^{98}Mo(^{37}Cl,4nγ) 1994Ga31

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Yu. Khazov, I. Mitropolsky, A. Rodionov	NDS 107, 2715 (2006)	17-Jul-2006

1994Ga31: ^{98}Mo(^{37}Cl,4nγ), E=155 MeV; measured γ(θ), γγ, DCO and DSAM analysis. TASCC facility: 12 HPGe Compton suppressed detectors and 71 BGO crystals.
1987Go26: ^{98}Mo(^{37}Cl,4nγ), E=145 MeV; measured γγ. TESSA2 facility: 6 HPGe Compton suppressed detectors and 50 element BGO ball.
1998Ko34,2000Ri20: ^{105}Pd(^{35}Cl,2α1nγ), E=173 MeV; measured Q_0 values by DSAM for πh$_{11/2}$ and HD bands.

^{131}Pr Levels

The level scheme is that of 1994Ga31 and based on γγ coincidence measurements.

E(level)	Jπ†	T$_{1/2}$‡	E(level)	Jπ†	E(level)	Jπ†
0[@]	(3/2$^+$)	1.51 min *2*	2315.2[c] *7*	(21/2$^+$)	4186.1[@] *7*	(35/2$^+$)
87.1[&] *4*	(5/2$^+$)		2327.8[@] *5*	(23/2$^+$)	4305.2[c] *8*	(33/2$^+$)
151.8[#] *4*	(11/2$^-$)	5.73 s *20*	2360.7[a] *9*	(19/2$^+$)	4598.3[&] *9*	(37/2$^+$)
250.9[@] *4*	(7/2$^+$)		2456.7[b] *8*	(21/2$^+$)	4606.0[a] *9*	(35/2$^+$)
408.2[#] *4*	(15/2$^-$)		2541.3[&] *6*	(25/2$^+$)	4682.2[d] *9*	(35/2$^+$)
447.8[&] *4*	(9/2$^+$)		2600.2[d] *7*	(23/2$^+$)	4753.8[#] *6*	(39/2$^-$)
449.9 *4*	(7/2$^+$)		2608.8[a] *7*	(23/2$^+$)	5053.6[b] *9*	(37/2$^+$)
679.1[@] *5*	(11/2$^+$)		2796.7[@] *6*	(27/2$^+$)	5090.5[@] *7*	(39/2$^+$)
875.2[#] *5*	(19/2$^-$)		2820.6[b] *8*	(25/2$^+$)	5503.2[d] *10*	(39/2$^+$)
976.5[c] *4*	(9/2$^+$)		2902.2[c] *7*	(25/2$^+$)	5550.3[&] *10*	(41/2$^+$)
979.5[&] *5*	(13/2$^+$)		3050.0[#] *6*	(31/2$^-$)	5704.3[#] *7*	(43/2$^-$)
1157.4[d] *5*	(11/2$^+$)		3082.3[&] *7*	(29/2$^+$)	6106.9[@] *8*	(43/2$^+$)
1240.2[@] *5*	(15/2$^+$)		3094.9[a] *8*	(27/2$^+$)	6395.2[d] *11*	(43/2$^+$)
1354.6[c] *5*	(13/2$^+$)		3224.2[d] *7*	(27/2$^+$)	6604.3[&] *11*	(45/2$^+$)
1501.4[#] *5*	(23/2$^-$)		3415.2[@] *6*	(31/2$^+$)	6745.8[#] *8*	(47/2$^-$)
1568.2[d] *6*	(15/2$^+$)		3417.2[b] *8*	(29/2$^+$)	7213.9[@] *9*	(47/2$^+$)
1616.9[&] *5*	(17/2$^+$)		3567.2[c] *8*	(29/2$^+$)	7743.3[&] *12*	(49/2$^+$)
1799.3[c] *6*	(17/2$^+$)		3769.3[&] *8*	(33/2$^+$)	7867.8[#] *9*	(51/2$^-$)
1950.0[@] *5*	(19/2$^+$)		3782.1[a] *8*	(31/2$^+$)	9015.8[#] *10*	(55/2$^-$)
2048.3[d] *6*	(19/2$^+$)		3882.1[#] *6*	(35/2$^-$)	10188.8[#] *10*	(59/2$^-$)
2118.1[&] *5*	(21/2$^+$)		3917.2[d] *8*	(31/2$^+$)	11428.8[#] *11*	(61/2$^-$)
2242.9[#] *5*	(27/2$^-$)		4179.2[b] *8*	(33/2$^+$)	12755.8[#] *12*	(65/2$^-$)

† J^π value were assigned on the basis of γ mult. and possible band structures.
‡ From Adopted Levels.
[#] Band(A): band, configuration=(πh$_{11/2}$, α=−1/2); Q_0=3.9 *3* eb, β_2=0.23 *2* (1994Ga31); Q_0=3.3 *2* eb, β_2=0.19 *1* (1998Ko34).
[@] Band(B): band based on (3/2$^+$), α=−1/2.
[&] Band(C): band based on (3/2$^+$), α=+1/2.
[a] Band(D): band based on (19/2$^+$), α=−1/2.
[b] Band(E): band based on (19/2$^+$), α=+1/2.
[c] Band(F): Highly-deformed band-1 based on (9/2$^+$); Q_0=5.5 *8* eb, β_2=0.32 *5* (1994Ga31); Q_0=5.3 *4* eb, β_2=0.31 *2* (1998Ko34).
[d] Band(G): Highly-deformed band-2 based on (9/2$^+$); Q_0=5.5 *8* eb, β_2=0.32 *5* (1994Ga31); Q_0=5.3 *4* eb, β_2=0.31 *2* (1998Ko34).

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$\gamma(^{131}Pr)$

E_γ[†‡]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
64.8 *3*		151.8	(11/2$^-$)	87.1	(5/2$^+$)	E3	E_γ,Mult.: from ^{131}Pr(IT) decay (1996Ge12).
87		87.1	(5/2$^+$)	0	(3/2$^+$)	M1	E_γ,Mult.: from ^{131}Nd(ε) and ^{131}Pr(IT) decays (1996Ge12).
96		2456.7	(21/2$^+$)	2360.7	(19/2$^+$)		
152		2608.8	(23/2$^+$)	2456.7	(21/2$^+$)		
164		250.9	(7/2$^+$)	87.1	(5/2$^+$)		
181		1157.4	(11/2$^+$)	976.5	(9/2$^+$)	D+Q	
197.0		447.8	(9/2$^+$)	250.9	(7/2$^+$)		
197		1354.6	(13/2$^+$)	1157.4	(11/2$^+$)	D+Q	
212		2820.6	(25/2$^+$)	2608.8	(23/2$^+$)		
213		1568.2	(15/2$^+$)	1354.6	(13/2$^+$)	D+Q	
231		679.1	(11/2$^+$)	447.8	(9/2$^+$)		
231		1799.3	(17/2$^+$)	1568.2	(15/2$^+$)	D+Q	
249		2048.3	(19/2$^+$)	1799.3	(17/2$^+$)	D+Q	
256.4 *1*	100[‡]	408.2	(15/2$^-$)	151.8	(11/2$^-$)		
261		1240.2	(15/2$^+$)	979.5	(13/2$^+$)		
267		2315.2	(21/2$^+$)	2048.3	(19/2$^+$)	D+Q	
274		3094.9	(27/2$^+$)	2820.6	(25/2$^+$)		
285		2600.2	(23/2$^+$)	2315.2	(21/2$^+$)	D+Q	
294		2608.8	(23/2$^+$)	2315.2	(21/2$^+$)	E2+M1[@]	
300		979.5	(13/2$^+$)	679.1	(11/2$^+$)		
302		2902.2	(25/2$^+$)	2600.2	(23/2$^+$)	D+Q	
322		3224.2	(27/2$^+$)	2902.2	(25/2$^+$)	D+Q	
322		3417.2	(29/2$^+$)	3094.9	(27/2$^+$)		
343		3567.2	(29/2$^+$)	3224.2	(27/2$^+$)	D+Q	
350		3917.2	(31/2$^+$)	3567.2	(29/2$^+$)	D+Q	
361		447.8	(9/2$^+$)	87.1	(5/2$^+$)	(E2)	
362		449.9	(7/2$^+$)	87.1	(5/2$^+$)		
364		2820.6	(25/2$^+$)	2456.7	(21/2$^+$)	(E2)	
365		3782.1	(31/2$^+$)	3417.2	(29/2$^+$)		
377		1616.9	(17/2$^+$)	1240.2	(15/2$^+$)		
377.7 *2*	4.6 *2*	2327.8	(23/2$^+$)	1950.0	(19/2$^+$)	(E2)	
378		1354.6	(13/2$^+$)	976.5	(9/2$^+$)	(E2)	
388		4305.2	(33/2$^+$)	3917.2	(31/2$^+$)	D+Q	
397		4179.2	(33/2$^+$)	3782.1	(31/2$^+$)		
411		1568.2	(15/2$^+$)	1157.4	(11/2$^+$)	(E2)	
423		2541.3	(25/2$^+$)	2118.1	(21/2$^+$)	(E2)	
427		4606.0	(35/2$^+$)	4179.2	(33/2$^+$)		
428		679.1	(11/2$^+$)	250.9	(7/2$^+$)	(E2)	
445		1799.3	(17/2$^+$)	1354.6	(13/2$^+$)	(E2)	
448		5053.6	(37/2$^+$)	4606.0	(35/2$^+$)		
450		449.9	(7/2$^+$)	0	(3/2$^+$)	(E2)	DCO=0.91 *15* (1994Ga31).
467.0 *2*	73.4 *2*	875.2	(19/2$^-$)	408.2	(15/2$^-$)	(E2)	
468.9 *3*		2796.7	(27/2$^+$)	2327.8	(23/2$^+$)	(E2)	
480		2048.3	(19/2$^+$)	1568.2	(15/2$^+$)	(E2)	
486		3094.9	(27/2$^+$)	2608.8	(23/2$^+$)	(E2)	
501		2118.1	(21/2$^+$)	1616.9	(17/2$^+$)	(E2)	
516		2315.2	(21/2$^+$)	1799.3	(17/2$^+$)	(E2)	
526		976.5	(9/2$^+$)	449.9	(7/2$^+$)	D+Q	DCO=0.49 *9*, $\delta\leq 0$ (1994Ga31).
529		976.5	(9/2$^+$)	447.8	(9/2$^+$)	D+Q	
532		979.5	(13/2$^+$)	447.8	(9/2$^+$)	(E2)	
541		3082.3	(29/2$^+$)	2541.3	(25/2$^+$)	(E2)	
552		2600.2	(23/2$^+$)	2048.3	(19/2$^+$)	(E2)	
560		2608.8	(23/2$^+$)	2048.3	(19/2$^+$)	(E2)	
561.0		1240.2	(15/2$^+$)	679.1	(11/2$^+$)	(E2)	

Continued on next page (footnotes at end of table)

^{98}Mo(^{37}Cl,4nγ) 1994Ga31 (continued)

$\gamma(^{131}Pr)$ (continued)

E_γ[†‡]	I_γ	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]
587		2902.2	(25/2$^+$)	2315.2	(21/2$^+$)	(E2)
597		3417.2	(29/2$^+$)	2820.6	(25/2$^+$)	(E2)
618.5 *2*	6.3 *2*	3415.2	(31/2$^+$)	2796.7	(27/2$^+$)	(E2)
624		3224.2	(27/2$^+$)	2600.2	(23/2$^+$)	(E2)
626.2 *1*	56.4 *21*	1501.4	(23/2$^-$)	875.2	(19/2$^-$)	(E2)
637		1616.9	(17/2$^+$)	979.5	(13/2$^+$)	(E2)
665		3567.2	(29/2$^+$)	2902.2	(25/2$^+$)	(E2)
687[&]		3769.3	(33/2$^+$)	3082.3	(29/2$^+$)	(E2)
687[&]		3782.1	(31/2$^+$)	3094.9	(27/2$^+$)	(E2)
693		3917.2	(31/2$^+$)	3224.2	(27/2$^+$)	(E2)
710		1950.0	(19/2$^+$)	1240.2	(15/2$^+$)	(E2)
726		976.5	(9/2$^+$)	250.9	(7/2$^+$)	D+Q
738		4305.2	(33/2$^+$)	3567.2	(29/2$^+$)	(E2)
741.5 *2*	31.6 *12*	2242.9	(27/2$^-$)	1501.4	(23/2$^-$)	(E2)
762		4179.2	(33/2$^+$)	3417.2	(29/2$^+$)	(E2)
765		4682.2	(35/2$^+$)	3917.2	(31/2$^+$)	(E2)
770.9 *2*	4.5 *3*	4186.1	(35/2$^+$)	3415.2	(31/2$^+$)	(E2)
807.1 *2*	22.8 *9*	3050.0	(31/2$^-$)	2242.9	(27/2$^-$)	(E2)
821		5503.2	(39/2$^+$)	4682.2	(35/2$^+$)	(E2)
824		4606.0	(35/2$^+$)	3782.1	(31/2$^+$)	(E2)
826.4 *2*	7.3 *9*	2327.8	(23/2$^+$)	1501.4	(23/2$^-$)	
829		4598.3	(37/2$^+$)	3769.3	(33/2$^+$)	(E2)
832		1240.2	(15/2$^+$)	408.2	(15/2$^-$)	
832.1 *2*	14.1 *6*	3882.1	(35/2$^-$)	3050.0	(31/2$^-$)	(E2)
871.7 *2*	12.0 *5*	4753.8	(39/2$^-$)	3882.1	(35/2$^-$)	(E2)
874		5053.6	(37/2$^+$)	4179.2	(33/2$^+$)	(E2)
892		6395.2	(43/2$^+$)	5503.2	(39/2$^+$)	(E2)
904.4 *3*	2.4 *4*	5090.5	(39/2$^+$)	4186.1	(35/2$^+$)	(E2)
950.5 *3*	8.5 *4*	5704.3	(43/2$^-$)	4753.8	(39/2$^-$)	(E2)
952		5550.3	(41/2$^+$)	4598.3	(37/2$^+$)	(E2)
1016.4 *3*	1.6 *2*	6106.9	(43/2$^+$)	5090.5	(39/2$^+$)	(E2)
1040		2541.3	(25/2$^+$)	1501.4	(23/2$^-$)	
1041.5 *3*	2.5 *2*	6745.8	(47/2$^-$)	5704.3	(43/2$^-$)	(E2)
1054		6604.3	(45/2$^+$)	5550.3	(41/2$^+$)	(E2)
1074.5 *4*	2.9 *2*	1950.0	(19/2$^+$)	875.2	(19/2$^-$)	
1107		7213.9	(47/2$^+$)	6106.9	(43/2$^+$)	(E2)
1122		7867.8	(51/2$^-$)	6745.8	(47/2$^-$)	(E2)
1139		7743.3	(49/2$^+$)	6604.3	(45/2$^+$)	(E2)
1148		9015.8	(55/2$^-$)	7867.8	(51/2$^-$)	(E2)
1173		10188.8	(59/2$^-$)	9015.8	(55/2$^-$)	(E2)
1240		11428.8	(61/2$^-$)	10188.8	(59/2$^-$)	(E2)
1243		2118.1	(21/2$^+$)	875.2	(19/2$^-$)	
1327		12755.8	(65/2$^-$)	11428.8	(61/2$^-$)	(E2)

[†] From 1994Ga31 assuming $\Delta E\gamma$=0.4 keV, except as noted.
[‡] From 1987Go26.
[#] From DCO ratios analysis and also from regular sequence of transitions in a cascade of rotational bands. Multipolarities of cascade stretched transitions in band are accepted as (E2).
[@] $+0.4<\delta<+2.5$ from 1994Ga31.
[&] Multiply placed.

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Level Scheme

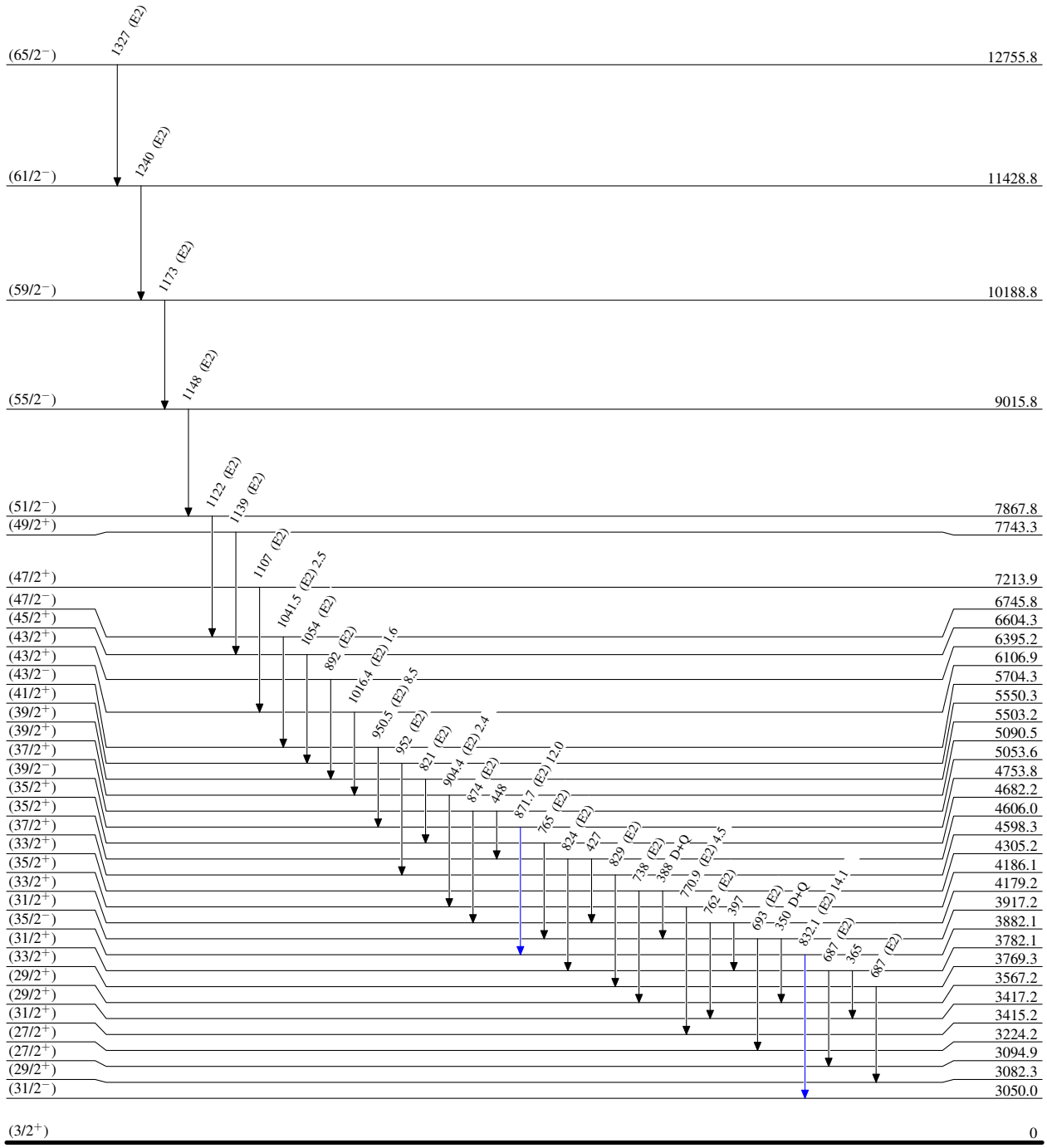
Intensities: Relative I_γ

Legend

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

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

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



$^{131}_{59}Pr_{72}$

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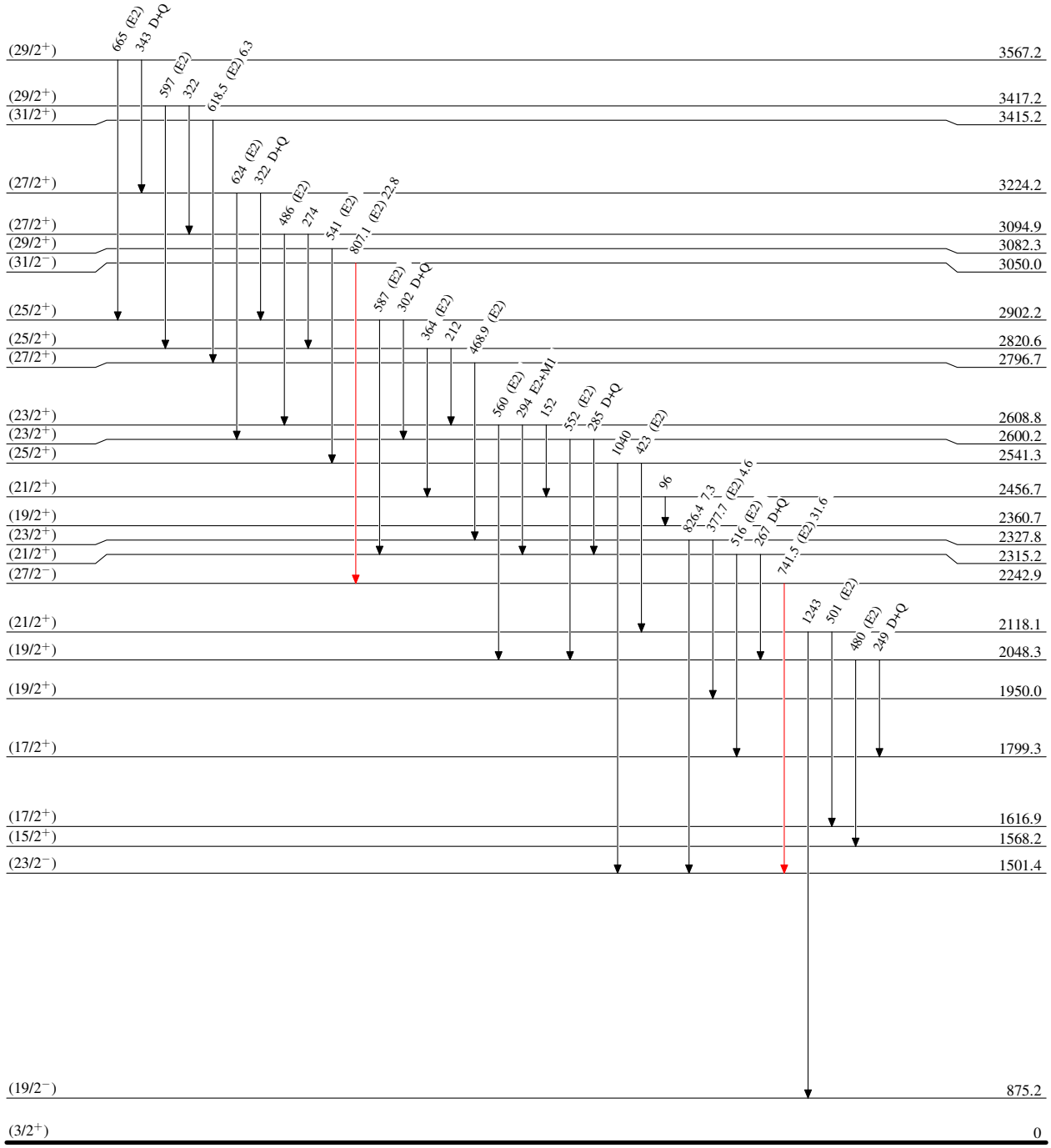
Level Scheme (continued)

Intensities: Relative I_γ

Legend
- $I_\gamma < 2\% \times I_\gamma^{max}$
- $I_\gamma < 10\% \times I_\gamma^{max}$
- $I_\gamma > 10\% \times I_\gamma^{max}$



1.51 min *2*

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Level Scheme (continued)

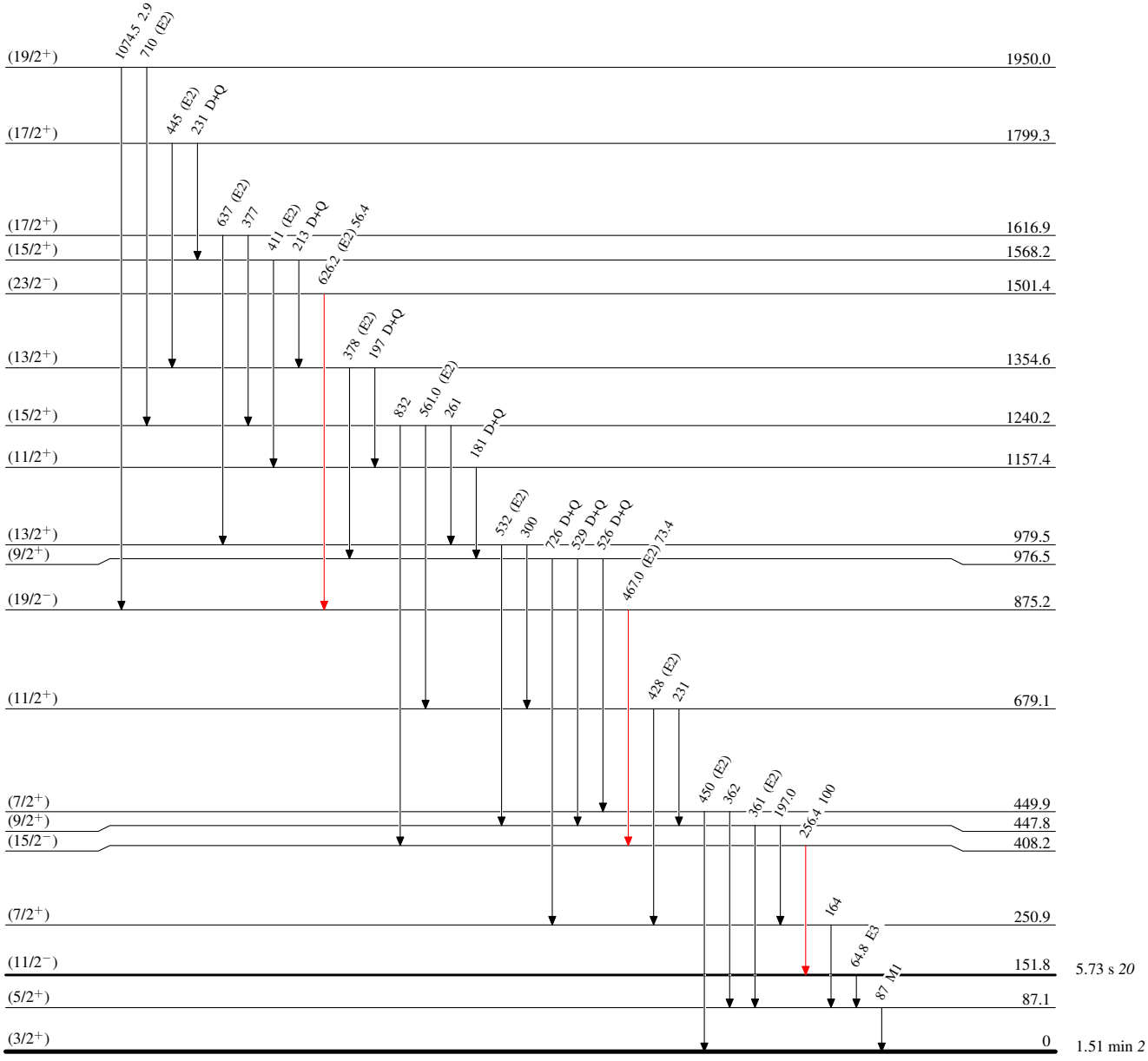
Intensities: Relative I_γ

Legend

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

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

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



$^{131}_{59}Pr_{72}$

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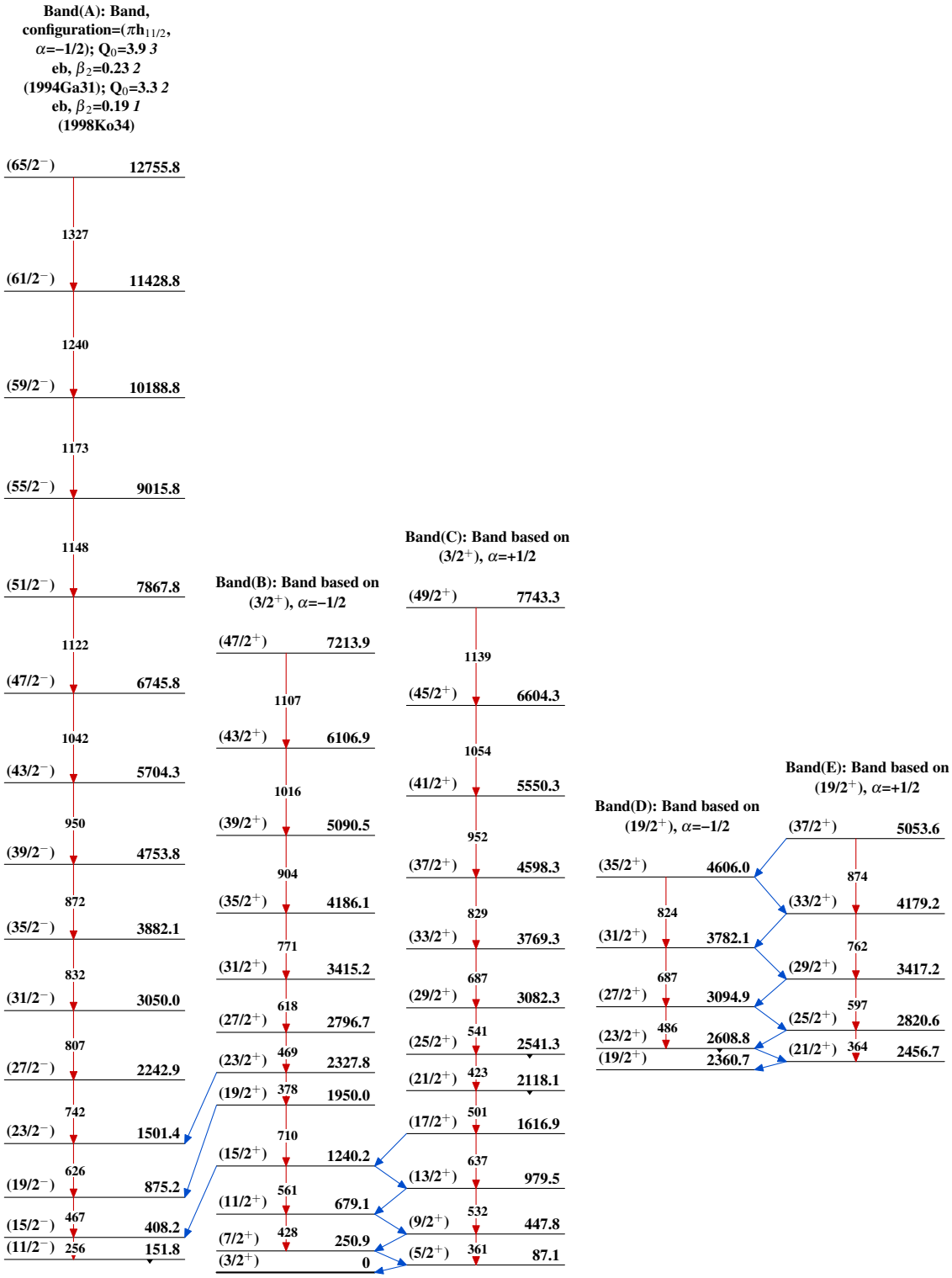
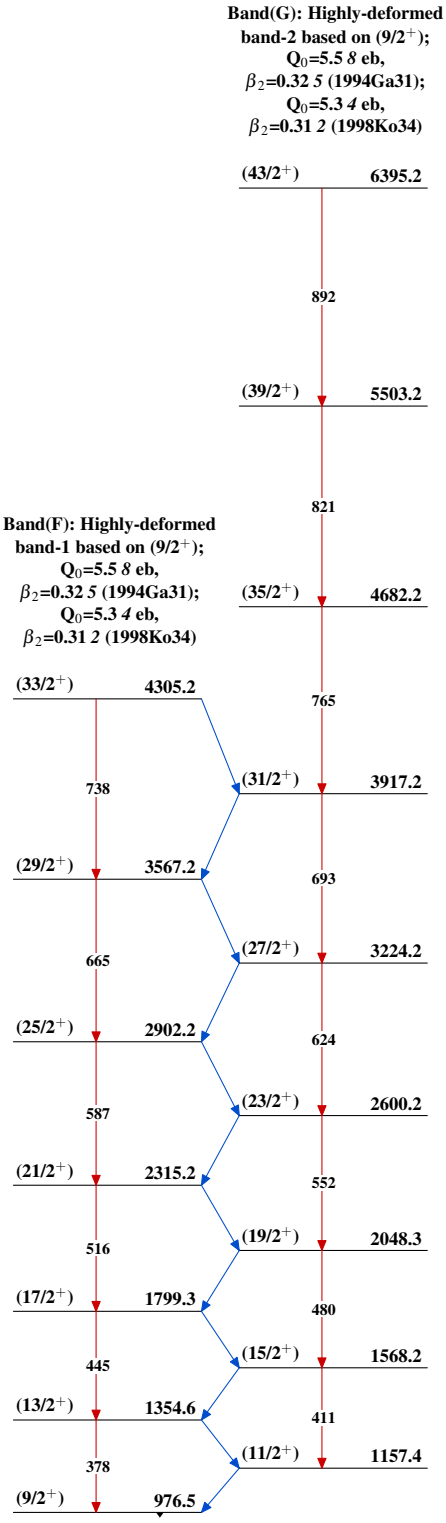


$^{131}_{59}Pr_{72}$

^{98}Mo(^{37}Cl,4nγ) 1994Ga31 (continued)



$^{131}_{59}Pr_{72}$