^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 111,275 (2010)	1-Oct-2009

1995De30: E=160 MeV:18 Compton-suppressed Ge detectors and 54 NaI detectors; measured Eγ, Iγ, $\gamma\gamma$ and $\gamma\gamma(\theta)$(DCO).

1986Ma06: E(^{32}S)=155, 160, 165 MeV; >92% ^{156}Gd target; three Ge detectors; measured excit (E=155, 160, 165 MeV), Eγ, Iγ, $\gamma\gamma$ coin (E=160 MeV), DCO ratios.

1973Ru08: E=156 MeV; Ge(Li) detector; measured Eγ, Iγ (5 transitions), $T_{1/2}$ using recoil distance technique.

The level scheme is taken from 1995De30. it is far more extensive than that from prior studies. six levels proposed In 1986Ma06 were not confirmed by 1995De30 so are not adopted. these level energies and deexciting gammas are As follows: 1089 (4^+), Eγ=722 *1*, Iγ=11; 1780? (6^+), Eγ=691 *1*, Iγ= 5; 2355? (8^+), Eγ=575 *1*, Iγ=4; 5087 (20^+), Eγ=707 *1*, Iγ=10 (now placed higher In band); 5848? (22^+), Eγ=761 *1*, Iγ=8; 6657? (24^+), Eγ=809 *1*, Iγ=6.

^{184}Hg Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0.0[d]	0^+		
366.78[d] *9*	2^+	21[@] ps *5*	
534.42[e] *9*	2^+		
653.77[e] *11*	4^+	22.7[@] ps *24*	
993.92[e] *12*	6^+	5.6[@] ps *21*	
1086.56[d] *10*	4^+		
1299.53 *13*	5		J=5 seems unlikely considering that strongest γ branch feeds the 2^+ 534 level; adopted J^π=(3,4^+).
1412.19[e] *12*	8^+	2.0 ps *+8−11*	other $T_{1/2}$: <5.5 ps (1973Ru08).
1413.27[f] *13*	5		
1549.19[d] *12*	6^+		
1653.59 *18*	5		J^π=(5,6^+) In Adopted Levels.
1751.00 *18*	6		J^π=(6^+) In Adopted Levels.
1803.16[f] *13*	7		
1817.14 *12*	6		J^π=(5,6^+) In Adopted Levels.
1847.53[c] *13*	5		
1872.69[&] *17*	7		
1901.41[e] *14*	10^+	0.83 ps *+17−26*	
2007.29[a] *18*	8		
2056.59[d] *16*	8^+		
2063.48[g] *15*	6		
2121.01[c] *12*	7		
2170.89[&] *18*	9		
2256.47[f] *13*	9		
2362.19[a] *19*	10		
2374.59[g] *14*	8		
2450.09[c] *14*	9		
2452.70[e] *16*	12^+	0.47 ps *+11−17*	
2579.09[&] *19*	11		
2612.09[d] *19*	10^+		
2754.18[g] *14*	10		
2767.37[f] *15*	11		
2810.69[a] *20*	12		
2850.36[c] *15*	11		
2966.78[b] *22*	10		

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^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08 (continued)

^{184}Hg Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	$T_{1/2}$[#]	E(level)[†]	J$^{\pi}$[‡]
3056.60[e] *19*	14$^+$	0.32 ps *+10−13*	4564.88[f] *22*	17
3065.99[&] *21*	13		4672.87[g] *24*	18
3184.58[g] *17*	12		4699.75[c] *25*	19
3295.56[c] *17*	13		4862.2[&] *3*	(19)
3329.88[f] *17*	13		4958.26[h] *25*	19
3331.19[a] *21*	14		5064.5[e] *3*	20$^+$
3407.08[b] *22*	12		5070.6[b] *3*	(18)
3619.79[&] *22*	15		5182.8[a] *3*	(20)
3635.17[g] *20*	14		5199.09[f] *24*	19
3702.60[e] *21*	16$^+$	0.25 ps *+8−14*	5262.8[g] *3*	20
3704.86[c] *20*	15		5297.8[c] *3*	21
3795.76[h] *20*	15		5598.3?[h] *11*	(21)
3906.78[b] *22*	14		5699.8[b] *3*	(20)
3908.69[a] *23*	16		5771.5[e] *3*	22$^+$
3935.88[f] *20*	15		5863.2[a] *4*	(22)
4125.47[g] *22*	16		5877.5[f] *4*	(21)
4166.85[c] *22*	17		5881.1[g] *3*	(22)
4228.09[&] *23*	17		5951.9[c] *3*	23
4365.35[h] *23*	17		6515.5[e] *3*	24$^+$
4377.11[e] *24*	18$^+$	0.21 ps *+6−11*	6653.6[c] *4*	(25)
4463.49[b] *24*	(16)		7317.6?[e] *4*	(26$^+$)
4530.19[a] *24*	18			

[†] From least-squares fit to Eγ, assigning 1 keV uncertainty to Eγ data for which the authors gave no uncertainty.

[‡] From 1995De30. authors′ values based on transition multipolarities allowed by measured DCO ratios and deduced band structure.

[#] From 1986Ma06, Doppler shift attenuation measurements, except as noted.

[@] From 1973Ru08, recoil distance technique.

[&] Band(a): (ν $i_{13/2}$)(ν $f_{7/2}$), α=1 band. See comment on signature partner band.

[a] Band(A): (ν $i_{13/2}$)(ν $f_{7/2}$), α=0 band. Probable configuration: K$^{\pi}$=7$^-$, 7/2[633]+7/2[514]. No signature splitting; similar to bands In ^{180}Os and ^{182}Pt. Band crossing At $\hbar\omega\approx$0.27 MeV. assignment supported by observed B(M1)/B(E2) ratios for intraband transitions.

[b] Band(B): band based on J=10, 2967 level.

[c] Band(C): band based on J=5, 1848 level. Becomes yrast for J>19; band crossing At $\hbar\omega\approx$0.32 MeV. possible configuration: (ν 1/2[651]) coupled to (ν 7/2[514]) and/or (ν 1/2[770]) (1995De30). second-strongest band populated In ^{156}Gd(^{32}S,4nγ) At 160 MeV.

[d] Band(D): K$^{\pi}$=0$^+$ g.s. band. Oblate band.

[e] Band(E): K$^{\pi}$=0$^+$ band. Prolate band; properties similar to yrast band In ^{186}Hg. alignment gain of 4$\hbar$ At crossing frequency of 0.34 MeV.

[f] Band(F): band based on J=5, 1413 level. Feeds prolate band; alignment pattern similar to that of yrast band; crossing frequency $\hbar\omega\approx$0.32 MeV. π=+ likely, analogous to similar band In ^{186}Hg. band May arise from collective Q excitation built on excited prolate deformed shape (1995De30).

[g] Band(G): band based on J=6, 2063 level. Feeds prolate band; band crossings At $\hbar\omega\approx$0.23 and 0.30 MeV. Band May arise from collective Q excitation built on excited prolate deformed shape (1995De30).

[h] Band(H): band based on J=15, 3796 level.

^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08 (continued)

γ(^{184}Hg)

E_γ[†]	I(γ+ce)[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	α[b]	Comments
98		1751.00	6	1653.59	5			
119.4 3	1.1 2	653.77	4+	534.42	2+			DCO=1.1 5.
122	6 1	1872.69	7	1751.00	6			
134.6 1	5.1 3	2007.29	8	1872.69	7	D+Q		DCO=0.78 18.
137.0 1	1.4 2	1549.19	6+	1412.19	8+			
163.6 1	2.4 2	2170.89	9	2007.29	8			
167.6 2	2.5 7	534.42	2+	366.78	2+			DCO=1.3 5.
191.3 1	3.2 2	2362.19	10	2170.89	9	D		DCO=0.65 17.
212.8 3	1.3 4	1299.53	5	1086.56	4+	D		DCO=0.73 14.
216.9 1	1.5 2	2579.09	11	2362.19	10			
219.1 1	3.3 1	1872.69	7	1653.59	5			DCO=0.84 16.
231.6 1	0.9 1	2810.69	12	2579.09	11	D+Q		DCO=0.74 25.
255.3 1	0.6 2	3065.99	13	2810.69	12			
256.3 1	0.7 1	2007.29	8	1751.00	6			
265.2 2	0.3 1	3331.19	14	3065.99	13	D		DCO=0.64 10.
273.5 1	4.9 1	2121.01	7	1847.53	5	Q		DCO=0.96 5.
287.0 1	83.3 2	653.77	4+	366.78	2+	E2[a]	0.1216	DCO=1.02 1.
288.6 2	0.2 1	3619.79	15	3331.19	14			
288.9 2	0.2 2	3908.69	16	3619.79	15			
298.2 1	1.7 1	2170.89	9	1872.69	7			DCO=0.88 15.
302.1 2		4530.19	18	4228.09	17			
303.9 1	3.2 1	2121.01	7	1817.14	6	D+Q		DCO=0.77 5.
305.1 6	1.6 1	3635.17	14	3329.88	13	D		DCO=0.58 11.
311.1 1	1.0 1	2374.59	8	2063.48	6	Q		DCO=1.17 13.
319.4 2	0.2 2	4228.09	17	3908.69	16			DCO=0.94 5.
329.1 1	11.5 2	2450.09	9	2121.01	7	Q		DCO=0.94 5.
340.1 1	72.1 1	993.92	6+	653.77	4+	E2[a]	0.0740	DCO=0.97 1.
354.9 1	2.2 1	2362.19	10	2007.29	8			DCO=0.87 15.
355.0 3	1.1 1	2256.47	9	1901.41	10+			
366.8 1	100.0	366.78	2+	0.0	0+	E2[a]		DCO=1.00 1.
379.6 1	4.0 1	2754.18	10	2374.59	8	Q		DCO=1.05 7.
389.9 1	3.1 1	1803.16	7	1413.27	5	Q		DCO=1.05 10.
391.0 2	0.5 1	1803.16	7	1412.19	8+			
397.7 3	0.4 1	2850.36	11	2452.70	12+			
400.3 1	14.5 2	2850.36	11	2450.09	9	Q		DCO=1.10 4.
408.2 1	3.5 4	2579.09	11	2170.89	9	Q		DCO=1.09 15.
409.3 1	8.6 2	3704.86	15	3295.56	13	(Q)		DCO=0.91 4.
417.2	1.6 1	3184.58	12	2767.37	11	D		DCO=0.51 9.
418.3 1	64.0 5	1412.19	8+	993.92	6+	E2[a]	0.0421	DCO=0.99 1.
430.4 1	4.3 1	3184.58	12	2754.18	10			DCO=0.89 6.
440.3 1	1.2 1	3407.08	12	2966.78	10			DCO=0.83 13.
445.2 1	11.1 2	3295.56	13	2850.36	11	Q		DCO=1.08 4.
448.5 1	2.5 2	2810.69	12	2362.19	10	Q		DCO=0.91 12.
450.6 1	4.3 1	3635.17	14	3184.58	12	Q		DCO=1.08 8.
451.5 2	0.7 2	1751.00	6	1299.53	5			
453.3 1	4.2 1	2256.47	9	1803.16	7	Q		DCO=0.93 13.
462.0 1	6.5 4	4166.85	17	3704.86	15	Q		DCO=1.08 7.
462.6 1	2.1[@] 5	1549.19	6+	1086.56	4+	Q		DCO=0.98 14.
486.9 1	1.1 2	3065.99	13	2579.09	11			DCO=0.85 13.
489.2 1	46.0 4	1901.41	10+	1412.19	8+	E2[a]	0.0283	DCO=0.95 2.
490.3 1	3.2 4	4125.47	16	3635.17	14	Q		DCO=1.12 11.
497.7 1	2.2 1	2754.18	10	2256.47	9	D		DCO=0.54 14.
499.7 1	0.9 1	3906.78	14	3407.08	12			DCO=0.89 7.
500.2 1	2.5 1	3795.76	15	3295.56	13	Q		DCO=0.95 13.
507.4 1	2.2 6	2056.59	8+	1549.19	6+	Q		DCO=0.99 9.
510.9 1	6.2 1	2767.37	11	2256.47	9	Q		DCO=1.09 8.

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^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08 (continued)

γ(^{184}Hg) (continued)

Eγ[†]	I(γ+ce)[‡]	Ei(level)	J^π_i	Ef	J^π_f	Mult.[#]	α[b]	Comments
516.7 *3*	3.5[@] *3*	2966.78	10	2450.09	9			
517.7 *3*	1.0[@] *4*	1817.14	6	1299.53	5			DCO=1.1 *3*.
520.5 *1*	1.4 *5*	3331.19	14	2810.69	12	Q		DCO=0.98 *11*.
532.9 *1*	4.1 *3*	4699.75	19	4166.85	17	Q		DCO=1.03 *8*.
534.4 *1*	7 *2*	534.42	2+	0.0	0+	Q		DCO=0.94 *14*.
547.4 *1*	2.9 *5*	4672.87	18	4125.47	16	(Q)		DCO=1.19 *15*.
548.0 *1*	3.9[@] *6*	1847.53	5	1299.53	5	[&]		DCO=1.08 *10*.
548.8 *2*	4.3[@] *2*	2450.09	9	1901.41	10+			
551.3 *1*	31.0 *4*	2452.70	12+	1901.41	10+	E2[a]	0.0214	DCO=0.99 *2*.
552.1 *1*	4.9 *5*	1086.56	4+	534.42	2+			DCO=1.19 *12*.
553.8 *1*	0.8 *3*	3619.79	15	3065.99	13	Q		DCO=1.13 *17*.
555.3 *3*	5[@] *2*	1549.19	6+	993.92	6+			
555.5 *1*		2612.09	10+	2056.59	8+			
556.7 *3*	1.8[@] *4*	3407.08	12	2850.36	11			
556.7 *1*	1.1[@] *3*	4463.49	(16)	3906.78	14			
562.5 *1*	2.8 *1*	3329.88	13	2767.37	11	Q		DCO=0.91 *9*.
569.6 *1*	2.2 *2*	4365.35	17	3795.76	15			DCO=0.88 *15*.
571.4 *1*	2.0 *2*	2374.59	8	1803.16	7	D+Q		DCO=0.81 *11*.
571.8 *1*	4.5 *3*	2121.01	7	1549.19	6+	D(+Q)		DCO=0.72 *17*.
577.5 *1*	0.7 *4*	3908.69	16	3331.19	14	Q		DCO=0.98 *13*.
589.9 *1*	2.5 *4*	5262.8	20	4672.87	18	Q		DCO=1.05 *13*.
592.9 *1*	1.4 *1*	4958.26	19	4365.35	17	Q		DCO=0.98 *13*.
598.0 *1*	2.6 *2*	5297.8	21	4699.75	19	Q		DCO=1.02 *12*.
603.9 *1*	23.5 *4*	3056.60	14+	2452.70	12+	E2[a]	0.01729	DCO=1.11 *5*.
606.0 *1*	2.9 *2*	3935.88	15	3329.88	13	Q		DCO=1.15 *16*.
607.1 *1*	1.2 *1*	5070.6	(18)	4463.49	(16)	(Q)		DCO=0.95 *15*.
608.3 *1*	0.6 *6*	4228.09	17	3619.79	15			DCO=0.8 *3*.
611.2 *2*	1.6 *1*	3906.78	14	3295.56	13			DCO=0.82 *24*.
618.3 *1*	1.3 *2*	5881.1	(22)	5262.8	20			
621.5 *1*	0.8 *8*	4530.19	18	3908.69	16			
629.0 *1*	1.2 *1*	4564.88	17	3935.88	15	(Q)		DCO=1.05 *23*.
629.2 *1*	0.7 *2*	5699.8	(20)	5070.6	(18)			DCO=0.89 *21*.
634.1 *2*		4862.2	(19)	4228.09	17			
634.2 *1*	0.8 *2*	5199.09	19	4564.88	17			DCO=0.66 *13*; much too low for ΔJ=2 implied by level scheme.
640[c]		5598.3?	(21)	4958.26	19			
645.8 *1*	1.7 *6*	1299.53	5	653.77	4+			
646.0 *1*	11.5 *2*	3702.60	16+	3056.60	14+	E2[a]	0.01487	DCO=0.98 *6*.
650.2 *1*	1.4 *1*	2063.48	6	1413.27	5	D		DCO=0.72 *9*.
652.6 *1*		5182.8	(20)	4530.19	18			
654.1 *1*	1.7 *1*	5951.9	23	5297.8	21			DCO=0.70 *13*; low for ΔJ=2 placement from 1995De30.
659.7 *2*	1.1 *2*	1653.59	5	993.92	6+			
674.5 *1*	5.4 *2*	4377.11	18+	3702.60	16+	E2[a]	0.01354	DCO=1.03 *5*.
678.4 *2*	0.3 *1*	5877.5	(21)	5199.09	19			
680.4 *2*		5863.2	(22)	5182.8	(20)			
687.4 *1*	2.6 *1*	5064.5	20+	4377.11	18+	Q		DCO=1.02 *7*.
701.7 *2*	0.6 *1*	6653.6	(25)	5951.9	23			
707.0 *1*	1.2 *1*	5771.5	22+	5064.5	20+			DCO=0.89 *19*.
708.8 *1*	3.7 *2*	2121.01	7	1412.19	8+	D		DCO=0.82 *6*.
719.8 *1*	3.3 *3*	1086.56	4+	366.78	2+	Q		DCO=1.09 *14*.
730.6 *1*	1.6 *7*	1817.14	6	1086.56	4+			DCO=0.76 *11*; low for ΔJ=2 character of transition implied by level scheme from 1995De30.
744.0 *1*	0.7 *1*	6515.5	24+	5771.5	22+	Q		DCO=1.02 *21*.

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^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08 (continued)

γ(^{184}Hg) (continued)

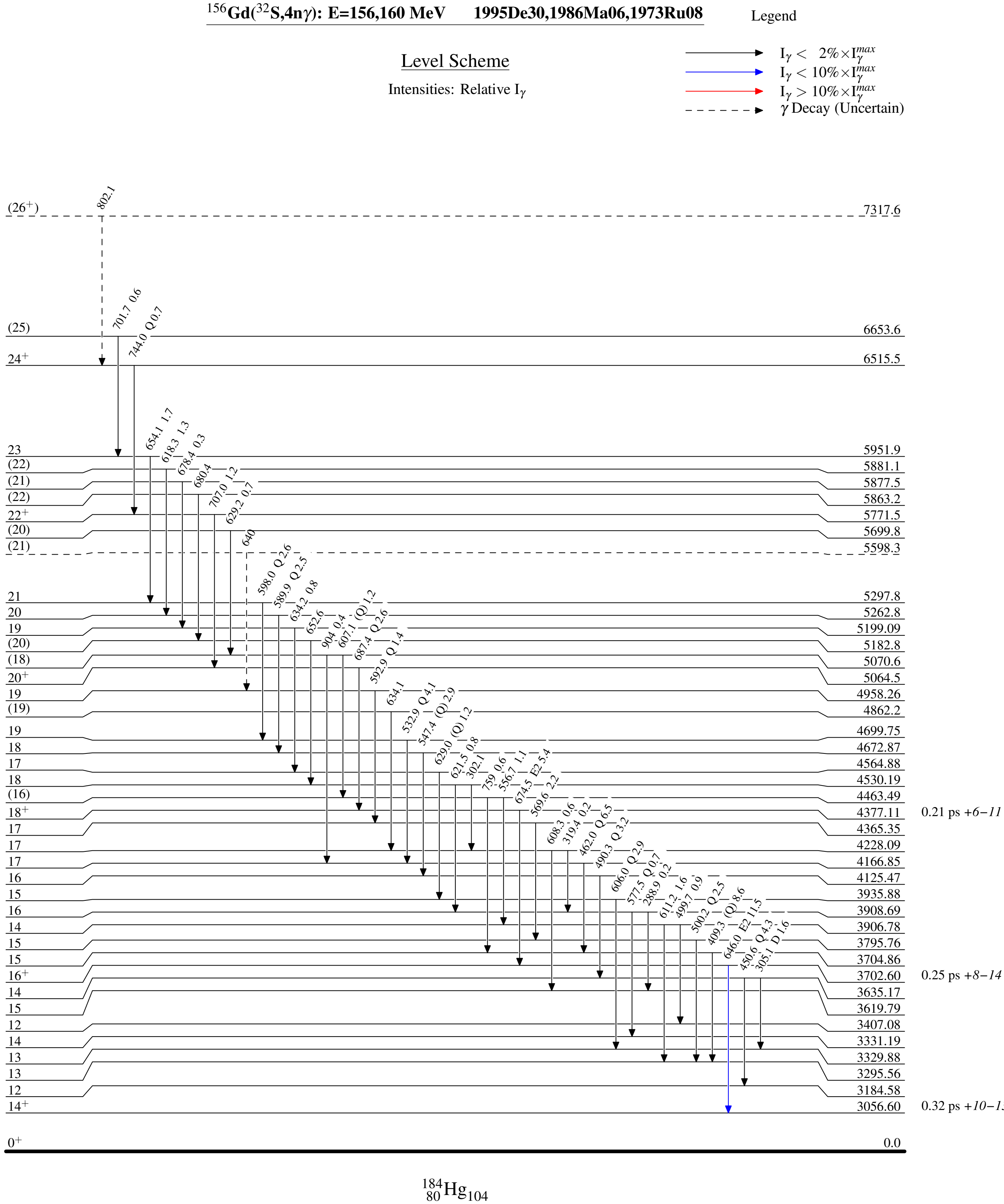
E_γ[†]	I(γ+ce)[‡]	E_i(level)	J^π_i	E_f	J^π_f	Mult.[#]	Comments
757	0.4 *2*	1751.00	6	993.92	6$^+$		
759	0.6 *1*	4463.49	(16)	3704.86	15		
759.5 *1*	5.6 *1*	1413.27	5	653.77	4$^+$	D	DCO=0.72 *7*.
765.2	3 *1*	1299.53	5	534.42	2$^+$		
802.1[c] *2*		7317.6?	(26$^+$)	6515.5	24$^+$		
809.2 *1*	4.4 *2*	1803.16	7	993.92	6$^+$	D	DCO=0.61 *8*.
844.3 *1*	3.2 *2*	2256.47	9	1412.19	8$^+$	D	DCO=0.75 *12*.
852.8 *2*	1.4 *2*	2754.18	10	1901.41	10$^+$		DCO=1.2 *3*.
865.9 *2*	1.0 *1*	2767.37	11	1901.41	10$^+$		
877.2 *2*	1.0 *1*	3329.88	13	2452.70	12$^+$		
878.7 *2*	1.4 *4*	1872.69	7	993.92	6$^+$		DCO=0.83 *20*.
904	0.4 *1*	5070.6	(18)	4166.85	17		
948.9 *1*	1.3 *3*	2850.36	11	1901.41	10$^+$	D	DCO=0.61 *16*.
962.5 *2*	1.1 *1*	2374.59	8	1412.19	8$^+$		DCO=0.92 *25*.
1000	0.5 *1*	1653.59	5	653.77	4$^+$		
1037.9 *2*	2.3 *2*	2450.09	9	1412.19	8$^+$	D	DCO=0.69 *19*.
1126 *1*	0.3 *1*	2121.01	7	993.92	6$^+$		
1193.8 *2*	1.5 *2*	1847.53	5	653.77	4$^+$	D	DCO=0.56 *9*.

† From gated coincidence spectra from 1995De30.
‡ Mostly obtained from gated coincidence spectra and normalized so I(366.8γ)=100.0.
# Based on DCO measurements; θ=0° (or 180°) and 90° and expected values are 0.7 for stretched D and 1.0 for stretched Q (or D, ΔJ=0).
@ Complex line; intensity estimated from coincidence spectra.
& Interpreted by authors As D, ΔJ=0 transition.
a Stretched Q from DCO ratio (1995De30 and/or 1986Ma06); not M2 from RUL.
b 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.
c Placement of transition in the level scheme is uncertain.

^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08

Level Scheme

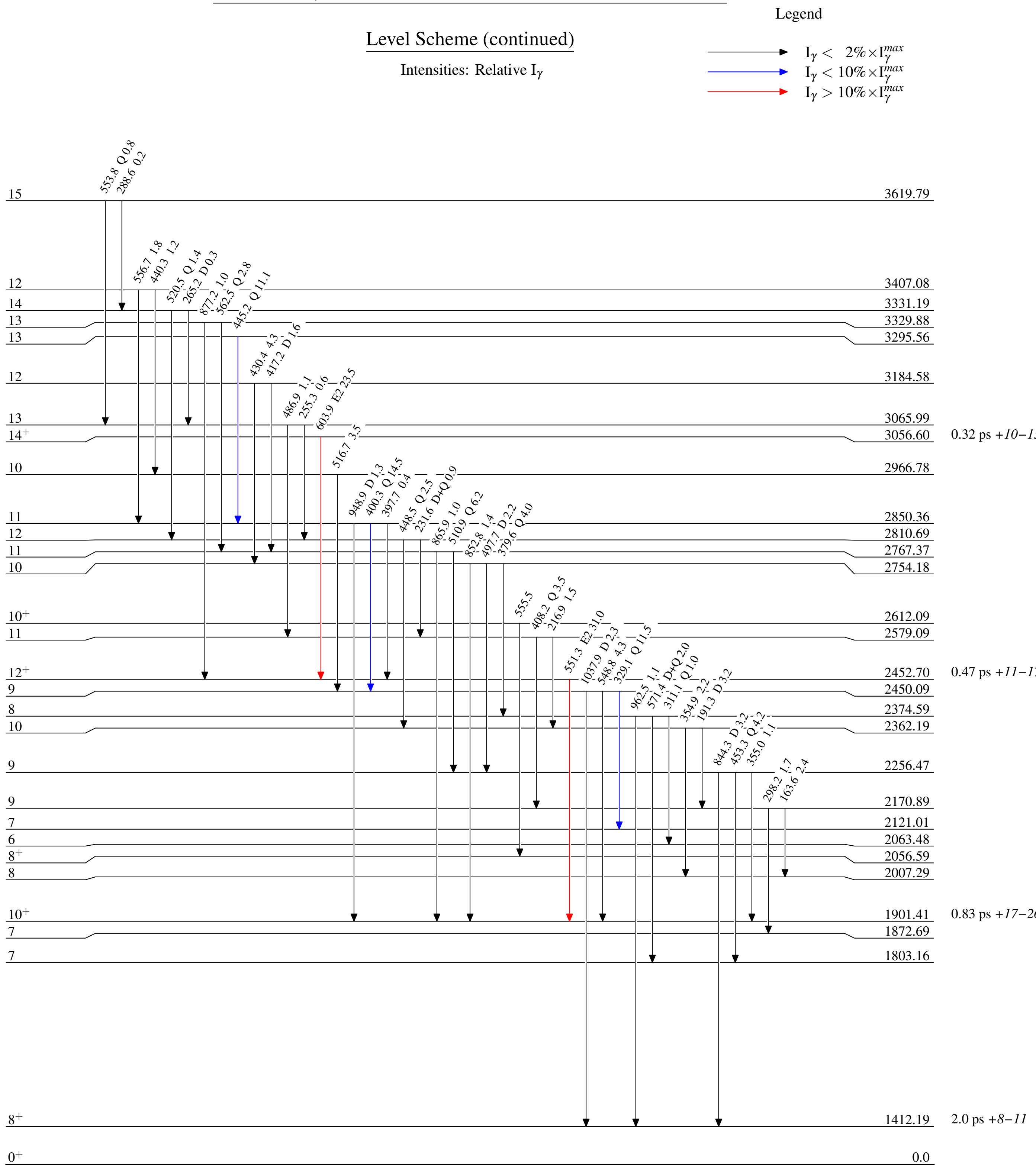
Intensities: Relative I_γ



^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08

Level Scheme (continued)

Intensities: Relative I_γ

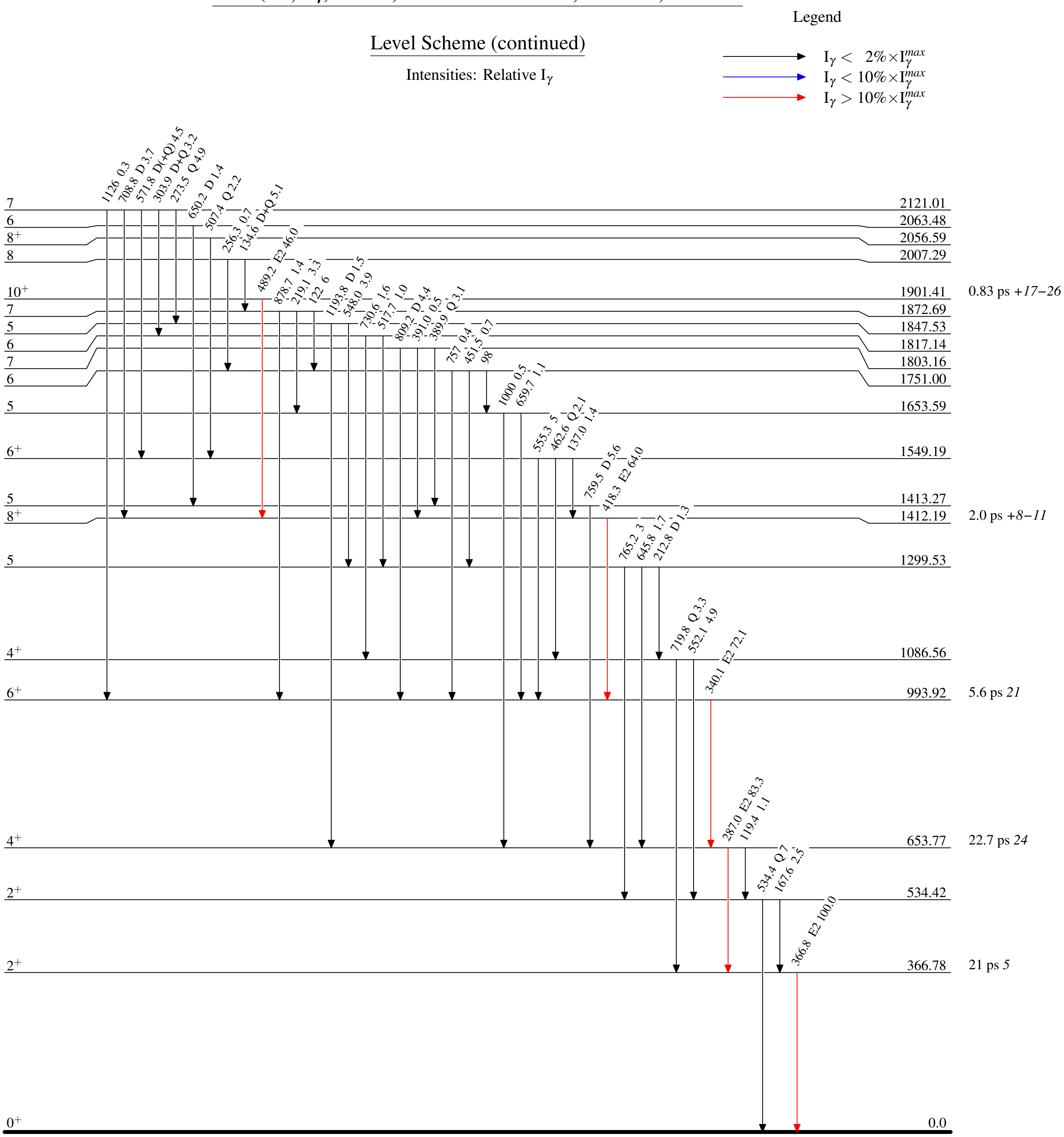


$^{184}_{80}Hg_{104}$

$^{156}Gd(^{32}S,4n\gamma)$: E=156,160 MeV 1995De30,1986Ma06,1973Ru08

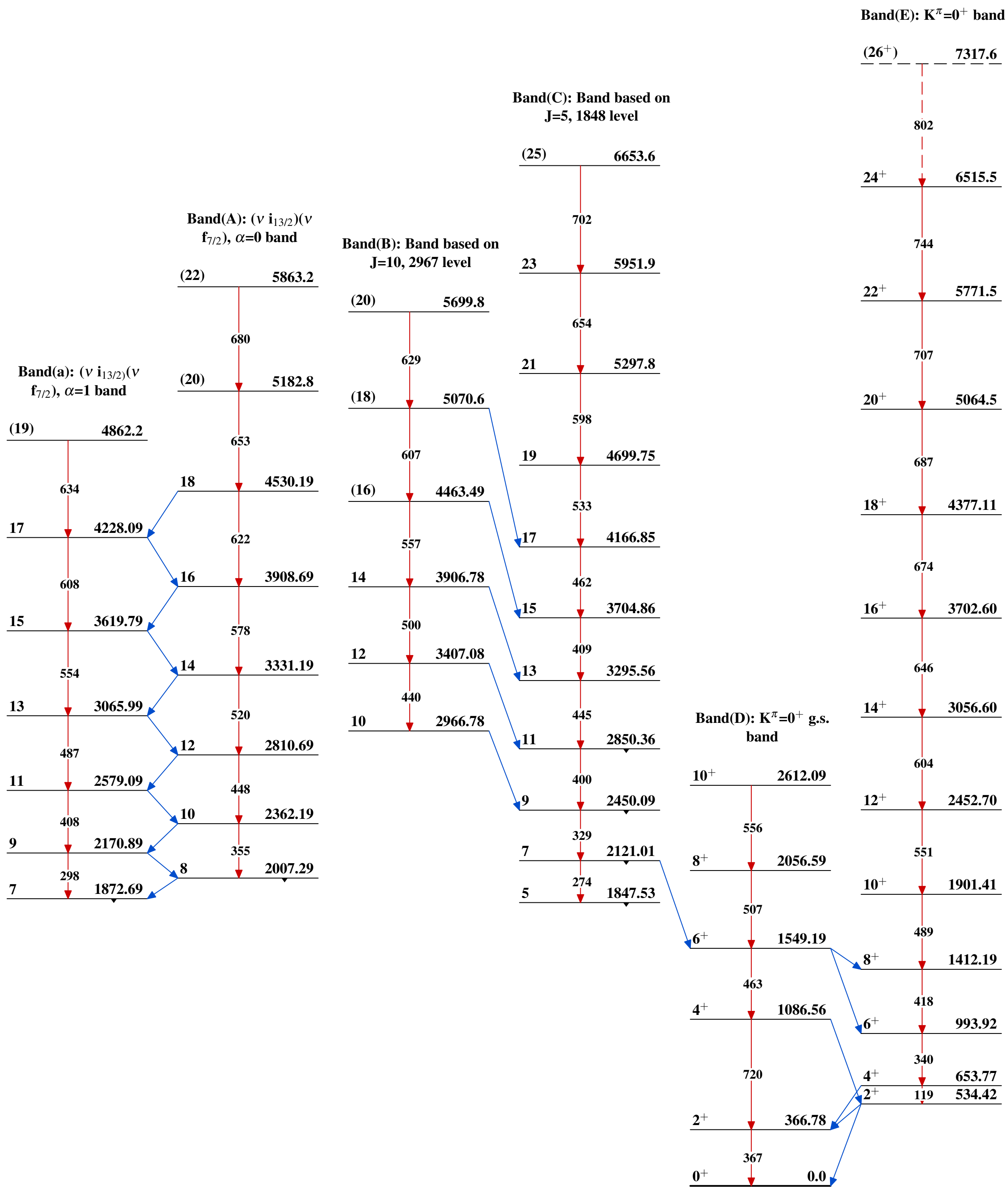
Level Scheme (continued)

Intensities: Relative I_γ



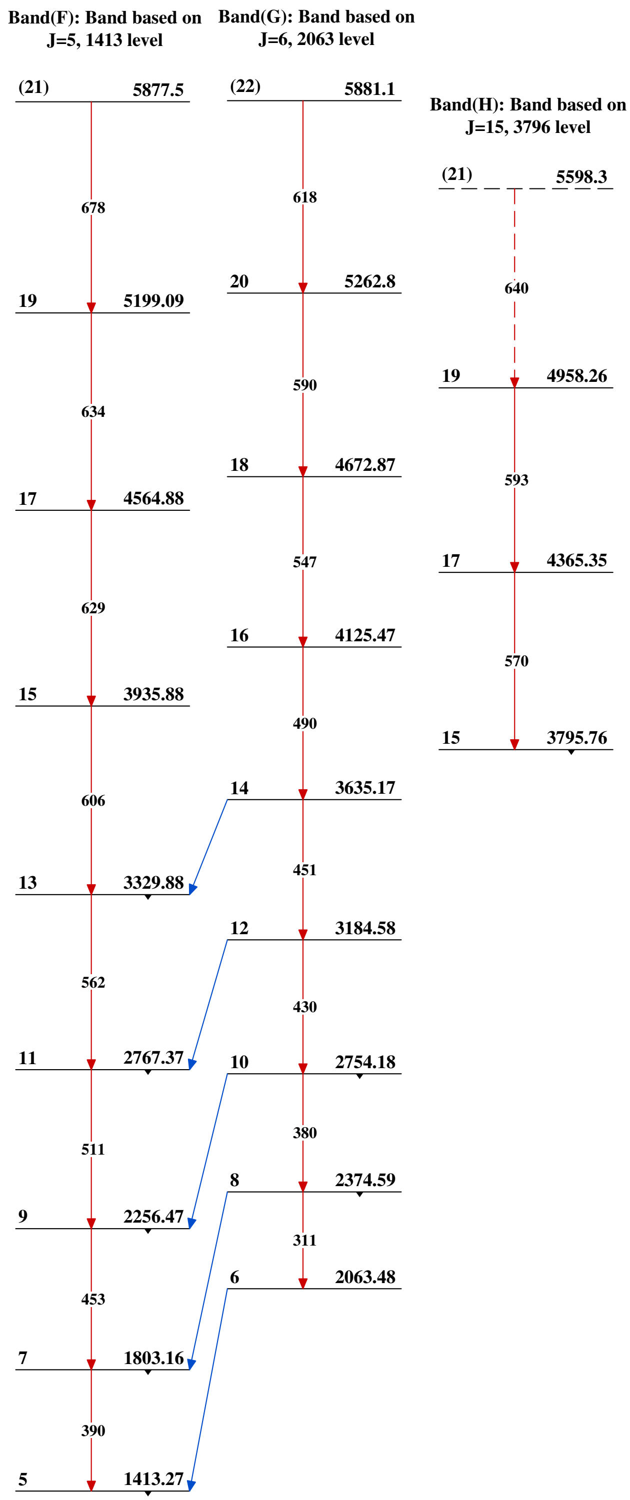
$^{184}_{80}Hg_{104}$

$^{156}Gd(^{32}S,4n\gamma)$: E=156,160 MeV 1995De30,1986Ma06,1973Ru08



$^{184}_{80}Hg_{104}$

^{156}Gd(^{32}S,4nγ): E=156,160 MeV 1995De30,1986Ma06,1973Ru08 (continued)



$^{184}_{80}Hg_{104}$