γ to (19/2 ⁻) 1772; band assignment.	
1986.37 ^k 18	(23/2 ⁺)		CD	J^π : intraband gammas to (21/2 ⁺) and (19/2 ⁺).	
1989.0 ^f 3	(19/2 ⁺)		D	J^π : intraband 175 γ to (17/2 ⁺) 1815; band assignment.	
2005.25 ^j 21	(29/2 ⁻)	0.69 ps 14	A CDE	J^π : intraband Q 559 γ to (25/2 ⁻) 1446; band assignment.	
2020.48 ³	(25/2 ⁻)	<0.62 ps	C	J^π : D intraband 296 γ to (23/2 ⁻) 1724; intraband Q 580 γ to (21/2 ⁻) 1441.	
2052.4 ^m 3	(25/2 ⁺)		C	J^π : (Q) intraband 416 γ to (21/2 ⁺) 1637.	
2053.32 19	(23/2 ⁺)		D	J^π : 340 γ to (21/2 ⁺) 1714; 616 γ to (19/2 ⁺) 1437.	
2096.96+x ^e 14	(27/2 ⁺)		CD	J^π : (D) intraband 195 γ to (25/2 ⁺) 1902+x; intraband 325 γ to (23/2 ⁺) 1772+x.	
2183.3 ^f 3	(21/2 ⁺)		D	J^π : intraband gammas to (19/2 ⁺) 1989 and (17/2 ⁺) 1815.	
2187.2 ^c 3	(23/2 ⁺)		CD	J^π : intraband 209 γ to (21/2 ⁺) 1979; band assignment.	
2251.54 ^l 18	(25/2 ⁺)		CD	J^π : intraband gammas to (23/2 ⁺) 1986 and (21/2 ⁺) 1714.	
2299.4 ⁿ 3	(21/2 ⁻)		C	J^π : intraband (D) 441 γ to (19/2 ⁻) 1858.	
2313.8 ^h 3	(27/2 ⁻)		C	J^π : (D) intraband 293 γ to (25/2 ⁻) 2020; intraband 589 γ to (23/2 ⁻) 1724.	
2314.4 3	(21/2 ⁻)		C	J^π : (D) 456 γ to (19/2 ⁻) 1858.	
2320.9 ^p 3			C	J^π : 875 γ to (25/2 ⁻) 1446.	
2325.80+x ^d 16	(29/2 ⁺)		CD	J^π : intraband (D) 229 γ to (27/2 ⁺) 2097+x; intraband 424 γ to (25/2 ⁺) 1902+x.	
2382.3 ⁱ 3	(27/2 ⁻)		C	J^π : intraband 562 γ to (23/2 ⁻) 1820; band assignment.	
2397.1 ^f 3	(23/2 ⁺)		D	J^π : intraband gammas to (21/2 ⁺) 2183 and (19/2 ⁺) 1989.	
2411.9 ^p 3			C	J^π : 966 γ to (25/2 ⁻) 1446.	
2417.7 ^c 3	(25/2 ⁺)		CD	J^π : intraband gammas to (23/2 ⁺) 2187 and (21/2 ⁺) 1979.	
2508.4 ^o 4			C	J^π : 194 γ to (21/2 ⁻) 2314; band assignment.	
2519.06 ^k 22	(27/2 ⁺)		C	J^π : intraband gammas to (25/2 ⁺) 2252 and (23/2 ⁺) 1986.	
2552.6 ^m 4	(29/2 ⁺)		C	J^π : intraband 500 γ to (25/2 ⁺) 2052; band assignment.	
2555.61 23	(27/2 ⁺)		D	J^π : intraband 304 γ to (25/2 ⁺) 2252; band assignment.	
2580.88+x ^e 18	(31/2 ⁺)		CD	J^π : intraband (D) 255 γ to (29/2 ⁺) 2326+x; intraband 484 γ to (27/2 ⁺) 2097+x.	
2611.78 3	(29/2 ⁻)		C	J^π : intraband gammas to (27/2 ⁻) 2314 and (25/2 ⁻) 2020.	
2618.92 21	(27/2 ⁺)		D	J^π : 368 γ to (25/2 ⁺) 2252; 565 γ to (23/2 ⁺) 2053.	
2623.98 ^j 23	(33/2 ⁻)	<0.7 ps	A CD	J^π : intraband 619 γ to (29/2 ⁻) 2005; band assignment.	
2628.1 ^f 3	(25/2 ⁺)		D	J^π : intraband gammas to (23/2 ⁺) 2397 and (21/2 ⁺) 2183.	
2634.03 20	(27/2 ⁺)		D	J^π : 581 γ to (23/2 ⁺) 2053; 1188 γ to (25/2 ⁻) 1446.	
2694.4 ^c 4	(27/2 ⁺)		D	J^π : intraband gammas to (25/2 ⁺) 2418 and (23/2 ⁺) 2187.	
2791.2 ^l 3	(29/2 ⁺)		C	J^π : intraband 540 γ to (25/2 ⁺) 2252; band assignment.	
2821.1 ⁿ 4			C	J^π : intraband 522 γ to (21/2 ⁻) 2299; band assignment.	
2827.8 4			C	J^π : 513 γ to (21/2 ⁻) 2314.	
2851.8 ^p 3			C	J^π : 847 γ to (29/2 ⁻) 2005; band assignment.	

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Adopted Levels, Gammas (continued)

¹⁷⁹Re Levels (continued)

E(level) [†]	J ^π [‡]	T _{1/2} [#]	XREF	Comments
2858.22+x ^d 21	(33/2 ⁺)		C	J ^π : intraband (D) 277γ to (31/2 ⁺) 2581+x; intraband (Q) 533γ to (29/2 ⁺) 2326+x.
2877.5 ^f 3	(27/2 ⁺)		D	J ^π : intraband gammas to (25/2 ⁺) 2628 and (23/2 ⁺) 2397.
2907.2 ^h 4	(31/2 ⁻)		C	J ^π : intraband gammas to (29/2 ⁻) 2612 and (27/2 ⁻) 2314.
2984.0 ^o 4			C	J ^π : intraband 476γ to 2508.
3072.0 ^k 3	(31/2 ⁺)		C	J ^π : intraband 553γ to (27/2 ⁺) 2519; band assignment.
3130.2 ^m 4	(33/2 ⁺)		C	J ^π : intraband 578γ to (29/2 ⁺) 2553; band assignment.
3131.2 ^f 3	(29/2 ⁺)		D	J ^π : intraband gammas to (27/2 ⁺) 2878 and (25/2 ⁺) 2628.
3154.60+x ^e 23	(35/2 ⁺)		C	J ^π : intraband (D) 296γ to (33/2 ⁺) 2858+x; 574γ to (31/2 ⁺) 2581+x.
3159.69 21	(29/2 ⁺)	<1 ns	D	J ^π , configuration: possible K ^π =29/2 ⁺ five-quasiparticle state with configuration ((π 5/2[402])+(ν 9/2[624])+(ν 7/2[514])+(ν 7/2[633])+(ν 1/2[521])) (2002Th12); deexcites to (27/2 ⁺) states. T _{1/2} : from (¹¹ B,5nγ).
3206.0 ^g 4	(33/2 ⁻)		C	J ^π : intraband gammas to (31/2 ⁻) 2907 and (29/2 ⁻) 2612.
3253.3 ^c 4	(31/2 ⁻)		D	J ^π : intraband 559γ to (27/2 ⁺) 2694; band assignment.
3277.34 22	(31/2 ⁺)	<1 ns	D	J ^π , configuration: possible K ^π =31/2 ⁺ five-quasiparticle state with configuration ((π 9/2[514])+(ν 9/2[624])+(ν 7/2[514])+(ν 5/2[512])+(ν 1/2[521])) (2002Th12); M1 117γ to (29/2 ⁺) 3160; 653γ to (33/2 ⁻) 2624. T _{1/2} : from analysis of time-difference spectra in (¹¹ B,5nγ).
3290.2 ^j 3	(37/2 ⁻)		A C	J ^π : (Q) intraband 666γ to (33/2 ⁻) 2624.
3343.9 ^l 4	(33/2 ⁺)		C	J ^π : intraband 553γ to (29/2 ⁺) 2791; band assignment.
3426.7 ⁿ 4			C	J ^π : intraband 606γ to 2821; band assignment.
3455.66 ^a 24	(33/2 ⁺)		D	J ^π : M1 178γ to (31/2 ⁺) 3277; 296γ to (29/2 ⁺) 3160; band assignment.
3467.52+x ^d 24	(37/2 ⁺)		C	J ^π : intraband gammas to (35/2 ⁺) 3155+x and (33/2 ⁺) 2858+x.
3508.5 ^h 4	(35/2 ⁻)		C	J ^π : intraband gammas to (33/2 ⁻) 3206 and (31/2 ⁻) 2907.
3542.0 ^{&} 3	(33/2 ⁻)		D	J ^π : 265γ to (31/2 ⁺) 3277; band assignment.
3547.9 ^o 5			C	J ^π : intraband 564γ to 2984.
3630.6 ^k 4	(35/2 ⁺)		C	J ^π : possible intraband 559γ to (31/2 ⁺) 3072; band assignment.
3703.3 [@] 3	(35/2 ⁺)		D	J ^π : 426γ to (31/2 ⁺) 3277; band assignment.
3766.0 ^b 3	(35/2 ⁺)		D	J ^π : M1 intraband 310γ to (33/2 ⁺) 3456.
3775.8 ^m 5	(37/2 ⁺)		C	J ^π : intraband 646γ to (33/2 ⁺) 3130; band assignment.
3793.6+x ^e 3	(39/2 ⁺)		C	J ^π : intraband gammas to (37/2 ⁺) 3468+x and (35/2 ⁺) 3155+x.
3821.4 ^g 4	(37/2 ⁻)		C	J ^π : intraband gammas to (35/2 ⁻) 2509 and (33/2 ⁻) 3206.
3840.5 ^{&} 4	(35/2 ⁻)		D	J ^π : intraband M1 299γ to (33/2 ⁻) 3542; band assignment.
3995.0 [@] 4	(37/2 ⁺)		D	J ^π : intraband (M1) 292γ to (35/2 ⁺) 3703; band assignment.
4000.2 ^j 4	(41/2 ⁻)		A C	J ^π : intraband 710γ to (37/2 ⁻) 3290; band assignment.
4080.1 ^a 3	(37/2 ⁺)		D	J ^π : intraband M1+E2 314γ to (35/2 ⁺) 3766; intraband 624γ to (33/2 ⁺) 3456.
4107.4 ⁿ 5			C	J ^π : intraband 681γ to 3427.
4131.1+x ^d 3	(41/2 ⁺)		C	J ^π : intraband gammas to (39/2 ⁺) 3794+x and (37/2 ⁺) 3468+x.
4142.9 ^h 4	(39/2 ⁻)		C	J ^π : intraband 634γ to (35/2 ⁻) 3509; band assignment.
4152.5 ^{&} 4	(37/2 ⁻)		D	J ^π : intraband gammas to (35/2 ⁻) 3841 and (33/2 ⁻) 3542.
4191.0 ^o 5			C	J ^π : intraband 643γ to 3548.
4308.0 [@] 4	(39/2 ⁺)		D	J ^π : intraband gammas to (37/2 ⁺) 3995 and (35/2 ⁺) 3703.
4398.2 ^b 4	(39/2 ⁺)		D	J ^π : intraband M1+E2 318γ to (37/2 ⁺) 4080; intraband 632γ to (35/2 ⁺) 3766.
4476.4 ^m 5	(41/2 ⁺)		C	J ^π : intraband 701γ to (37/2 ⁺) 3776; band assignment.
4477.2+x ^e 3	(43/2 ⁺)		C	J ^π : intraband gammas to (41/2 ⁺) 4131+x and (39/2 ⁺) 3794+x.
4480.2 ^{&} 4	(39/2 ⁻)		D	J ^π : intraband gammas to (37/2 ⁻) 4153 and (35/2 ⁻) 3841.
4720.1 ^a 4	(41/2 ⁺)		D	J ^π : intraband M1(+E2) 322γ to (39/2 ⁺) 4398; intraband 640γ to (37/2 ⁺) 4080.
4733.1 [@] 4	(41/2 ⁺)		D	J ^π : intraband gammas to (39/2 ⁺) 4308 and (37/2 ⁺) 3995.
4757.2 ^j 5	(45/2 ⁻)		C	J ^π : intraband 757γ to (41/2 ⁻) 4000; band assignment.

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Adopted Levels, Gammas (continued)

^{179}Re Levels (continued)					
E(level) [†]	$J^{\pi\ddagger}$	$T_{1/2}^{\#}$	XREF	Comments	
4824.4 ^{&} 4	(41/2 ⁻)		D	J^{π} : intraband gammas to (39/2 ⁻) 4480 and (37/2 ⁻) 4153.	
4826.4+x ^d 4	(45/2 ⁺)		C	J^{π} : intraband 695 γ to (41/2 ⁺) 4131+x; band assignment.	
5049.7 ^b 4	(43/2 ⁺)		D	J^{π} : intraband M1+E2 330 γ to (41/2 ⁺) 4720; intraband 651 γ to (39/2 ⁺) 4398.	
5163.1 [@] 5	(45/2 ⁺)		D	J^{π} : intraband 430 γ to (43/2 ⁺) 4733; band assignment.	
5186.2 ^{&} 4	(43/2 ⁻)		D	J^{π} : intraband gammas to (41/2 ⁻) 4824 and (39/2 ⁻) 4480.	
5351.4 5	(45/2 ⁺)		D	J^{π} : 165 γ to (43/2 ⁻) 5186.	
5389.5 ^a 4	(45/2 ⁺)		D	J^{π} : intraband gammas to (43/2 ⁺) 5050 and (41/2 ⁺) 4720.	
5408.0 5	(47/2,49/2 ⁺)	0.466 ms 15	D	%IT=100 J^{π} : γ to (45/2 ⁺); a seven-quasiparticle state with configuration ((π 11/2[505])+(π 9/2[514])+(π 7/2[404])+(π 5/2[402])+(π 1/2[541]) +(ν 7/2[514])+(ν 7/2[633]))47/2 ⁺ is expected near this energy (2002Th12). $T_{1/2}$: from ($^{18}\text{O},4n\gamma$) data, using pulsed and chopped beam, 0.11 ms on and 6.4 ms off (2002Th12) (see ($^{11}\text{B},5n\gamma$) source data set).	

[†] From least-squares fit to adopted $E\gamma$, excluding uncertain and multiply-placed lines along with 515.4 γ and 269.8 γ , both of which fit their placement poorly.

[‡] Unless noted otherwise, J^{π} and Nilsson orbital assignments are based on γ -ray multipolarities and decay patterns, deduced rotational structure, and on the energy systematics of these orbitals in neighboring odd-A Re isotopes. Level energies for the $J^{\pi}=13/2$ to 29/2 members of the 1/2[541] rotational band are well reproduced by a Coriolis calculation which includes the N=5 interacting Nilsson orbitals (1972Le04).

[#] From RDM in ($^{18}\text{O},4n\gamma$), except as noted.

[@] Band(A): $K^{\pi}=(35/2^+)$ band (2002Th12). Possible five-quasiparticle band with configuration ((π 7/2[404])+(ν 9/2[624])+(ν 7/2[514])+(ν 5/2[512])+(ν 7/2[633])) based primarily on g-factor analysis in ($^{11}\text{B},5n\gamma$) and on multiquasiparticle calculations which predict E=4010 for this configuration's bandhead.

[&] Band(B): $K^{\pi}=(33/2^-)$ band (2002Th12). Possible five-quasiparticle band with configuration ((π 9/2[514])+(ν 9/2[624])+(ν 7/2[514])+(ν 1/2[521])+(ν 7/2[633])) based primarily on g-factor analysis in ($^{11}\text{B},5n\gamma$).

^a Band(C): $K^{\pi}=(33/2^+)$, $\alpha=+1/2$ band (2002Th12). Possible five-quasiparticle band with configuration ((π 5/2[402])+(ν 9/2[624])+(ν 7/2[514])+(ν 5/2[512])+(ν 7/2[633])) analogous to that built on 2826 level in ^{177}Ta .

^b Band(c): $K^{\pi}=(33/2^+)$, $\alpha=-1/2$ band (2002Th12). See comment on signature partner.

^c Band(D): $K^{\pi}=(19/2^+)$ band (2002Th12).

^d Band(E): $K^{\pi}=(23/2^+)$ $\alpha=+1/2$ band (1989Ve08). Suggested configuration=((π 9/2[514])+(ν 7/2[633])+(ν 7/2[514])). Intraband transition energies are similar to those of analogous band in ^{177}Ta (2002Th12).

^e Band(e): $K^{\pi}=(23/2^+)$ $\alpha=-1/2$ band (1989Ve08). See comment on signature partner band.

^f Band(F): $K^{\pi}=(17/2^+)$ band (2002Th12). Suggested configuration=((π 5/2[402])+(ν 7/2[514])+(ν 5/2[512])), consistent with g-factor analysis, alignment and relative excitation energy.

^g Band(G): 9/2[514], $\alpha=+1/2$ band (1989Ve08). Rotational parameters: A=15.1, B=-4.5 (J=9/2, 11/2, 13/2 levels).

^h Band(g): 9/2[514], $\alpha=-1/2$ band (1989Ve08). See comment on signature partner.

ⁱ Band(H): $K^{\pi}=(15/2^-)$ band, $\alpha=-1/2$.

^j Band(I): 1/2[541], $\alpha=+1/2$ band (1989Ve08). Band parameters: A=8.9, B=-26, a=+7.8 (J=1/2 through 25/2 levels), but sensitive to choice of levels included in fit. Possibly Coriolis-mixed.

^k Band(j): 5/2[402], $\alpha=-1/2$ band (1989Ve08). g.s. band.

^l Band(J): 5/2[402], $\alpha=+1/2$ band (1989Ve08). g.s. band.

^m Band(K): 1/2[660] band, $\alpha=+1/2$.

ⁿ Band(L): $K^{\pi}=(17/2^-)$ band.

^o Band(M): collective band.

^p Band(N): possible $\pi=-$ side band.

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$								
$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	α^d	Comments
65.35	(5/2 ⁻)	65.39 ⁹	100	0.0	5/2 ⁺	(E1)	0.230	B(E1)(W.u.)=6.5×10 ⁻⁹ 18 E _γ : weighted average from (¹¹ B,4n _γ) and ε decay. Mult.: very tentative assignment from (¹¹ B,4n _γ) based on intensity balance arguments.
87.54	(9/2 ⁻)	(87.54 23)		0.0	5/2 ⁺	[M2]	76.5 14	E _γ : from level energy difference.
115.59	(9/2 ⁻)	50.4 [#] 2	100	65.35	(5/2 ⁻)	E2	87.0 21	E _γ =58 keV predicted by Coriolis calculation which includes the N=5 interacting Nilsson orbitals (1972Le04). Mult.: from α(exp) in (¹¹ B,5n _γ). Mult.: from subshell ratio in ε decay.
118.39	(1/2 ⁻)	53.3 ^c 3	100 ^c	65.35	(5/2 ⁻)	E2	66.3 21	
124.07	(7/2 ⁺)	123.93 ^a 13	100	0.0	5/2 ⁺	(M1(+E2))	2.3 6	
253.05	(11/2 ⁻)	165.50 ^a 7	100	87.54	(9/2 ⁻)	(M1(+E2))	0.9 3	
279.71	(9/2 ⁺)	155.60 ^a 8	100 ^{&} 11	124.07	(7/2 ⁺)	(M1(+E2))	1.1 4	
		279.80 ^b 14	14 ^{&} 4	0.0	5/2 ⁺			
283.98	(3/2 ⁻)	165.7 ^c 2	43 ^c	118.39	(1/2 ⁻)			
		218.6 ^c 2	100 ^c	65.35	(5/2 ⁻)			
284.28	(13/2 ⁻)	168.71 ^a 7	100	115.59	(9/2 ⁻)	E2	0.575	Mult.: stretched Q from (¹⁸ O,4n _γ); not M2 from α(exp) in (¹¹ B,5n _γ).
447.24	(13/2 ⁻)	194.21 ^a 7	100 7	253.05	(11/2 ⁻)	(M1+E2)	0.57 22	I _γ : from (¹¹ B,5n _γ). Other I(194 _γ):(360 _γ)=100.0 9:5.3 7 in (α,6n _γ).
		359.70 ^b 14	12.6 24	87.54	(9/2 ⁻)	(E2) [@]	0.0521	B(E2)(W.u.)=14 4 I _γ : from (¹¹ B,5n _γ). Mult.: stretched Q intraband γ.
465.83	(11/2 ⁺)	186.10 ^a 12	100 ^{&} 10	279.71	(9/2 ⁺)	(M1+E2)	0.65 24	
		341.72 ^b 14	33 ^{&} 6	124.07	(7/2 ⁺)	(E2)	0.0602	B(E2)(W.u.)=29 8 Mult.: Q intraband transition from (¹⁸ O,4n _γ), (¹⁴ N,5n _γ). B(E2)(W.u.)=240 +8-24
570.14	(17/2 ⁻)	285.83 ^a 7	100	284.28	(13/2 ⁻)	(E2)	0.1019	
593.89	(1/2 ⁺ ,3/2,5/2 ⁻)	310.0 ^c 3	100 ^c	283.98	(3/2 ⁻)			
		475.5 ^c 4	87 ^c	118.39	(1/2 ⁻)			
		593.8 ^{ec} 3	≤322 ^{ec}	0.0	5/2 ⁺			
664.99	(15/2 ⁻)	217.77 ^a 7	100.0 12	447.24	(13/2 ⁻)	(M1+E2) [@]	0.41 17	I _γ : from (α,6n _γ). Other I _γ : 100 10 from (¹⁸ O,4n _γ), 100 20 from (¹¹ B,4n _γ) and 100 6 from (¹¹ B,5n _γ). Mult.: D+Q intraband γ.
		411.86 ^a 13	34.5 14	253.05	(11/2 ⁻)	(E2)	0.0360	B(E2)(W.u.)=32 5 I _γ : from (α,6n _γ). Other I _γ : 42 9 from (¹⁸ O,4n _γ), 34 6 from (¹¹ B,4n _γ) and 18 4 from (¹¹ B,5n _γ).
676.98	(13/2 ⁺)	211.10 ^a 13	100	465.83	(11/2 ⁺)	(M1)	0.624	B(M1)(W.u.)=0.235 17
		397.24 ^a 13	62 4	279.71	(9/2 ⁺)	(E2)	0.0397	B(E2)(W.u.)=59 6

6

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	α^d	Comments
								I_γ : weighted average of 73 19 from (¹⁸ O,4n γ), 46 17 from (¹¹ B,4n γ), 60 4 from (α ,6n γ) and 76 10 from (¹¹ B,5n γ).
816.61	(1/2 ⁻ ,3/2,5/2 ⁻)	532.8 ^c 3	100 ^c	283.98 (3/2 ⁻)				
		697.5 ^{cf} 4	70 ^c	118.39 (1/2 ⁻)				
		750.8 ^c 5	67 ^c	65.35 (5/2 ⁻)				
817.83		224.2 ^c 6	19 ^c	593.89 (1/2 ⁺ ,3/2,5/2 ⁻)				
		817.7 ^c 3	100 ^c	0.0 5/2 ⁺				
877.7	(1/2,3/2,5/2 ⁻)	593.8 ^{ec} 3	$\leq 192^{ec}$	283.98 (3/2 ⁻)				
		759.4 ^c 3	100 ^c	118.39 (1/2 ⁻)				
906.25	(17/2 ⁻)	241.27 ^a 8	100 7	664.99 (15/2 ⁻)		(M1+E2)	0.30 13	I_γ : weighted average from (¹⁸ O,4n γ), (¹¹ B,4n γ) and (¹¹ B,5n γ).
		459.12 ^a 13	40 6	447.24 (13/2 ⁻)		(E2)	0.0271	B(E2)(W.u.)=46 10
								I_γ : weighted average of 47 9 from (¹⁸ O,4n γ), 30 6 from (¹¹ B,4n γ) and 49 7 from (¹¹ B,5n γ). Unweighted average is 42 6. Other I(459 γ):I(241 γ)=22.0 19:100.0 17 from (α ,6n γ).
913.81	(15/2 ⁺)	236.80 14	89 6	676.98 (13/2 ⁺)		(M1+E2)	0.32 14	E_γ : weighted average from (¹¹ B,5n γ) and (¹⁸ O,4n γ). I_γ : weighted average from (¹¹ B,5n γ), (¹⁸ O,4n γ) and (α ,6n γ). Other I(237 γ):I(448 γ)=139 16:100 16 in (¹¹ B,4n γ).
		448.00 ^a 12	100	465.83 (11/2 ⁺)		(E2)	0.0289	B(E2)(W.u.)=76 8
927.64	(15/2 ⁻)	357.6 2	27 10	570.14 (17/2 ⁻)				
		643.2 2	100 20	284.28 (13/2 ⁻)		D [@]		
962.19	(21/2 ⁻)	392.02 ^a 7	100	570.14 (17/2 ⁻)		(E2)	0.0411	B(E2)(W.u.)=3.0 $\times 10^2$ +4-3
1164.04	(19/2 ⁻)	257.87 ^a 12	100	906.25 (17/2 ⁻)		(M1+E2)	0.25 11	
		498.93 17		664.99 (15/2 ⁻)		[E2]	0.0220	E_γ : weighted average from (¹⁸ O,4n γ) and (¹¹ B,4n γ). Other E_γ : 500.4 2 from (¹¹ B,5n γ). I_γ : I(258 γ):I(499 γ) is 100 10:73 15 in (¹⁸ O,4n γ), 100 9:100 18 in (¹¹ B,4n γ), 100 9:50 9 in (¹¹ B,5n γ), 100 4:23 5 in (α ,6n γ).
1166.41	(17/2 ⁺)	252.70 ^a 13	77 6	913.81 (15/2 ⁺)		(M1)	0.380	B(M1)(W.u.)=0.32 4
		489.33 ^a 17	100	676.98 (13/2 ⁺)		(E2)	0.0231	B(E2)(W.u.)=102 6
1202.2	(21/2)	295.9 5	100	906.25 (17/2 ⁻)		Q		E_γ : from (¹¹ B,4n γ).
1208.70	(15/2 ⁻)	638.2 2	38 7	570.14 (17/2 ⁻)		D [@]		
		924.8 2	100 21	284.28 (13/2 ⁻)		(D) [@]		
1297.89	(15/2 ⁻)	632.80 ^b 14		664.99 (15/2 ⁻)				I_γ : see comment on 1044.7 γ .

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)								
$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	α^d	Comments
1297.89	(15/2 ⁻)	727.8 [#] 2		570.14	(17/2 ⁻)			
		850.60 ^b 14		447.24	(13/2 ⁻)			I_γ : see comment on 1044.7 γ .
		1013.8 [#] 2		284.28	(13/2 ⁻)			
		1044.85 ^b 14		253.05	(11/2 ⁻)	(Q) [@]		$I(1045\gamma):I(851\gamma):(633\gamma)=100\ 30:36\ 10:30\ 11$ in (¹⁸ O,4n γ) but 6 13:13 9:100 24 in (¹¹ B,5n γ).
1315.08	(19/2 ⁺)	401.2 2	100	913.81	(15/2 ⁺)	(Q) [@]		
1330.41	(19/2 ⁻)	402.7 2	69 14	927.64	(15/2 ⁻)	(Q) [@]		
		760.3 2	100 19	570.14	(17/2 ⁻)	D [@]		
1429.28	(3/2)	551.6 ^c 3	50 ^c	877.7	(1/2,3/2,5/2 ⁻)			
		612.4 ^c 3	43 ^c	816.61	(1/2 ⁻ ,3/2,5/2 ⁻)			
		836.1 ^{cf} 10	18 ^c	593.89	(1/2 ⁺ ,3/2,5/2 ⁻)			
		1311.0 ^c 4	100 ^c	118.39	(1/2 ⁻)			
		1364.2 ^c 5	32 ^c	65.35	(5/2 ⁻)			
1436.57	(19/2 ⁺)	1429.5 ^c 5	33 ^c	0.0	5/2 ⁺			
		270.20 ^a 13	54 8	1166.41	(17/2 ⁺)	(M1) [@]	0.317	B(M1)(W.u.)>0.29 I_γ : unweighted average of 48 14 from (¹⁸ O,4n γ), 69 15 from (¹¹ B,4n γ), 33 7 from (α ,6n γ) and 66 7 from (¹¹ B,5n γ).
		522.70 ^a 13	100 6	913.81	(15/2 ⁺)	(E2)	0.0196	B(E2)(W.u.)>120 I_γ : weighted average from (¹⁸ O,4n γ), (¹¹ B,4n γ), (α ,6n γ) and (¹¹ B,5n γ).
1440.83	(21/2 ⁻)	276.90 14	100	1164.04	(19/2 ⁻)	(M1) [@]	0.296	B(M1)(W.u.)=0.43 +12-7 E_γ : weighted average from (¹⁸ O,4n γ) and (¹¹ B,4n γ).
		534.42 18	54 6	906.25	(17/2 ⁻)	(E2) [@]	0.0186	B(E2)(W.u.)=48 +14-10 E_γ : weighted average from (¹⁸ O,4n γ) and (¹¹ B,4n γ). I_γ : weighted average of 82 28 from (¹⁸ O,4n γ), 57 16 from (¹¹ B,4n γ) and 52 7 from (α ,6n γ).
1445.87	(25/2 ⁻)	483.63 ^a 8	100	962.19	(21/2 ⁻)	(E2) [@]	0.0238	B(E2)(W.u.)=2.4 \times 10 ² +5-4 Mult.: Q intraband transition from (¹⁸ O,4n γ).
1448.93	(3/2)	630.9 ^c 5	26 ^c	817.83				
		633.4 ^c 5	35 ^c	816.61	(1/2 ⁻ ,3/2,5/2 ⁻)			
		1164.6 ^c 5	36 ^c	283.98	(3/2 ⁻)			
		1330.3 ^c 4	100 ^c	118.39	(1/2 ⁻)			
		1383.5 ^c 5	28 ^c	65.35	(5/2 ⁻)			
1448.8 ^c 5	25 ^c	0.0	5/2 ⁺					
1478.6	(23/2)	276.4 5	100	1202.2	(21/2)	(D+Q)	0.21 10	E_γ ,Mult.: from ¹⁸¹ Ta(α ,6n γ).
1490.77	(17/2 ⁻)	282.1 2	100 20	1208.70	(15/2 ⁻)	(D) [@]		

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	α^d	Comments
1490.77	(17/2 ⁻)	324.2 2	54 17	1166.41	(17/2 ⁺)			
		528.6 2	18 6	962.19	(21/2 ⁻)			
		576.9 2	83 17	913.81	(15/2 ⁺)	(D) [@]		
		920.8 2	43 9	570.14	(17/2 ⁻)	D [@]		
1545.67	(17/2 ⁻)	247.8 2	≤24	1297.89	(15/2 ⁻)			Other data: $E_\gamma=246.1$ 2, $I_\gamma=136$ 39 in (¹¹ B,5n γ).
		639.5 2	≤26	906.25	(17/2 ⁻)			Not reported in (¹¹ B,5n γ).
		880.7 2	43 14	664.99	(15/2 ⁻)			Not reported in (¹¹ B,5n γ).
		1098.4 2	100 29	447.24	(13/2 ⁻)	(Q) [@]		E_γ : weighted average from (¹¹ B,5n γ) and (¹⁸ O,4n γ).
1562.3		684.7 ^c 5	82 ^c	877.7	(1/2,3/2,5/2 ⁻)			
		745.3 ^c 5	46 ^c	816.61	(1/2 ⁻ ,3/2,5/2 ⁻)			
		968.4 ^c 3	100 ^c	593.89	(1/2 ⁺ ,3/2,5/2 ⁻)			
		1278.6 ^c 10	≈7 ^c	283.98	(3/2 ⁻)			
1618.15	(17/2 ⁻)	320.30 ^b 14	100 & 16	1297.89	(15/2 ⁻)			
		711.7 2	≤31	906.25	(17/2 ⁻)			
		953.2 ^b 2	40 14	664.99	(15/2 ⁻)	(D) [@]		I_γ : weighted average of 60 17 from (¹⁸ O,4n γ) and 30 12 from (¹¹ B,5n γ).
		1170.85 ^b 15		447.24	(13/2 ⁻)	(Q) [@]		I_γ : 83 27 in (¹⁸ O,4n γ) but 9 9 in (¹¹ B,5n γ).
1636.95	(21/2 ⁺)	321.8 2	100 49	1315.08	(19/2 ⁺)	(D) [@]		
		470.6 2	47 14	1166.41	(17/2 ⁺)	Q [@]		
1714.07	(21/2 ⁺)	277.60 ^b 14	66 & 7	1436.57	(19/2 ⁺)	(M1) [@]	0.294	B(M1)(W.u.)>0.40 Mult.: D intraband γ .
		547.70 ^b 14	100 & 9	1166.41	(17/2 ⁺)	[E2]	0.01752	B(E2)(W.u.)>110
1724.4	(23/2 ⁻)	283.5 2	77 23	1440.83	(21/2 ⁻)	D [@]		
		560.3 2	100 31	1164.04	(19/2 ⁻)	Q [@]		
1772.20	(19/2 ⁻)	153.90 ^b 20	31 16	1618.15	(17/2 ⁻)			I_γ : unweighted average of 15 4 from (¹⁸ O,4n γ) and 47 8 from (¹¹ B,5n γ). Weighted average is 21 13. Should have been seen in (¹¹ B,5n γ) but was not.
		226.6 2	35 12	1545.67	(17/2 ⁻)			
		474.20 ^b 20	31 & 9	1297.89	(15/2 ⁻)	(Q) [@]		
		608.10 ^b 14	82 & 10	1164.04	(19/2 ⁻)	D [@]		
		866.10 ^b 20	94 & 11	906.25	(17/2 ⁻)	D [@]		
		1107.30 ^b 14	100 & 12	664.99	(15/2 ⁻)	(Q) [@]		
1772.20+x	(23/2 ⁺)	(x)	100	1772.20	(19/2 ⁻)	[M2]		E_γ : see comment on E(1772+x level).
1814.57	(17/2 ⁺)	269.8 [#] 2	100 [#] 30	1545.67	(17/2 ⁻)			
		515.4 [#] 2	47 [#] 15	1297.89	(15/2 ⁻)			
		908.5 [#] 2	77 [#] 23	906.25	(17/2 ⁻)			

Adopted Levels, Gammas (continued)

E _i (level)	J ^π _i	γ(¹⁷⁹ Re) (continued)						Comments
		E _γ [†]	I _γ [†]	E _f	J ^π _f	Mult. [‡]	α ^d	
1814.57	(17/2 ⁺)	1149.6 [#] 2	58 [#] 17	664.99	(15/2 ⁻)			
1820.05	(23/2 ⁻)	489.6 2	100 20	1330.41	(19/2 ⁻)			
1826.7	(19/2 ⁺)	857.9 2 (54.5 4)	51 23	962.19 1772.20	(21/2 ⁻) (19/2 ⁻)	(D) [@]		E _γ : from level energy difference.
1857.97	(19/2 ⁻)	367.2 2	100 20	1490.77	(17/2 ⁻)	(D) [@]		
1858.7		421.4 2	32 10	1436.57	(19/2 ⁺)			
1894.7		896.5 2	100	962.19	(21/2 ⁻)			
1902.29+x	(25/2 ⁺)	932.5 2	100	962.19	(21/2 ⁻)			
1978.5	(21/2 ⁺)	130.15 ^b 14	100	1772.20+x	(23/2 ⁺)	(M1) [@]	2.43	E _γ ,Mult.: from (¹⁸ O,4nγ), (¹⁴ N,5nγ); (D) intraband transition.
1986.37	(23/2 ⁺)	151.80 ^b 20	21.7& 24	1826.7	(19/2 ⁺)			
		206.30 ^b 14	100& 16	1772.20	(19/2 ⁻)			
		272.30 ^b 14	38& 8	1714.07	(21/2 ⁺)			
		549.90 ^b 14	100& 12	1436.57	(19/2 ⁺)			
1989.0	(19/2 ⁺)	174.5 [#] 2	100	1814.57	(17/2 ⁺)			
2005.25	(29/2 ⁻)	559.28 ^a 13	100	1445.87	(25/2 ⁻)	(E2)	0.01666	B(E2)(W.u.)=250 50
2020.4	(25/2 ⁻)	296.0 2	90 30	1724.4	(23/2 ⁻)	(M1)	0.247	B(M1)(W.u.)>0.57
		579.6 2	100 30	1440.83	(21/2 ⁻)	(E2) [@]	0.01532	Mult.: (D) intraband γ from (¹⁸ O,4nγ). B(E2)(W.u.)>110 Mult.: Q intraband γ from (¹⁸ O,4nγ).
2052.4	(25/2 ⁺)	415.5 2	100	1636.95	(21/2 ⁺)	(Q) [@]		
2053.32	(23/2 ⁺)	339.7 [#] 2	100 [#] 25	1714.07	(21/2 ⁺)			
		616.3 [#] 2	31 [#] 11	1436.57	(19/2 ⁺)			
2096.96+x	(27/2 ⁺)	194.70 ^b 14	100 19	1902.29+x	(25/2 ⁺)	(D) [@]		I _γ : from (¹¹ B,5nγ).
		324.6 [#] 2	7 [#] 3	1772.20+x	(23/2 ⁺)			
2183.3	(21/2 ⁺)	194.3 [#] 2	29 [#] 4	1989.0	(19/2 ⁺)			
		368.9 [#] 2	100 [#] 11	1814.57	(17/2 ⁺)			
2187.2	(23/2 ⁺)	208.70 ^b 14	100	1978.5	(21/2 ⁺)			
2251.54	(25/2 ⁺)	265.20 ^b 14	64& 10	1986.37	(23/2 ⁺)			
		537.40 ^b 14	100& 9	1714.07	(21/2 ⁺)			
2299.4	(21/2 ⁻)	441.4 2	100	1857.97	(19/2 ⁻)	(D) [@]		
2313.8	(27/2 ⁻)	293.4 2	60 18	2020.4	(25/2 ⁻)	(D) [@]		
		589.4 2	100 31	1724.4	(23/2 ⁻)			
2314.4	(21/2 ⁻)	456.4 2	100	1857.97	(19/2 ⁻)	(D) [@]		
2320.9		875.0 2	100	1445.87	(25/2 ⁻)			
2325.80+x	(29/2 ⁺)	228.85 ^b 14	100 19	2096.96+x	(27/2 ⁺)	(D) [@]		

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)									
$E_i(\text{level})$	J_i^π	E_γ †	I_γ †	E_f	J_f^π	Mult. ‡	α^d	Comments	
2325.80+x	(29/2 ⁺)	423.6 2	14 3	1902.29+x	(25/2 ⁺)				
2382.3	(27/2 ⁻)	562.2 2	100	1820.05	(23/2 ⁻)				
2397.1	(23/2 ⁺)	214.0 [#] 2	86 [#] 15	2183.3	(21/2 ⁺)				
		408.1 [#] 2	100 [#] 17	1989.0	(19/2 ⁺)				
2411.9		966.0 2	100	1445.87	(25/2 ⁻)				
2417.7	(25/2 ⁺)	230.6 2	100 61	2187.2	(23/2 ⁺)			Other E_γ : 229.9 2 in (¹¹ B,5n γ).	
		439.3 2	61 18	1978.5	(21/2 ⁺)				
2508.4		194.0 2	100	2314.4	(21/2 ⁻)				
2519.06	(27/2 ⁺)	267.4 2	≤ 31	2251.54	(25/2 ⁺)				
		532.8 2	100 28	1986.37	(23/2 ⁺)				
2552.6	(29/2 ⁺)	500.2 2	100	2052.4	(25/2 ⁺)				
2555.61	(27/2 ⁺)	304.0 [#] 2	100	2251.54	(25/2 ⁺)				
2580.88+x	(31/2 ⁺)	255.10 ^b 14	100 20	2325.80+x	(29/2 ⁺)	(D) [@]			
		483.8 2	45 9	2096.96+x	(27/2 ⁺)				
2611.7	(29/2 ⁻)	297.9 2	67 33	2313.8	(27/2 ⁻)				
		591.3 2	100 30	2020.4	(25/2 ⁻)				
2618.92	(27/2 ⁺)	367.5 [#] 2	42 [#] 3	2251.54	(25/2 ⁺)				
		565.3 [#] 2	100 [#] 5	2053.32	(23/2 ⁺)				
2623.98	(33/2 ⁻)	618.75 ^a 14	100	2005.25	(29/2 ⁻)	[E2]	0.01316	B(E2)(W.u.)>150	
2628.1	(25/2 ⁺)	231.0 [#] 2	57 [#] 5	2397.1	(23/2 ⁺)				
		444.8 [#] 2	100 [#] 8	2183.3	(21/2 ⁺)				
2634.03	(27/2 ⁺)	581.0 [#] 2	29 [#] 4	2053.32	(23/2 ⁺)				
		1188.1 [#] 2	100 [#] 6	1445.87	(25/2 ⁻)				
2694.4	(27/2 ⁺)	277.0 [#] 2	100 [#] 14	2417.7	(25/2 ⁺)				
		506.9 [#] 2	76 [#] 16	2187.2	(23/2 ⁺)				
2791.2	(29/2 ⁺)	539.7 2	100	2251.54	(25/2 ⁺)				
2821.1		521.7 2	100	2299.4	(21/2 ⁻)				
2827.8		513.4 2	100	2314.4	(21/2 ⁻)				
2851.8		846.5 2	100	2005.25	(29/2 ⁻)				
2858.22+x	(33/2 ⁺)	277.4 2	100 20	2580.88+x	(31/2 ⁺)	(M1) [@]	0.295		
		532.5 2	59 11	2325.80+x	(29/2 ⁺)	(E2) [@]	0.0187		
2877.5	(27/2 ⁺)	249.5 [#] 2	55 [#] 17	2628.1	(25/2 ⁺)				
		480.6 [#] 2	100 [#] 23	2397.1	(23/2 ⁺)				
2907.2	(31/2 ⁻)	295.5 2	27 8	2611.7	(29/2 ⁻)				
		593.4 2	100 29	2313.8	(27/2 ⁻)				
2984.0		475.6 2	100	2508.4					
3072.0	(31/2 ⁺)	552.9 2	100	2519.06	(27/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)

$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	α^d	$I_{(\gamma+ce)}$	Comments
3130.2	(33/2 ⁺)	577.6 2	100	2552.6	(29/2 ⁺)				
3131.2	(29/2 ⁺)	254.1 [#] 2	26 [#] 3	2877.5	(27/2 ⁺)				
		503.0 [#] 2	100 [#] 6	2628.1	(25/2 ⁺)				
3154.60+x	(35/2 ⁺)	296.4 2	100 21	2858.22+x	(33/2 ⁺)	(M1) [@]	0.2461		
		573.6 2	96 9	2580.88+x	(31/2 ⁺)				
3159.69	(29/2 ⁺)	525.9 [#] 2	100 [#] 6	2634.03	(27/2 ⁺)	[M1]	0.0537		B(M1)(W.u.)>7.2×10 ⁻⁵
		540.6 [#] 2	79 [#] 4	2618.92	(27/2 ⁺)	[M1]	0.0499		B(M1)(W.u.)>5.2×10 ⁻⁵
		604.0 [#] 2	21 [#] 5	2555.61	(27/2 ⁺)	[M1]	0.0375		B(M1)(W.u.)>1.0×10 ⁻⁵
3206.0	(33/2 ⁻)	298.8 2	70 36	2907.2	(31/2 ⁻)				
		594.4 2	100 30	2611.7	(29/2 ⁻)				
3253.3	(31/2 ⁺)	559.0 [#] 2	100	2694.4	(27/2 ⁺)				
3277.34	(31/2 ⁺)	(25)		3253.3	(31/2 ⁺)			16 3	
		117 [#] 1	51 [#] 6	3159.69	(29/2 ⁺)	M1	3.30 10		B(M1)(W.u.)>0.0013 E _γ : for contaminated line.
		146.3 [#] 2	39.6 [#] 16	3131.2	(29/2 ⁺)	M1	1.75		Mult.: from $\alpha(\text{exp})=3.7$ 7 from intensity balance in (¹¹ B,5n γ).
		653.4 [#] 2	64 [#] 5	2623.98	(33/2 ⁻)	[E1]	0.00422 6		B(M1)(W.u.)>0.00054 Mult.: from $\alpha(\text{exp})=2.7$ 5 from intensity balance in (¹¹ B,5n γ).
		1271.8 [#] 2	100 [#] 6	2005.25	(29/2 ⁻)	(E1)	1.26×10 ⁻³ 2		B(E1)(W.u.)>9.6×10 ⁻⁸ B(E1)(W.u.)>2.0×10 ⁻⁸ Mult.: E1 or E2 from $\alpha(\text{K})\text{exp}=0.0026$ 9 in (¹¹ B,5n γ); $\Delta\pi$ =yes from level scheme.
3290.2	(37/2 ⁻)	666.17 19	100	2623.98	(33/2 ⁻)	(E2) [@]	0.01113		E _γ : weighted average from (¹⁸ O,4n γ) and (¹¹ B,4n γ).
3343.9	(33/2 ⁺)	552.7 2	100	2791.2	(29/2 ⁺)				
3426.7		605.6 2	100	2821.1					
3455.66	(33/2 ⁺)	178.3 [#] 2	55 [#] 3	3277.34	(31/2 ⁺)	M1	1.000		Mult.: from $\alpha(\text{exp})=1.4$ 4 from intensity balance in (¹¹ B,5n γ).
		296.0 [#] 2	100 [#] 5	3159.69	(29/2 ⁺)				
3467.52+x	(37/2 ⁺)	312.8 2	100 20	3154.60+x	(35/2 ⁺)				
		609.4 2	19 4	2858.22+x	(33/2 ⁺)				
3508.5	(35/2 ⁻)	302.5 2	100 31	3206.0	(33/2 ⁻)				
		601.3 2	100 31	2907.2	(31/2 ⁻)				
3542.0	(33/2 ⁻)	264.7 [#] 2	100	3277.34	(31/2 ⁺)	[E1]	0.0320		
3547.9		563.9 2	100	2984.0					
3630.6	(35/2 ⁺)	558.6 ^f 2	100	3072.0	(31/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)									
$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	δ	α^d	Comments
3703.3	(35/2 ⁺)	426.0 [#] 2	100	3277.34	(31/2 ⁺)	[E2]		0.0329	
3766.0	(35/2 ⁺)	310.3 [#] 2	100	3455.66	(33/2 ⁺)	M1		0.217	Mult.: from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ).
3775.8	(37/2 ⁺)	645.5 2	100	3130.2	(33/2 ⁺)				
3793.6+x	(39/2 ⁺)	326.1 2	100 19	3467.52+x	(37/2 ⁺)				
		639.0 2	64 14	3154.60+x	(35/2 ⁺)				
3821.4	(37/2 ⁻)	312.9 2	71 36	3508.5	(35/2 ⁻)				
		615.4 2	100 50	3206.0	(33/2 ⁻)				
3840.5	(35/2 ⁻)	298.5 [#] 2	100	3542.0	(33/2 ⁻)	M1		0.241	Mult.: from $\alpha(\text{exp})$ in (¹¹ B,5n γ).
3995.0	(37/2 ⁺)	291.7 [#] 2	100	3703.3	(35/2 ⁺)	(M1)		0.257	Mult.: from $\alpha(\text{exp})$ in (¹¹ B,5n γ).
4000.2	(41/2 ⁻)	710.0 2	100	3290.2	(37/2 ⁻)				E_γ : from (¹⁸ O,4n γ). 710.9 5 from (α ,6n γ).
4080.1	(37/2 ⁺)	314.2 [#] 2	100 [#] 4	3766.0	(35/2 ⁺)	M1+E2	0.37 +25-37	0.194 22	Mult., δ : from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ).
		624.4 [#] 2	12.6 [#] 14	3455.66	(33/2 ⁺)				
4107.4		680.7 2	100	3426.7					
4131.1+x	(41/2 ⁺)	337.4 2	100 3	3793.6+x	(39/2 ⁺)				
		663.5 2	8 3	3467.52+x	(37/2 ⁺)				
4142.9	(39/2 ⁻)	634.4 2	100	3508.5	(35/2 ⁻)				
4152.5	(37/2 ⁻)	312.0 [#] 2	100 [#] 6	3840.5	(35/2 ⁻)	[M1]		0.214	
		610.4 [#] 2	42 [#] 6	3542.0	(33/2 ⁻)				
4191.0		643.1 2	100	3547.9					
4308.0	(39/2 ⁺)	313.0 [#] 2	100 [#] 11	3995.0	(37/2 ⁺)				
		604 ^{#f} 1	7 [#] 4	3703.3	(35/2 ⁺)				
4398.2	(39/2 ⁺)	318.3 [#] 2	100 [#] 4	4080.1	(37/2 ⁺)	M1+E2	1.2 +21-6	0.13 5	Mult., δ : from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ).
		632.2 [#] 2	22.5 [#] 18	3766.0	(35/2 ⁺)				
4476.4	(41/2 ⁺)	700.6 2	100	3775.8	(37/2 ⁺)				
4477.2+x	(43/2 ⁺)	346.0 2	100 50	4131.1+x	(41/2 ⁺)				
		683.8 2	80 60	3793.6+x	(39/2 ⁺)				
4480.2	(39/2 ⁻)	327.8 [#] 2	71 [#] 5	4152.5	(37/2 ⁻)	[M1]		0.187	
		639.9 [#] 2	100 [#] 6	3840.5	(35/2 ⁻)				
4720.1	(41/2 ⁺)	322.1 [#] 2	100 [#] 4	4398.2	(39/2 ⁺)	M1(+E2)	≤ 0.31	0.191 7	Mult., δ : from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ).
		640.0 [#] 2	40.0 [#] 24	4080.1	(37/2 ⁺)				$\delta=0.17 +47-17$ from $\alpha(\text{K})\text{exp}$, ≤ 0.31 from $\alpha(\text{L})\text{exp}$.
4733.1	(41/2 ⁺)	425.2 [#] 2	100 [#] 15	4308.0	(39/2 ⁺)				
		738.1 [#] 2	9 [#] 6	3995.0	(37/2 ⁺)				
4757.2	(45/2 ⁻)	757.0 2	100	4000.2	(41/2 ⁻)				
4824.4	(41/2 ⁻)	344.4 [#] 2	60 [#] 8	4480.2	(39/2 ⁻)				
		671.6 [#] 2	100 [#] 13	4152.5	(37/2 ⁻)				

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)									
$E_i(\text{level})$	J_i^π	E_γ^\dagger	I_γ^\dagger	E_f	J_f^π	Mult. [‡]	δ	α^d	Comments
4826.4+x	(45/2 ⁺)	695.3 2	100	4131.1+x	(41/2 ⁺)				
5049.7	(43/2 ⁺)	329.9 [#] 2	100 [#] 4	4720.1	(41/2 ⁺)	M1+E2	0.55 15	0.157 12	Mult., δ : from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ). $\delta=1.0 +15-6$ from $\alpha(\text{K})\text{exp}$, ≤ 0.7 from $\alpha(\text{L})\text{exp}$.
		651.3 [#] 2	41.6 [#] 24	4398.2	(39/2 ⁺)				
5163.1	(45/2 ⁺)	429.9 [#] 2	100	4733.1	(41/2 ⁺)	[E2]		0.0321	
5186.2	(43/2 ⁻)	361.7 [#] 2	52 [#] 4	4824.4	(41/2 ⁻)	[M1]		0.1440	
		706.1 [#] 2	100 [#] 7	4480.2	(39/2 ⁻)				
5351.4	(45/2 ⁺)	165.2 [#] 2	100	5186.2	(43/2 ⁻)	[E1]		0.1050	
5389.5	(45/2 ⁺)	339.9 [#] 2	100 [#] 4	5049.7	(43/2 ⁺)	M1(+E2)	≤ 0.84	0.148 23	Mult., δ : from $\alpha(\text{K})\text{exp}$ and $\alpha(\text{L})\text{exp}$ in (¹¹ B,5n γ).
		669.3 [#] 2	56.9 [#] 27	4720.1	(41/2 ⁺)				
5408.0	(47/2,49/2 ⁺)	(18)		5389.5	(45/2 ⁺)				I $\gamma=63.3$ 17, 4.03 12, 0.0393 10 and $\alpha=7.80$, 138.2, 1.415E4, respectively, if mult=E1, M1, E2. B(E1)(W.u.)= 6.7×10^{-9} 12 if E1, B(M1)(W.u.)= 4.4×10^{-8} 8 if M1, B(E2)(W.u.)= 5.6×10^{-4} 16 if E2, assuming I($\gamma+ce$)(56)=I($\gamma+ce$)(165.2) in (¹¹ B,5n γ). Alternatively, B(E1)(W.u.)= 6.3×10^{-9} 12 if E1, B(M1)(W.u.)= 4.2×10^{-8} 8 if M1, B(E2)(W.u.)= 5.3×10^{-4} 15 if E2, assuming I($\gamma+ce$)(56)=I($\gamma+ce$)(362 γ +706 γ) in (¹¹ B,5n γ). I $\gamma=56$ 9 or 89 4, 13.0 21 or 20.7 10, 1.43 22 or 2.28 12 and $\alpha=0.3525$, 4.828, 52.1, respectively, if mult=E1, M1, E2 depending on whether I($\gamma+ce$)(56) is deduced from I($\gamma+ce$) deexciting the 5352 or 5186 level in (¹¹ B,5n γ). B(E1)(W.u.)= 2.0×10^{-10} 4 if E1, B(M1)(W.u.)= 4.8×10^{-9} 9 if M1, B(E2)(W.u.)= 7.0×10^{-5} 14 if E2, assuming I($\gamma+ce$)(56)=I($\gamma+ce$)(165.2) in (¹¹ B,5n γ). Alternatively, B(E1)(W.u.)= 2.98×10^{-10} 25 if E1, B(M1)(W.u.)= 7.2×10^{-9} 7 if M1, B(E2)(W.u.)= 1.05×10^{-4} 12 if E2, assuming I($\gamma+ce$)(56)=I($\gamma+ce$)(362 γ +706 γ) in (¹¹ B,5n γ). $\alpha=0.0388$, 0.4137, 0.1645, respectively, if mult=E1, M1, E2.
		56 ^{#f} 1	12.6 21	5351.4	(45/2 ⁺)				
		244.9 [#] 2	100 [#] 9	5163.1	(45/2 ⁺)				

Adopted Levels, Gammas (continued)

$\gamma(^{179}\text{Re})$ (continued)

<u>$E_i(\text{level})$</u>	<u>E_γ</u> [†]	<u>Comments</u>
		B(E1)(W.u.)= 4.2×10^{-12} 4 if E1, B(M1)(W.u.)= 4.4×10^{-10} 5 if M1, B(E2)(W.u.)= 3.1×10^{-6} 3 if E2, assuming $I(\gamma+ce)(56)=I(\gamma+ce)(165.2)$ in ($^{11}\text{B}, 5n\gamma$). Alternatively, B(E1)(W.u.)= 4.1×10^{-10} 4 if E1, B(M1)(W.u.)= 4.1×10^{-10} 4 if M1, B(E2)(W.u.)= 2.9×10^{-6} 3 if E2, assuming $I(\gamma+ce)(56)=I(\gamma+ce)(362\gamma+706\gamma)$ in ($^{11}\text{B}, 5n\gamma$).

[†] From $^{165}\text{Ho}(^{18}\text{O}, 4n\gamma)$, $^{170}\text{Er}(^{14}\text{N}, 5n\gamma)$, unless otherwise specified.

[‡] From $^{181}\text{Ta}(\alpha, 6n\gamma)$, based on $\gamma(\theta)$ and band structure, assigning $\Delta\pi=(\text{no})$ for intraband transitions, except as noted.

[#] From ($^{11}\text{B}, 5n\gamma$).

[@] From DCO data in ($^{18}\text{O}, 4n\gamma$), ($^{14}\text{N}, 5n\gamma$), assigning $\Delta\pi=(\text{no})$ for intraband transitions.

[&] Weighted average from ($^{18}\text{O}, 4n\gamma$) and ($^{11}\text{B}, 5n\gamma$).

^a Weighted average from ($^{18}\text{O}, 4n\gamma$), ($^{11}\text{B}, 4n\gamma$) and ($^{11}\text{B}, 5n\gamma$).

^b Weighted average from ($^{18}\text{O}, 4n\gamma$) and ($^{11}\text{B}, 5n\gamma$).

^c From ^{179}Os ε decay.

^d 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.

^e Multiply placed with undivided intensity.

^f Placement of transition in the level scheme is uncertain.

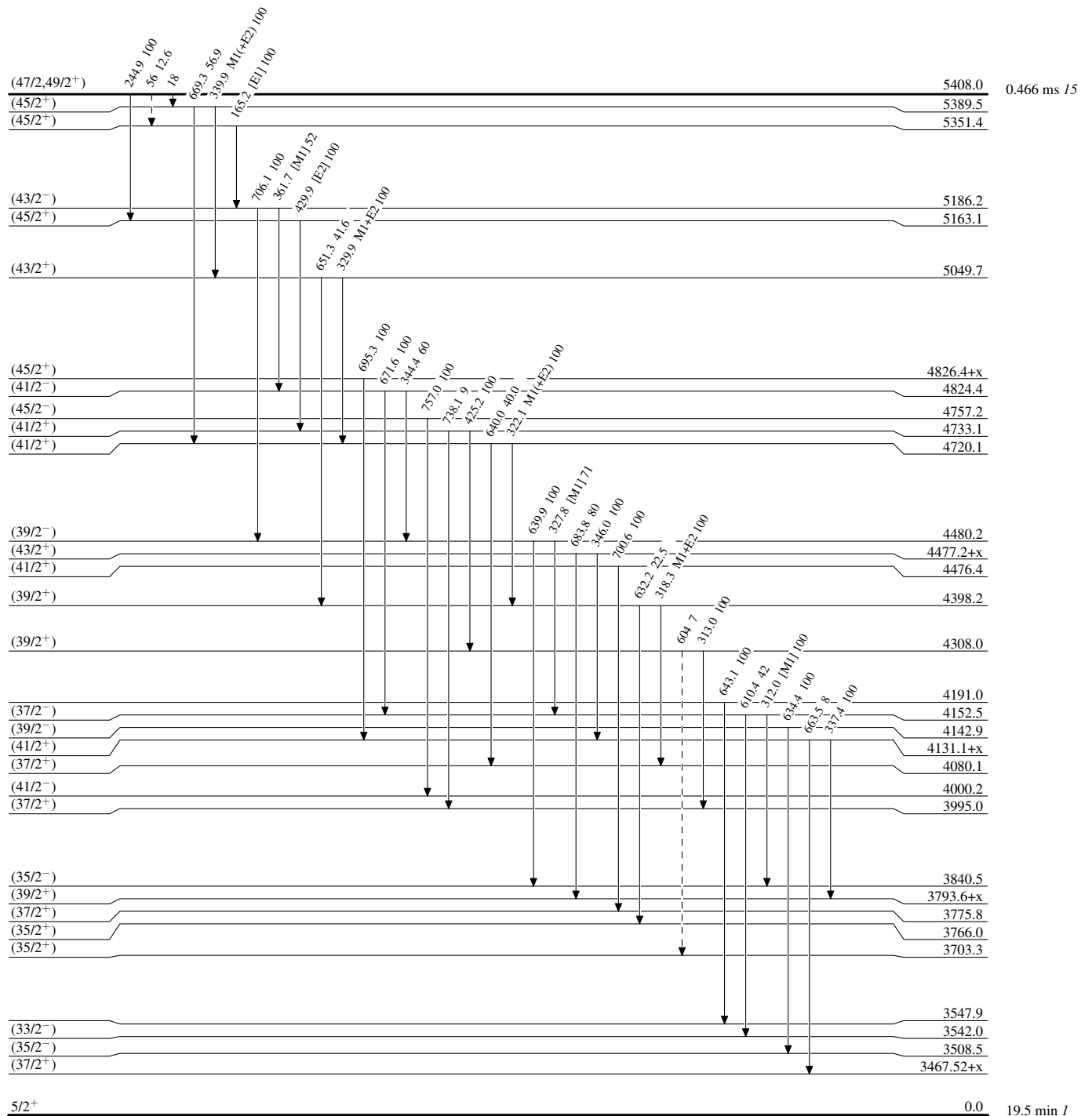
Adopted Levels, Gammas

Legend

Level Scheme

Intensities: Relative photon branching from each level

-----▶ γ Decay (Uncertain)



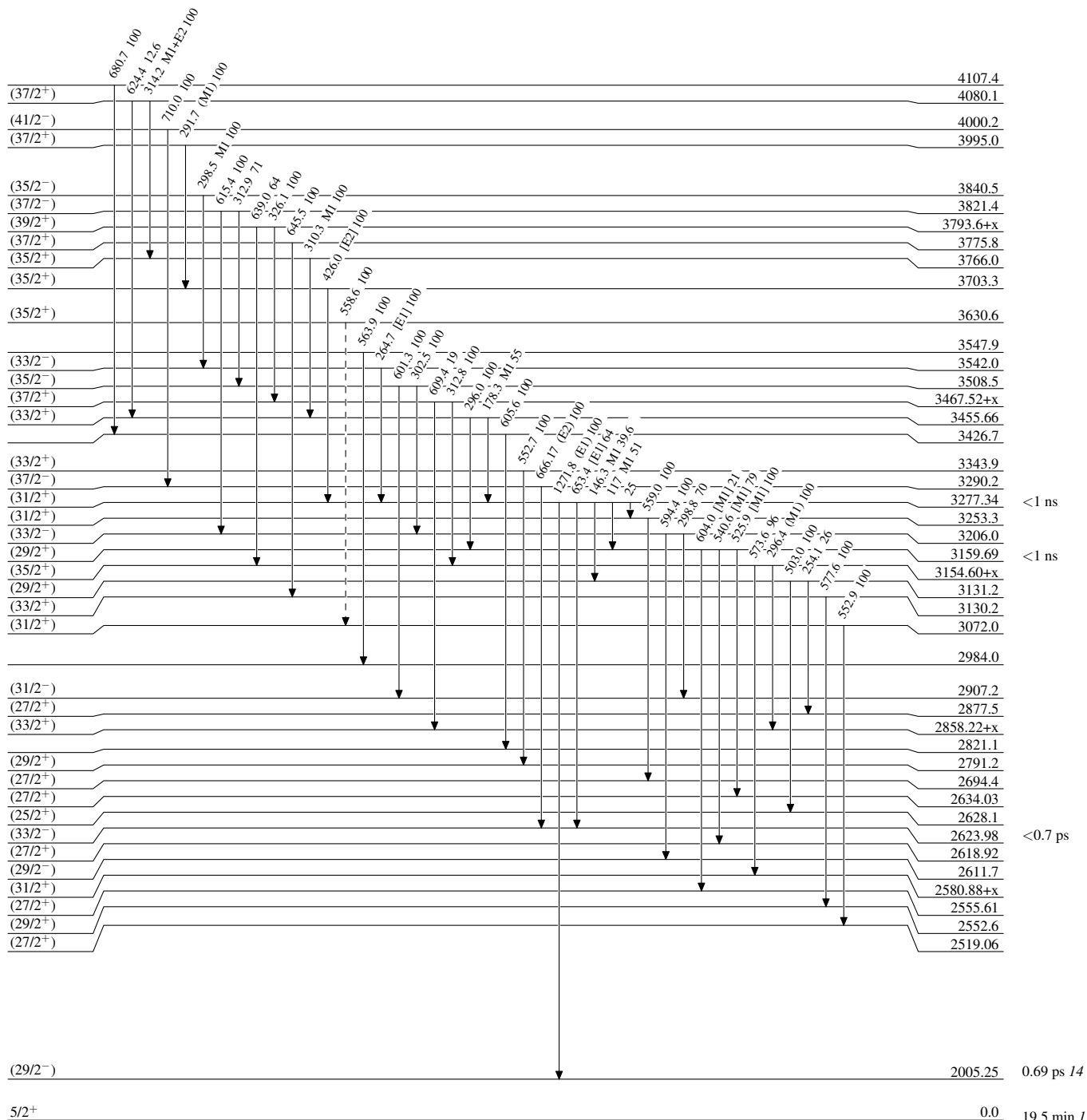
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

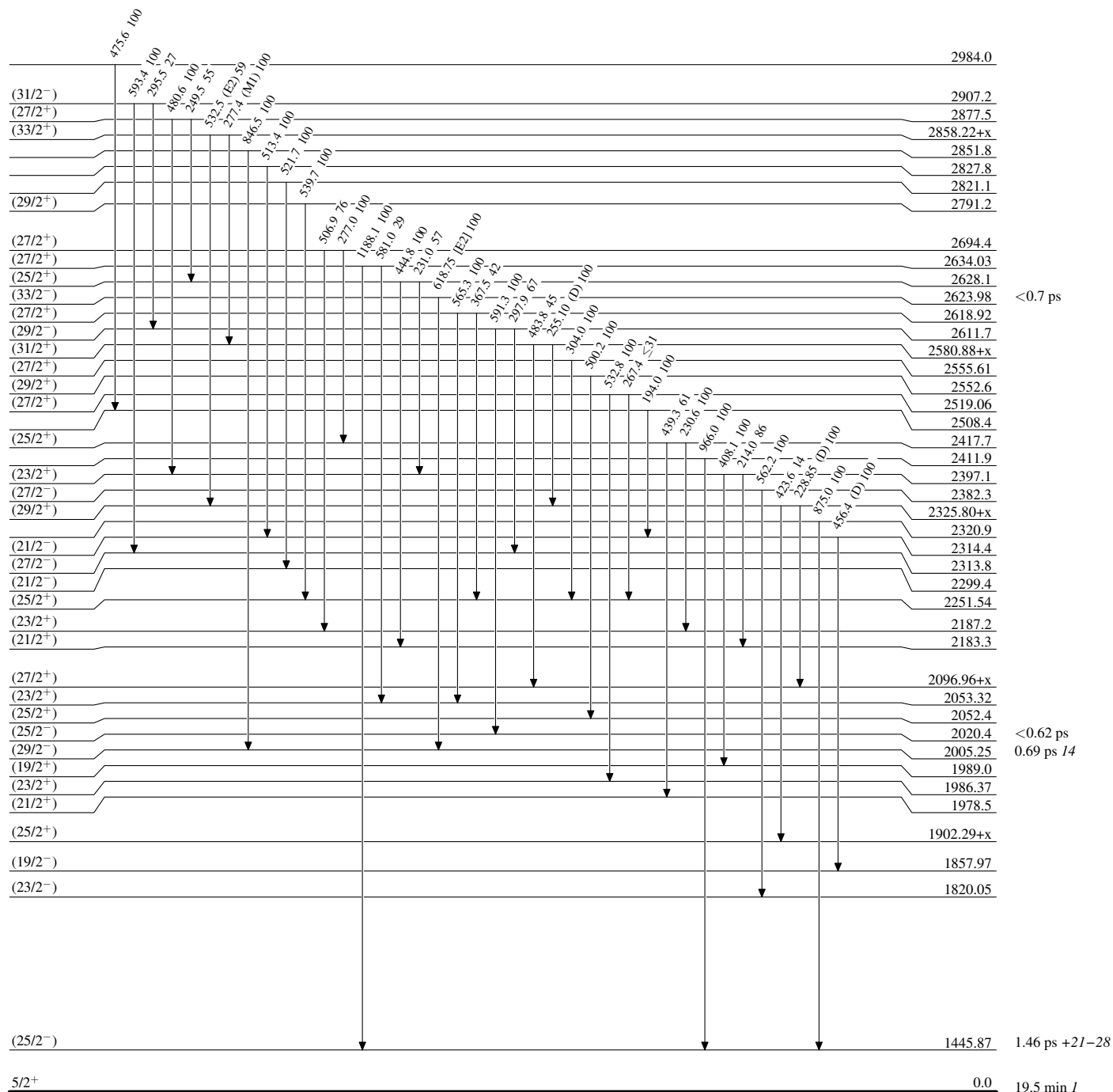
-----> γ Decay (Uncertain)



Adopted Levels, Gammas

Level Scheme (continued)

Intensities: Relative photon branching from each level



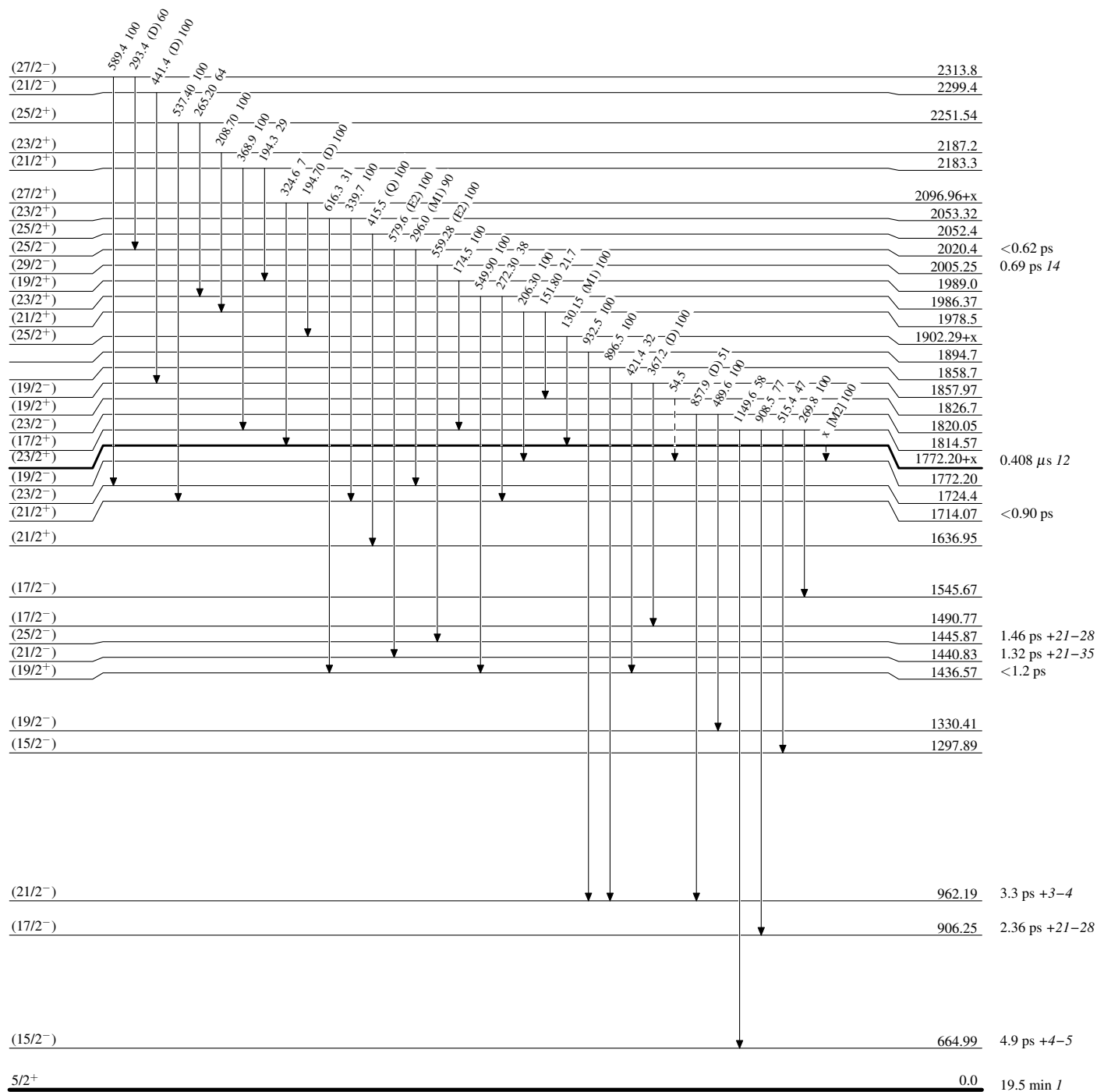
Adopted Levels, Gammas

Legend

Level Scheme (continued)

Intensities: Relative photon branching from each level

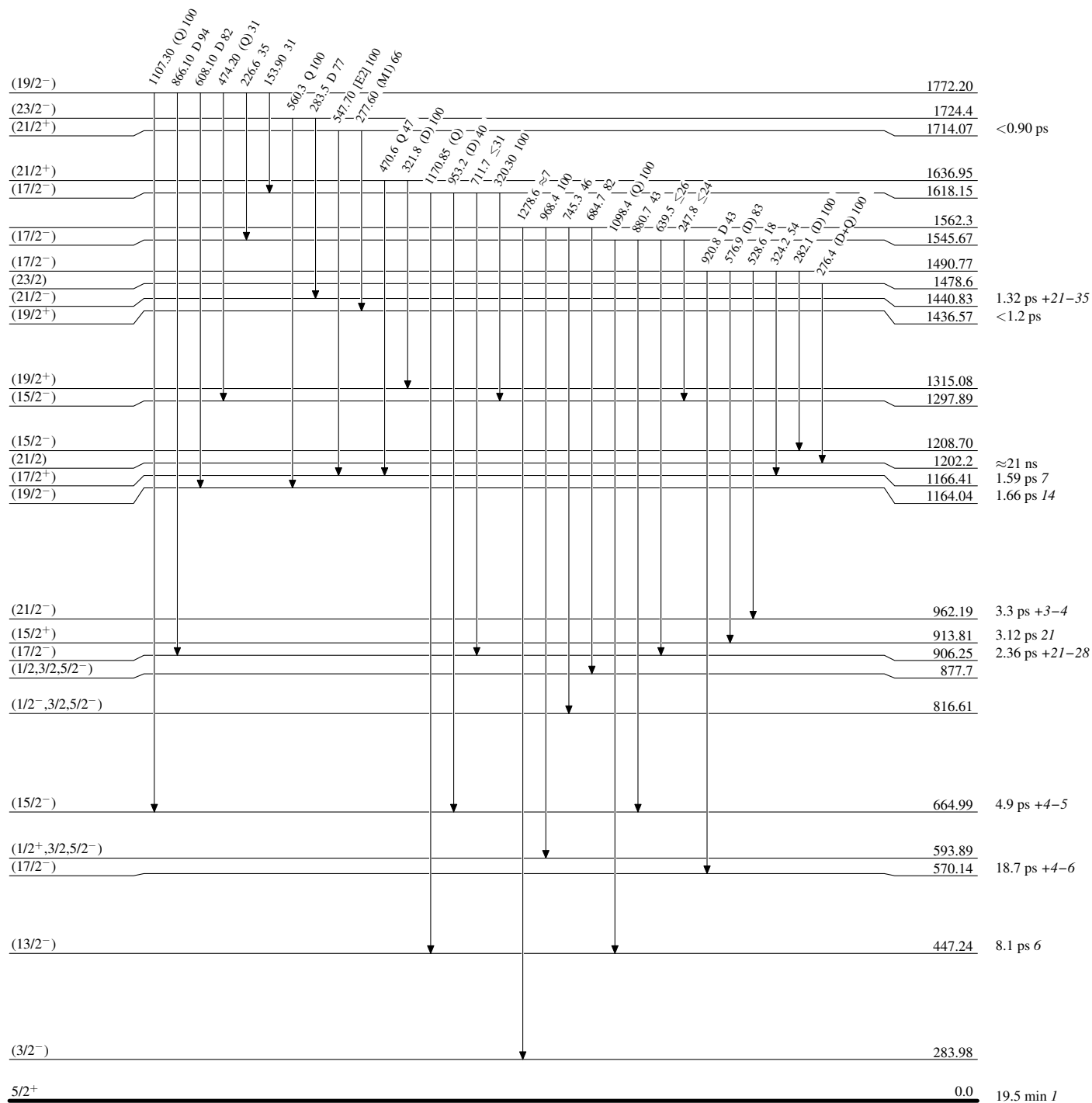
-----▶ γ Decay (Uncertain)



$^{179}_{75}\text{Re}_{104}$

Adopted Levels, Gammas**Level Scheme (continued)**

Intensities: Relative photon branching from each level



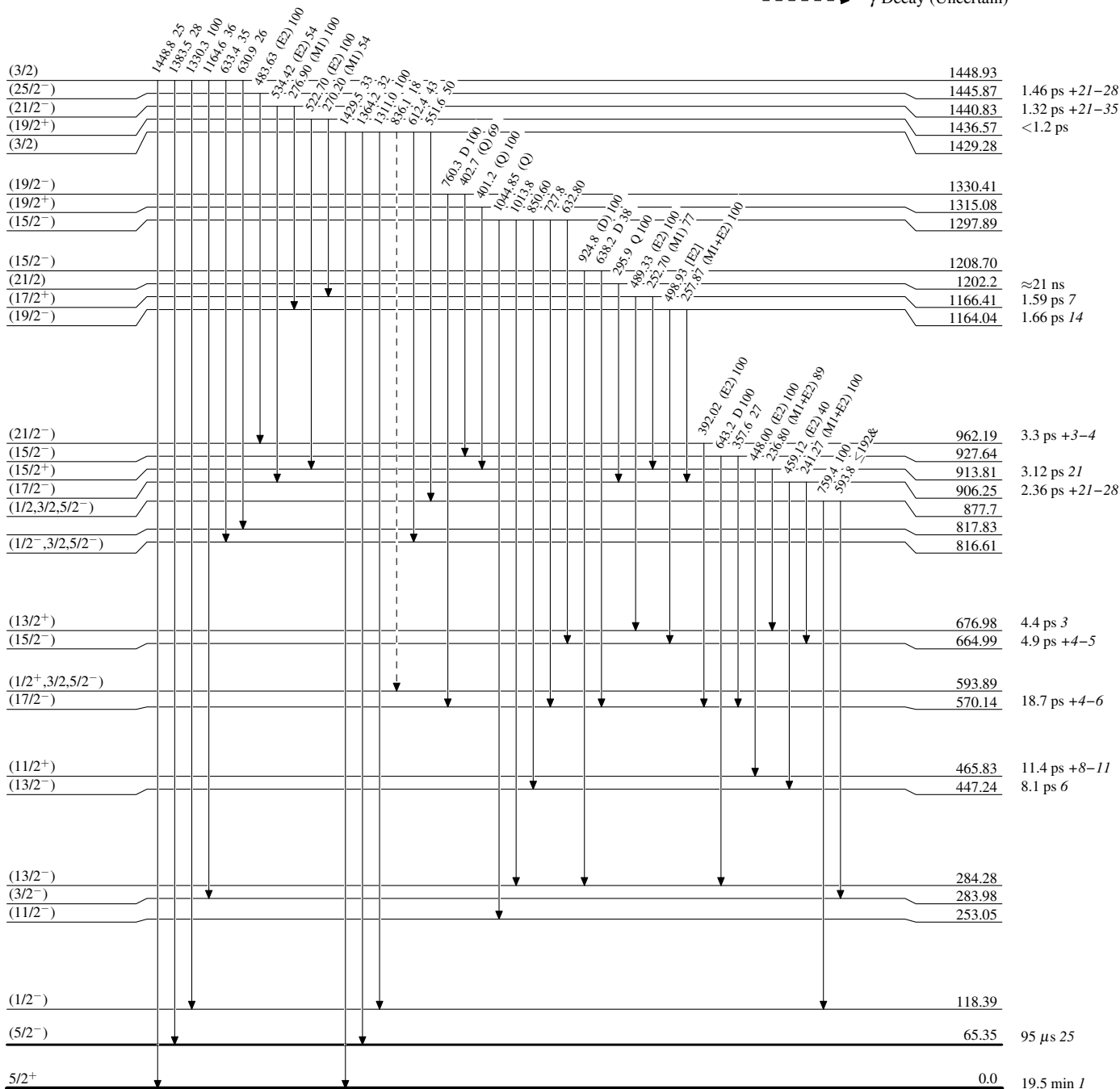
Adopted Levels, Gammas

Level Scheme (continued)

Legend

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

-----▶ γ Decay (Uncertain)



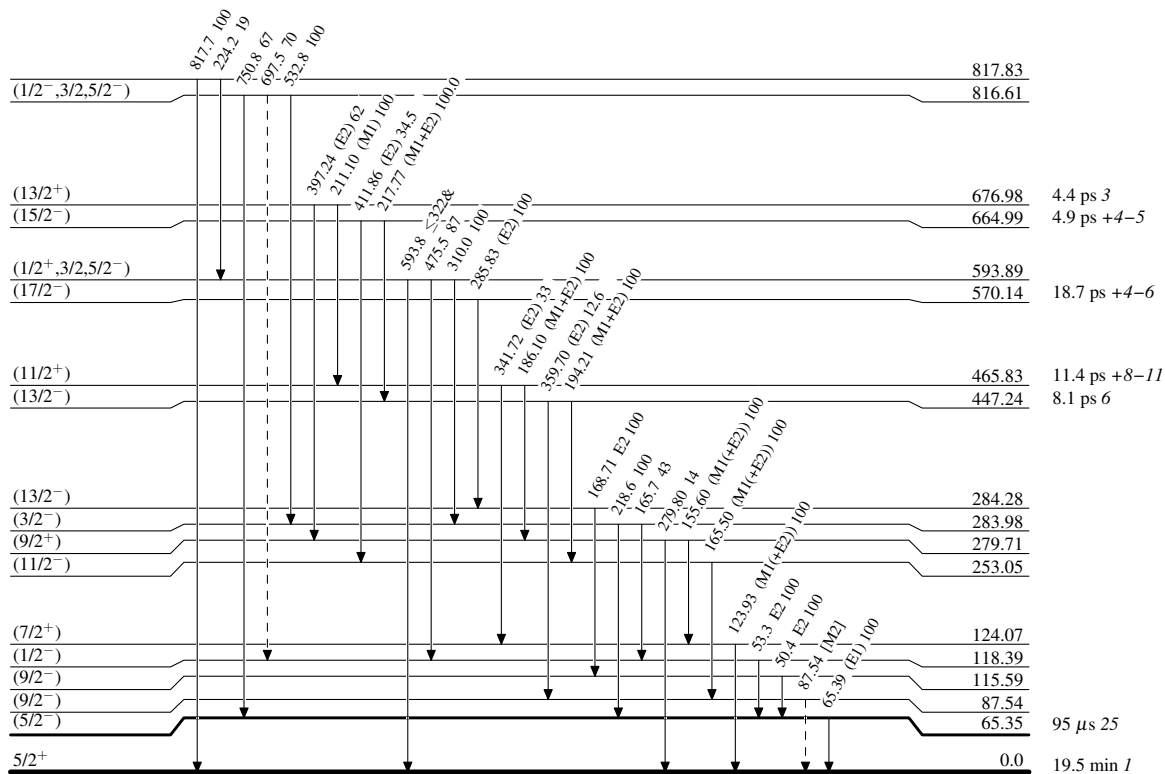
Adopted Levels, Gammas

Level Scheme (continued)

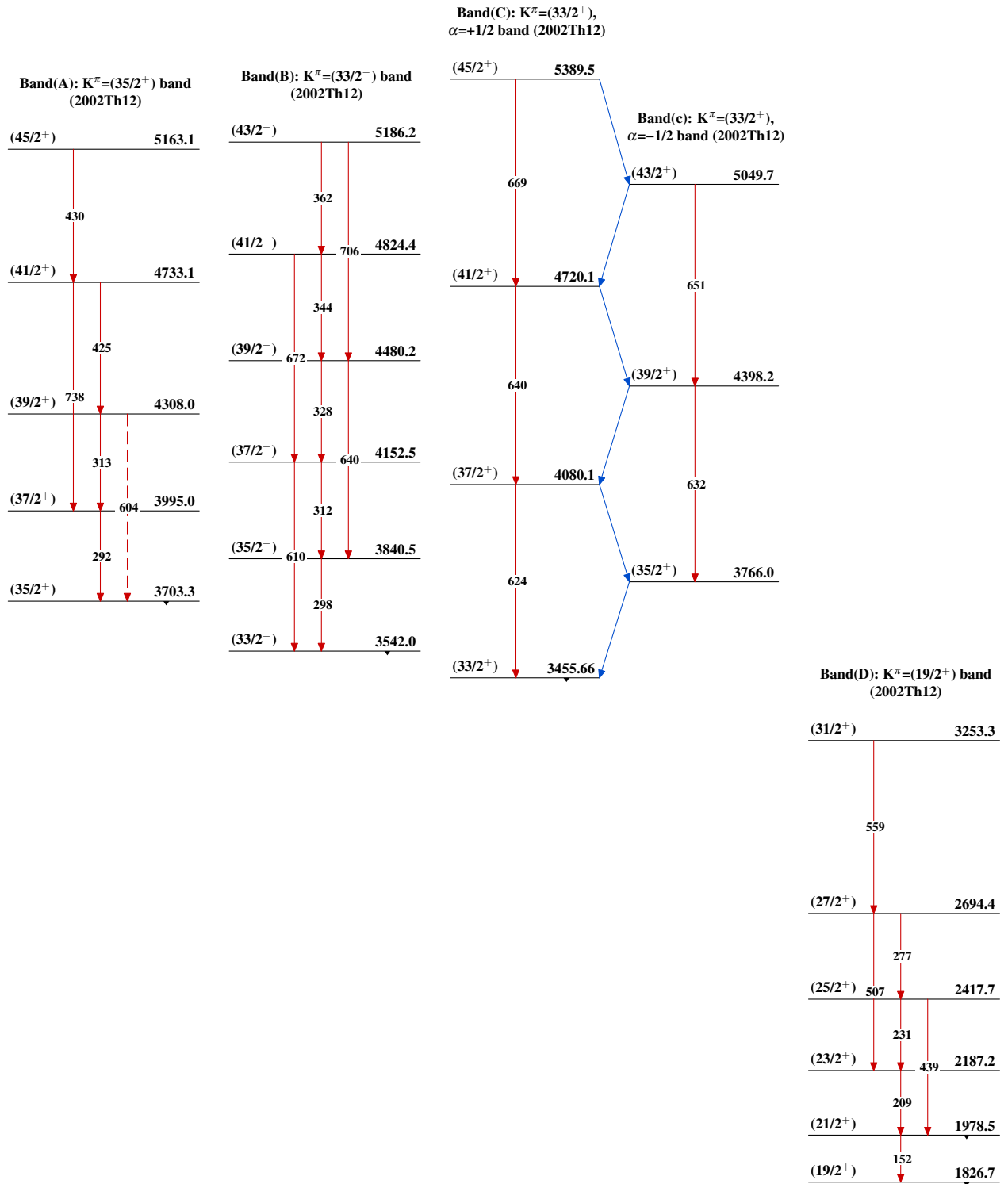
Legend

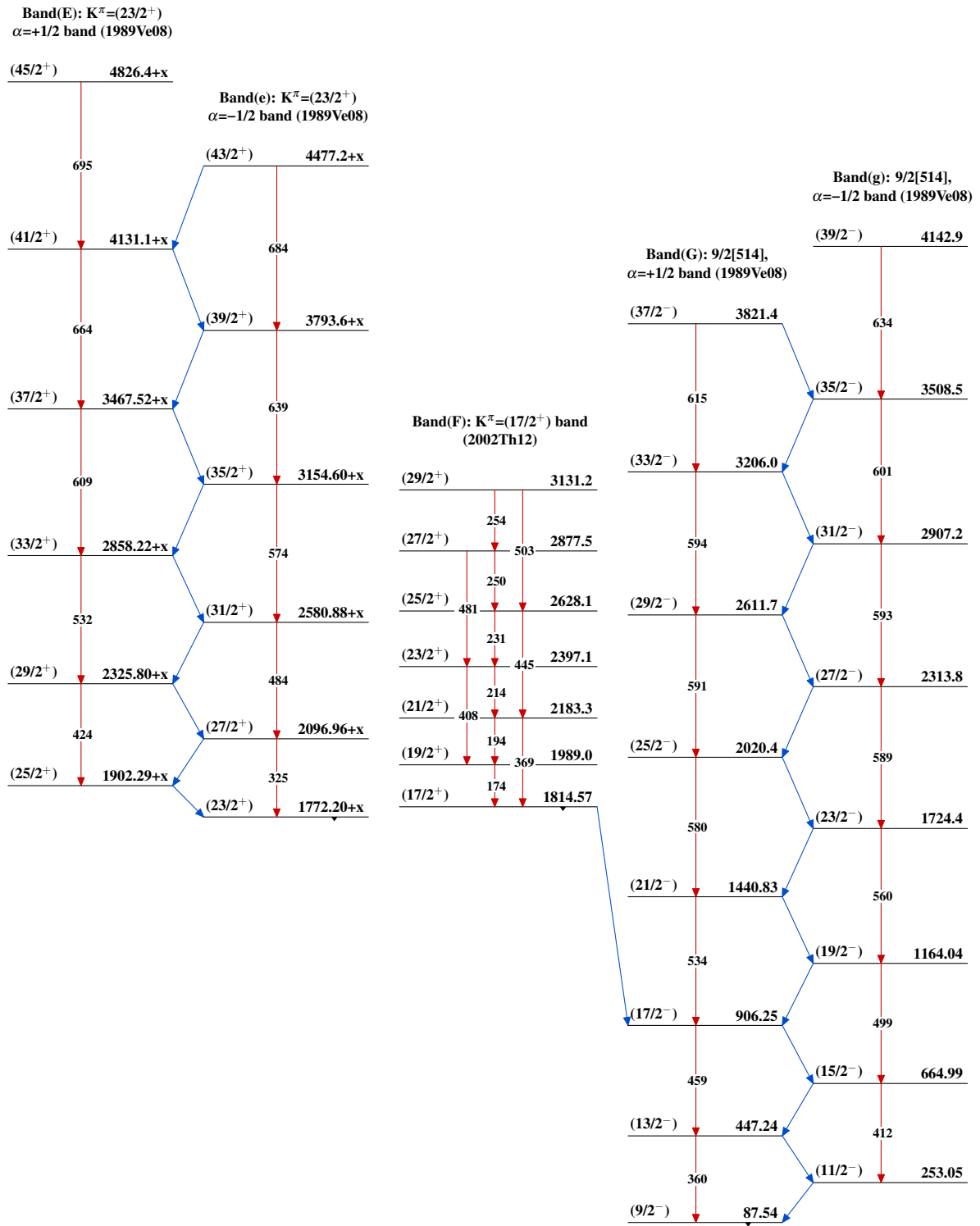
Intensities: Relative photon branching from each level
& Multiply placed: undivided intensity given

-----> γ Decay (Uncertain)



$^{179}_{75}\text{Re}_{104}$

Adopted Levels, Gammas

Adopted Levels, Gammas (continued)

Adopted Levels, Gammas (continued)

Band(H): $K^\pi=(15/2^-)$
band, $\alpha=-1/2$

(27/2⁻) 2382.3

562

(23/2⁻) 1820.05

490

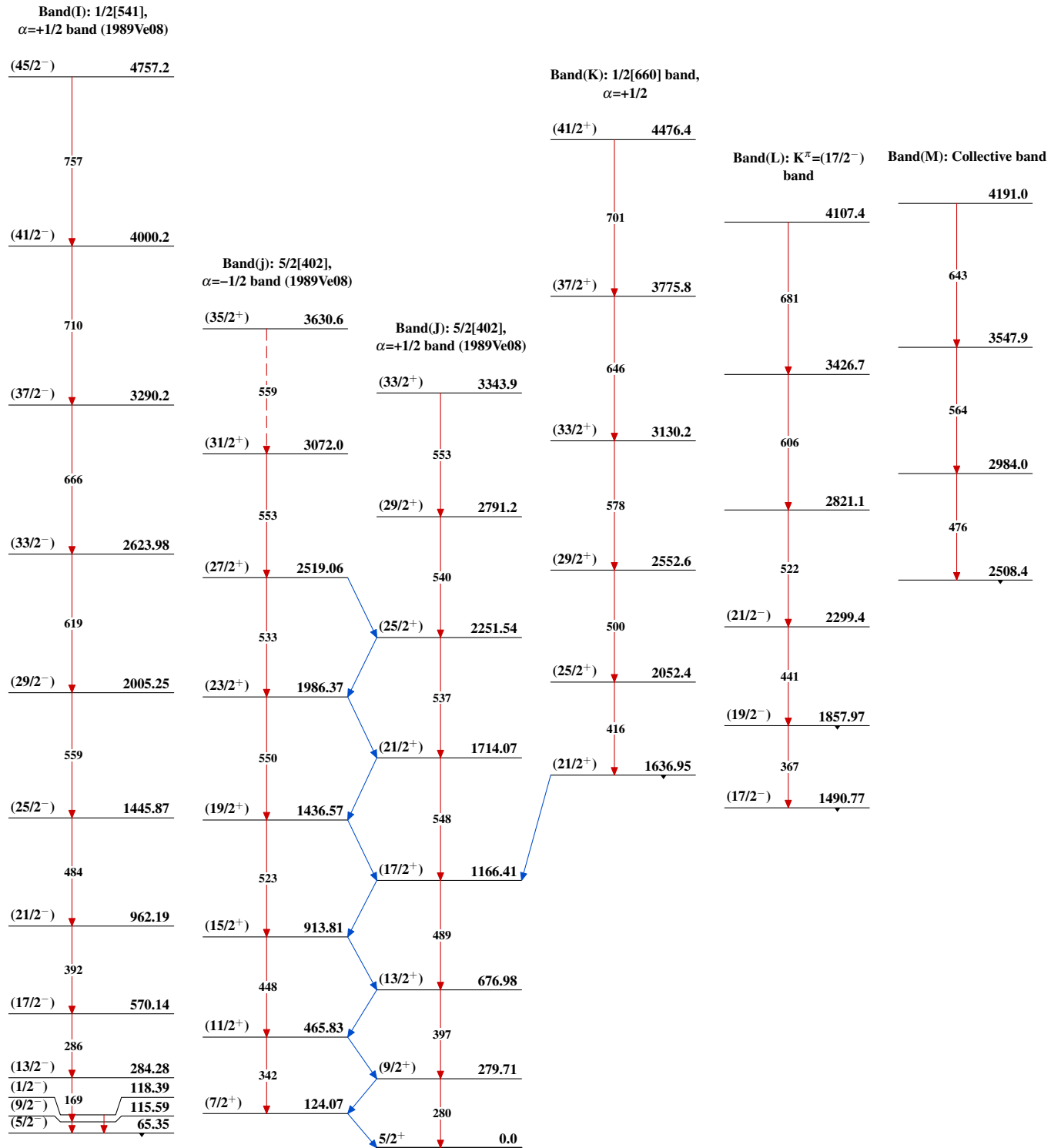
(19/2⁻) 1330.41

403

(15/2⁻) 927.64

$^{179}_{75}\text{Re}_{104}$

Adopted Levels, Gammas (continued)

 $^{179}_{75}\text{Re}_{104}$

Adopted Levels, Gammas (continued)

Band(N): Possible $\pi=-$
side band

2851.8
↓

2411.9
↓

2320.9
↓

1894.7
↓

1858.7
↓

$^{179}_{75}\text{Re}_{104}$