^{130}Te(^{37}Cl,4nγ) 2007Pa22

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich, Balraj Singh	NDS 111, 1211 (2010)	12-Apr-2010

Additional information 1.

2007Pa22: E=170 MeV, enriched target. Measured Eγ, Iγ, $\gamma\gamma$, $\gamma\gamma(\theta)$(DCO) using the Gammasphere array containing 98 Compton- suppressed HPGe detectors. Deduced strongly-deformed triaxial bands. Comparisons made with tilted-axis cranking shell-model calculations.

2007Wa21 (also 2007WaZV thesis): E=165 MeV, enriched target. Measured mean lifetimes by Doppler-shift attenuation method. The Gammasphere array was used for detection of γ rays. Deduced transition quadrupole moments for four bands and comparison with model calculations.

^{163}Tm Levels

For Q_t values from 2007Wa21, the uncertainties are statistical only, the systematic uncertainties due to stopping powers are not included.

E(level)[‡]	J$^\pi$[†]	E(level)[‡]	J$^\pi$[†]	E(level)[‡]	J$^\pi$[†]	E(level)[‡]	J$^\pi$[†]
0	1/2$^+$	2376.8[&] *8*	29/2$^-$	5643.5[#] *12*	51/2$^-$	9944.8[b] *22*	69/2$^-$
13.53 *3*	3/2$^+$	2626.2[#] *9*	31/2$^-$	5751.2[b] *14*	49/2$^-$	10115.5[#] *21*	71/2$^-$
23.3 *8*	7/2$^+$	2920.9[@] *9*	33/2$^-$	5894.2[&] *18*	49/2$^-$	10412.4[a] *22*	71/2$^-$
86.9[#] *8*	7/2$^-$	3014.5[&] *9*	33/2$^-$	6057.9[@] *13*	53/2$^-$	10788.9[@] *22*	73/2$^-$
174.6[@] *9*	9/2$^-$	3171.3[#] *9*	35/2$^-$	6096.9[a] *15*	51/2$^-$	10975.2[b] *24*	73/2$^-$
248.0[&] *8*	5/2$^-$	3265.1 *11*	35/2$^-$	6433.5[#] *14*	55/2$^-$	11159.5[#] *23*	75/2$^-$
290.3[#] *8*	11/2$^-$	3427.7[@] *9*	37/2$^-$	6462.3[b] *16*	53/2$^-$	11451.4[a] *24*	75/2$^-$
369.1[&] *8*	9/2$^-$	3689.5[#] *10*	39/2$^-$	6838.0[a] *16*	55/2$^-$	11908.9[@] *24*	77/2$^-$
436.9[@] *9*	13/2$^-$	3713.6[&] *9*	37/2$^-$	6893.9[@] *14*	57/2$^-$	12070[b] *3*	77/2$^-$
586.5[&] *8*	13/2$^-$	3967.6[@] *9*	41/2$^-$	7236.9[b] *17*	57/2$^-$	12253.5[#] *25*	79/2$^-$
603.6[#] *8*	15/2$^-$	4094.5 *11*	39/2$^-$	7279.5[#] *15*	59/2$^-$	12547[a] *3*	79/2$^-$
804.8[@] *9*	17/2$^-$	4266.3[#] *10*	43/2$^-$	7642.4[a] *17*	59/2$^-$	13090[@] *3*	81/2$^-$
900.5[&] *8*	17/2$^-$	4443.2[&] *10*	41/2$^-$	7785.9[@] *16*	61/2$^-$	13219[b] *3*	81/2$^-$
1011.5[#] *8*	19/2$^-$	4501.6?[b] *14*	(41/2$^-$)	8075.7[b] *18*	61/2$^-$	13400[#] *3*	83/2$^-$
1261.1[@] *9*	21/2$^-$	4586.6[@] *11*	45/2$^-$	8175.5[#] *16*	63/2$^-$	13695[a] *3*	83/2$^-$
1308.4[&] *8*	21/2$^-$	4774.9 *13*	43/2$^-$	8507.6[a] *19*	63/2$^-$	14321[@] *3*	85/2$^-$
1498.4[#] *8*	23/2$^-$	4918.4[#] *10*	47/2$^-$	8729.9[@] *17*	65/2$^-$	14597[#] *3*	87/2$^-$
1785.7[@] *9*	25/2$^-$	5098.9[b] *12*	45/2$^-$	8978.1[b] *20*	65/2$^-$	14882[a] *3*	87/2$^-$
1803.9[&] *8*	25/2$^-$	5173.2[&] *14*	45/2$^-$	9120.5[#] *18*	67/2$^-$		
2046.3[#] *8*	27/2$^-$	5285.9[@] *11*	49/2$^-$	9431.0[a] *20*	67/2$^-$		
2356.4[@] *9*	29/2$^-$	5417.4[a] *13*	47/2$^-$	9729.9[@] *20*	69/2$^-$		

[†] As proposed by 2007Pa22, based on angular-distribution measurements and band associations.

[‡] From least-squares fit to Eγ's.

[#] Band(A): π7/2[523],α=−1/2. Q_t=6.39 *+33−31* (DSAM,2007Wa21).

[@] Band(a): π7/2[523],α=+1/2. Q_t=6.40 *+57−33* (DSAM,2007Wa21).

[&] Band(B): π1/2[541],α=+1/2.

[a] Band(C): Triaxial SD-1 band,α=−1/2. Percent population intensity=2.9 *11*. Q_t=7.42 *+44−37* (DSAM,2007Wa21). The side-feeding Q_{sf}=10.2 *+18−13*. From comparison with structure calculations and interband transitions, this band is proposed as a particle-hole excitation rather than a wobbling-mode excitation.

Continued on next page (footnotes at end of table)

^{130}Te(^{37}Cl,4nγ) 2007Pa22 (continued)

^{163}Tm Levels (continued)

[b] Band(c): Triaxial SD-2 band,α=+1/2 Percent population intensity=2.1 *9*. Q_t=7.7 *+10−6* (DSAM,2007Wa21). The side-feeding Q_{sf}=9.7 *+29−23*. See comment for the α=−1/2 signature partner for nature of the band.

γ(^{163}Tm)

DCO values are from e-mail reply of Feb 26, 2007 from U. Garg (one of the authors of 2007Pa22) to S. Geraedts and B. Singh.

E_γ[†]	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[‡]	Comments
9.7 *10*	0.3 *3*	23.3	7/2$^+$	13.53	3/2$^+$		
13.53 *3*		13.53	3/2$^+$	0	1/2$^+$		
63.62 *3*		86.9	7/2$^-$	23.3	7/2$^+$		
115.7 *10*	56 *6*	290.3	11/2$^-$	174.6	9/2$^-$		
121.10 *20*	5.0 *5*	369.1	9/2$^-$	248.0	5/2$^-$		
146.6 *10*	0.3 *3*	436.9	13/2$^-$	290.3	11/2$^-$		
151.3 *10*	0.3 *3*	174.6	9/2$^-$	23.3	7/2$^+$		
166.7 *10*	56 *6*	603.6	15/2$^-$	436.9	13/2$^-$		
190.0 *10*	0.3 *3*	1498.4	23/2$^-$	1308.4	21/2$^-$		
201.2 *10*	74 *11*	804.8	17/2$^-$	603.6	15/2$^-$		
203.40 *20*	38 *4*	290.3	11/2$^-$	86.9	7/2$^-$		
206.7 *10*	57 *6*	1011.5	19/2$^-$	804.8	17/2$^-$		
217.40 *20*	55 *6*	586.5	13/2$^-$	369.1	9/2$^-$		
234.5 *10*	5.0 *5*	248.0	5/2$^-$	13.53	3/2$^+$		
237.3 *10*	28.9 *18*	1498.4	23/2$^-$	1261.1	21/2$^-$		
242.4 *10*	8.0 *10*	2046.3	27/2$^-$	1803.9	25/2$^-$		
249.5 *10*	41 *4*	2626.2	31/2$^-$	2376.8	29/2$^-$		
249.6 *10*	36 *7*	1261.1	21/2$^-$	1011.5	19/2$^-$		
250.5 *10*	19.1 *18*	3171.3	35/2$^-$	2920.9	33/2$^-$		
256.2 *10*	27 *6*	3427.7	37/2$^-$	3171.3	35/2$^-$		
260.6 *10*	25 *5*	2046.3	27/2$^-$	1785.7	25/2$^-$		
261.9 *10*	17.8 *20*	3689.5	39/2$^-$	3427.7	37/2$^-$		
262.30 *20*	78 *11*	436.9	13/2$^-$	174.6	9/2$^-$		
269.8 *10*	20.4 *18*	2626.2	31/2$^-$	2356.4	29/2$^-$		
278.0 *10*	27 *4*	3967.6	41/2$^-$	3689.5	39/2$^-$		
287.3 *10*	26 *6*	1785.7	25/2$^-$	1498.4	23/2$^-$		
294.8 *10*	33 *5*	2920.9	33/2$^-$	2626.2	31/2$^-$		
296.9 *10*	2.5 *3*	900.5	17/2$^-$	603.6	15/2$^-$		
298.8 *10*	25 *3*	4266.3	43/2$^-$	3967.6	41/2$^-$		
305.5 *10*	7.8 *8*	1803.9	25/2$^-$	1498.4	23/2$^-$		
310.1 *10*	21 *5*	2356.4	29/2$^-$	2046.3	27/2$^-$		
313.30 *20*	68 *13*	603.6	15/2$^-$	290.3	11/2$^-$		
314.00 *20*	97 *10*	900.5	17/2$^-$	586.5	13/2$^-$		
318.5[&] *10*	0.3 *3*	5417.4	47/2$^-$	5098.9	45/2$^-$		
320.2 *10*	16.6 *23*	4586.6	45/2$^-$	4266.3	43/2$^-$		
323.9 *10*	8.0 *3*	5098.9	45/2$^-$	4774.9	43/2$^-$		
330.4 *10*	3.3 *5*	2376.8	29/2$^-$	2046.3	27/2$^-$		
331.9 *10*	16.8 *18*	4918.4	47/2$^-$	4586.6	45/2$^-$		
333.8 *10*	10.6 *3*	5751.2	49/2$^-$	5417.4	47/2$^-$	D	DCO=0.51 *15*
345.7 *10*	6.4 *3*	6096.9	51/2$^-$	5751.2	49/2$^-$	D	DCO=0.78 *15*
357.6 *10*	13.3 *15*	5643.5	51/2$^-$	5285.9	49/2$^-$		
365.4 *10*	4.3 *3*	6462.3	53/2$^-$	6096.9	51/2$^-$	D	DCO=0.63 *15*
367.4 *10*	12.3 *13*	5285.9	49/2$^-$	4918.4	47/2$^-$		
367.90 *20*	62 *9*	804.8	17/2$^-$	436.9	13/2$^-$		
375.6 *10*	7.5 *8*	6433.5	55/2$^-$	6057.9	53/2$^-$		
375.7 *10*	4.8 *3*	6838.0	55/2$^-$	6462.3	53/2$^-$		

Continued on next page (footnotes at end of table)

^{130}Te(^{37}Cl,4nγ) 2007Pa22 (continued)

γ(^{163}Tm) (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f	Mult. ‡	Comments
385.6 *10*	5.5 *5*	7279.5	59/2−	6893.9	57/2−		
389.6 *10*	4.8 *13*	8175.5	63/2−	7785.9	61/2−		
390.6 *10*	2.5 *13*	9120.5	67/2−	8729.9	65/2−		
398.9 *10*	3.2 *3*	7236.9	57/2−	6838.0	55/2−	D	DCO=0.77 *25*
405.5 *10*	0.3 *3*	7642.4	59/2−	7236.9	57/2−		
407.90 *20*	80 *8*	1011.5	19/2−	603.6	15/2−		
407.90 *20*	100 *10*	1308.4	21/2−	900.5	17/2−		
414.4 *10*	10.1 *13*	6057.9	53/2−	5643.5	51/2−		
431.9& *10*	0.3 *3*	8507.6	63/2−	8075.7	61/2−		
433.3 *10*	1.2 *3*	8075.7	61/2−	7642.4	59/2−		
452.9& *10*	0.3 *3*	9431.0	67/2−	8978.1	65/2−		
456.30 *20*	50 *11*	1261.1	21/2−	804.8	17/2−		
460.4 *10*	11.3 *15*	6893.9	57/2−	6433.5	55/2−		
486.90 *20*	63 *6*	1498.4	23/2−	1011.5	19/2−		
495.50 *20*	60 *6*	1803.9	25/2−	1308.4	21/2−		
506.4 *10*	10.8 *13*	7785.9	61/2−	7279.5	59/2−		
506.80 *20*	38 *6*	3427.7	37/2−	2920.9	33/2−		
518.1 *10*	47 *5*	3689.5	39/2−	3171.3	35/2−		
524.60 *20*	54 *12*	1785.7	25/2−	1261.1	21/2−		
539.90 *20*	38 *6*	3967.6	41/2−	3427.7	37/2−		
545.10 *20*	50 *5*	3171.3	35/2−	2626.2	31/2−		
547.90 *20*	60 *6*	2046.3	27/2−	1498.4	23/2−		
554.4 *10*	0.3 *3*	8729.9	65/2−	8175.5	63/2−		
564.50 *20*	43 *9*	2920.9	33/2−	2356.4	29/2−		
570.70 *20*	50 *11*	2356.4	29/2−	1785.7	25/2−		
572.90 *20*	43 *4*	2376.8	29/2−	1803.9	25/2−		
576.80 *20*	44 *5*	4266.3	43/2−	3689.5	39/2−		
579.90 *20*	60 *6*	2626.2	31/2−	2046.3	27/2−		
598#&		5098.9	45/2−	4501.6?	(41/2−)		
619.0 *10*	35 *5*	4586.6	45/2−	3967.6	41/2−		
637.70 *20*	38 *4*	3014.5	33/2−	2376.8	29/2−		
639.0 *10*	9 *3*	3265.1	35/2−	2626.2	31/2−		
642.4 *10*	18.8 *3*	5417.4	47/2−	4774.9	43/2−		
652.10 *20*	42 *4*	4918.4	47/2−	4266.3	43/2−		
652.3 *10*	22.6 *13*	5751.2	49/2−	5098.9	45/2−		
655.7 *10*	13.8 *3*	5098.9	45/2−	4443.2	41/2−		
679.5 *10*	20.6 *3*	6096.9	51/2−	5417.4	47/2−		
680.4 *10*	20.6 *3*	4774.9	43/2−	4094.5	39/2−		
699.10 *20*	38 *4*	3713.6	37/2−	3014.5	33/2−		
699.30 *20*	33 *4*	5285.9	49/2−	4586.6	45/2−		
711.1 *10*	21 *3*	6462.3	53/2−	5751.2	49/2−		
721.0 *10*	3.0 *5*	5894.2	49/2−	5173.2	45/2−		
725.0 *10*	39 *4*	5643.5	51/2−	4918.4	47/2−		
729.6 *5*	12.6 *13*	4443.2	41/2−	3713.6	37/2−		
730.0 *10*	3.5 *5*	5173.2	45/2−	4443.2	41/2−		
741.1 *10*	17.8 *3*	6838.0	55/2−	6096.9	51/2−		
772.0 *10*	31 *4*	6057.9	53/2−	5285.9	49/2−		
774.6 *10*	20.4 *23*	7236.9	57/2−	6462.3	53/2−		
788.0& *10*	2.5 *3*	4501.6?	(41/2−)	3713.6	37/2−		
790.0 *10*	29 *3*	6433.5	55/2−	5643.5	51/2−		
804.4 *10*	19 *3*	7642.4	59/2−	6838.0	55/2−		
829.4 *5*	9 *3*	4094.5	39/2−	3265.1	35/2−		
836.0 *10*	30 *4*	6893.9	57/2−	6057.9	53/2−		
838.8 *10*	19 *3*	8075.7	61/2−	7236.9	57/2−		
846.0 *10*	28 *3*	7279.5	59/2−	6433.5	55/2−		

Continued on next page (footnotes at end of table)

^{130}Te(^{37}Cl,4nγ) 2007Pa22 (continued)

γ(^{163}Tm) (continued)

E_γ †	I_γ †	E_i(level)	J^π_i	E_f	J^π_f
865.2 *10*	21.9 *3*	8507.6	63/2⁻	7642.4	59/2⁻
892.0 *10*	27 *3*	7785.9	61/2⁻	6893.9	57/2⁻
896.0 *10*	25 *3*	8175.5	63/2⁻	7279.5	59/2⁻
902.4 *10*	16 *3*	8978.1	65/2⁻	8075.7	61/2⁻
923.1 *10*	8 *3*	4094.5	39/2⁻	3171.3	35/2⁻
923.4 *10*	24 *4*	9431.0	67/2⁻	8507.6	63/2⁻
944.0 *10*	26 *3*	8729.9	65/2⁻	7785.9	61/2⁻
945.0 *10*	24 *3*	9120.5	67/2⁻	8175.5	63/2⁻
966.7 *10*	12.6 *23*	9944.8	69/2⁻	8978.1	65/2⁻
981.4 *10*	22.4@ *30*	10412.4	71/2⁻	9431.0	67/2⁻
995.0 *10*	22.1 *23*	10115.5	71/2⁻	9120.5	67/2⁻
1000.0 *10*	21.4 *23*	9729.9	69/2⁻	8729.9	65/2⁻
1030.4 *10*	8.8 *20*	10975.2	73/2⁻	9944.8	69/2⁻
1039.0 *10*	17 *3*	11451.4	75/2⁻	10412.4	71/2⁻
1044.0 *10*	16.6 *18*	11159.5	75/2⁻	10115.5	71/2⁻
1059.0 *10*	15.6 *15*	10788.9	73/2⁻	9729.9	69/2⁻
1094.0 *10*	13.1 *13*	12253.5	79/2⁻	11159.5	75/2⁻
1095.0 *10*	6 *3*	12070	77/2⁻	10975.2	73/2⁻
1096.0 *10*	11 *3*	12547	79/2⁻	11451.4	75/2⁻
1120.0 *10*	12.3 *13*	11908.9	77/2⁻	10788.9	73/2⁻
1147.0 *10*	9.0 *10*	13400	83/2⁻	12253.5	79/2⁻
1148.0 *10*	8 *4*	13695	83/2⁻	12547	79/2⁻
1148.8 *10*	4.3 *20*	13219	81/2⁻	12070	77/2⁻
1181.0 *10*	7.3 *8*	13090	81/2⁻	11908.9	77/2⁻
1187.0 *10*	3 *3*	14882	87/2⁻	13695	83/2⁻
1197.0 *10*	9.5 *10*	14597	87/2⁻	13400	83/2⁻
1231.0 *10*	5.0 *3*	14321	85/2⁻	13090	81/2⁻

† From e-mail reply of Feb 26, 2007 from U. Garg (one of the authors of 2007Pa22) to S. Geraedts and B. Singh. According to another e-mail reply from U. Garg on March 15, 2007, general uncertainty of 1 keV for γ-ray energies is a default value and realistic for triaxial SD bands while, for normal-deformed structures, the uncertainty is expected to be less than 0.3 keV.

‡ From DCO ratios for selected transitions as received in e-mail reply of Feb 26, 2007 from U. Garg (one of the authors of 2007Pa22) to S. Geraedts and B. Singh. For triaxial SD-band transitions, a general DCO is quoted as 0.90 *5* in this e-mail communication, which forms the basis of assignment of stretched quadrupole (E2) multipolarity for all the transitions in the two bands. For interband transitions, measured DCO ratios suggest ΔJ=1, M1 multipolarity. Since full details of these data are not available, the evaluators have not listed the multipolarities as given in this communication.

From the level scheme (figure 1) of 2007Pa22. γ not listed in the authors′ e-mail reply of Feb 26, 2007.

@ Uncertainty increased by the evaluators from 0.3 to 3.0 according to the uncertainties for other transitions in the region.

& Placement of transition in the level scheme is uncertain.

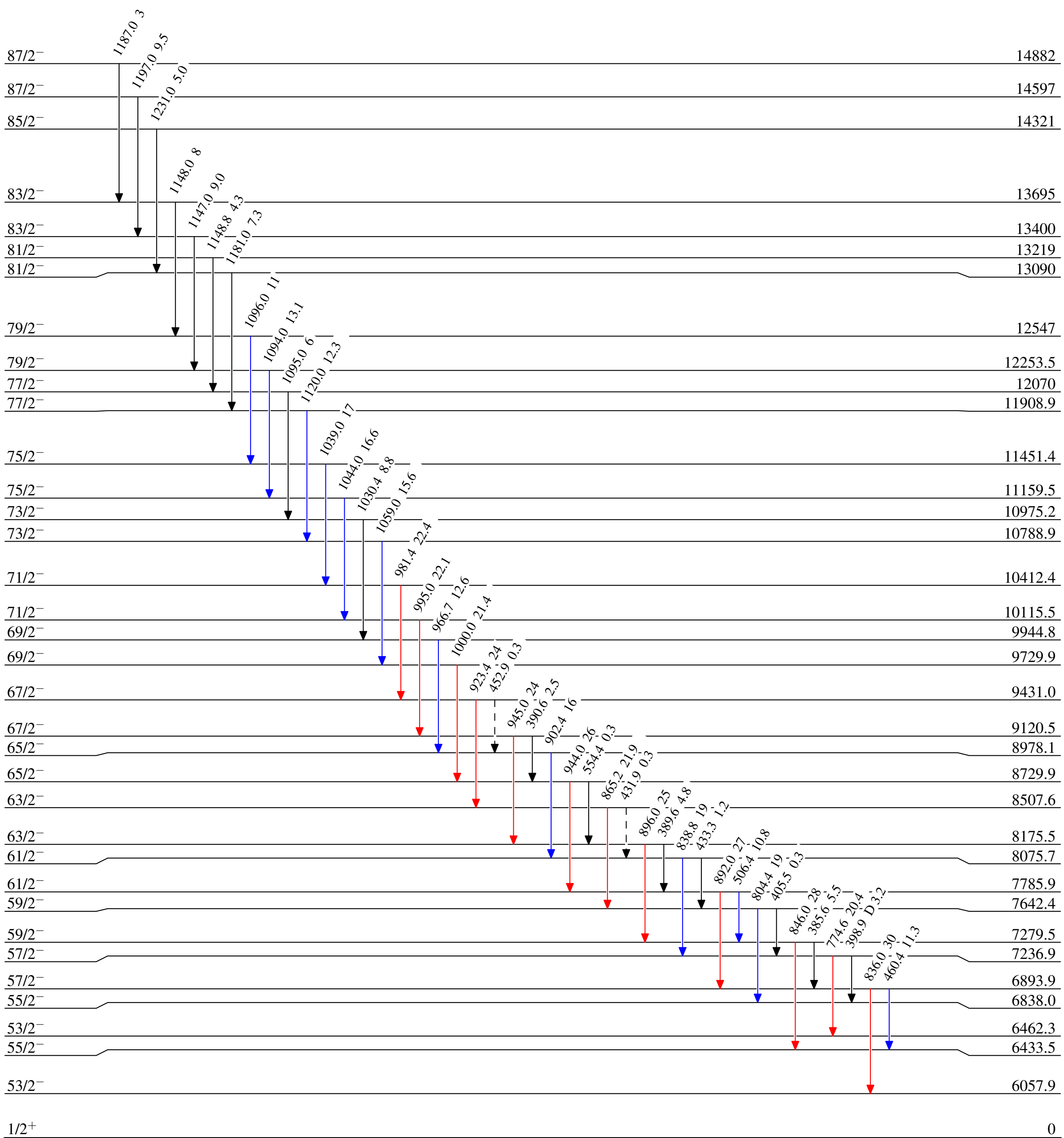
^{130}Te(^{37}Cl,4nγ) 2007Pa22

Level Scheme

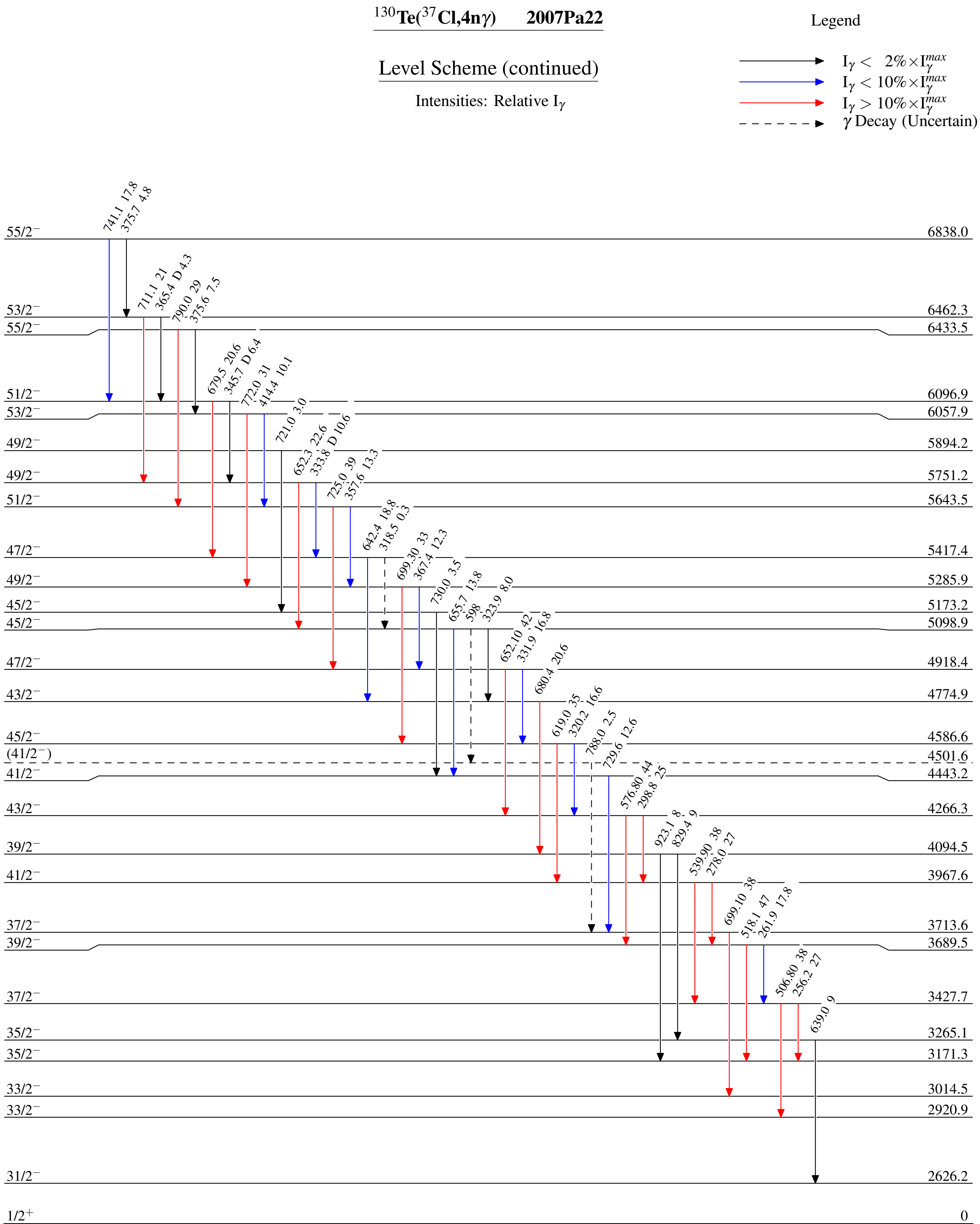
Intensities: Relative I_γ

Legend

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



$^{163}_{69}Tm_{94}$

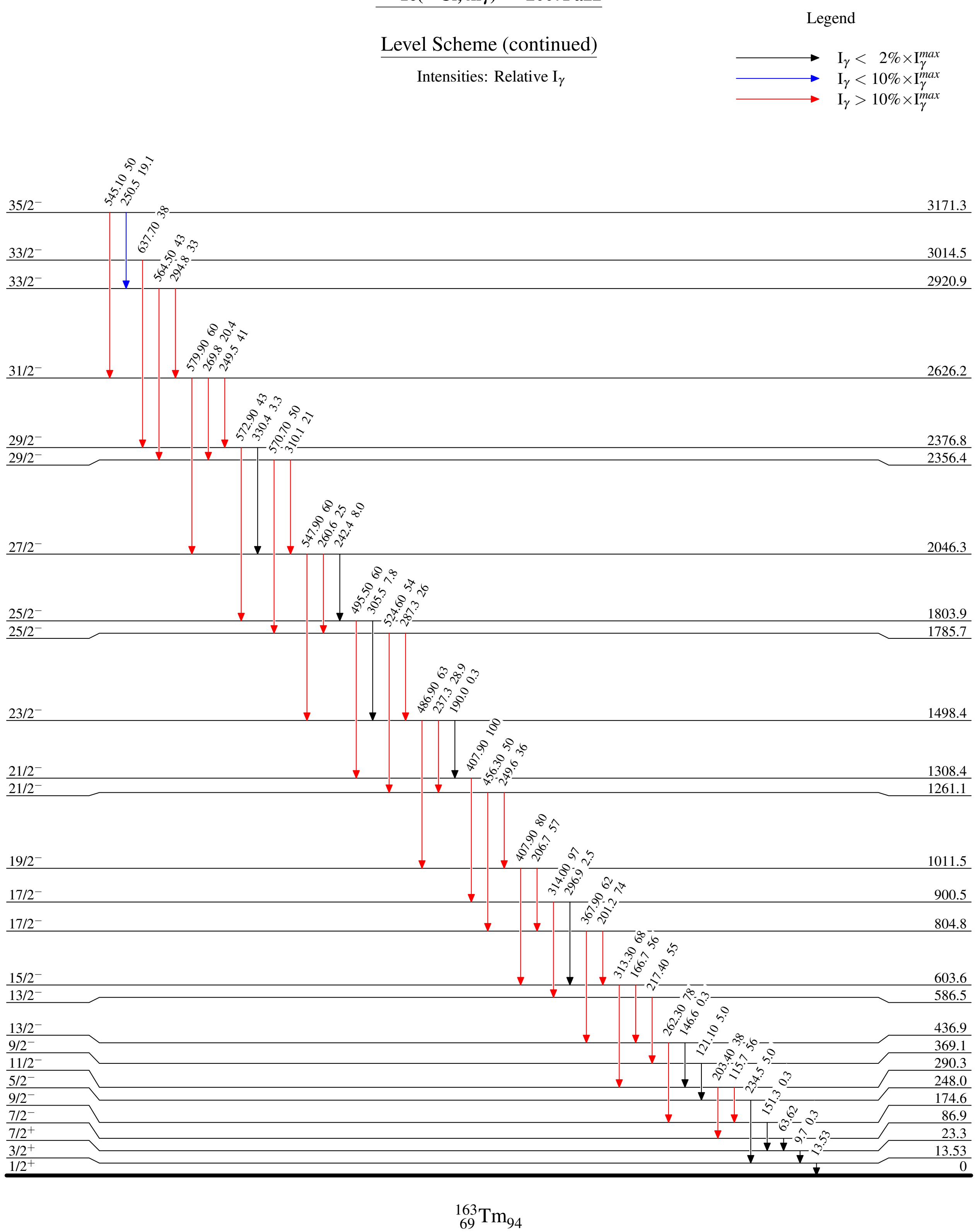

^{130}Te(^{37}Cl,4nγ) 2007Pa22
Level Scheme (continued)
Intensities: Relative I_γ
Legend
$I_\gamma < 2\% \times I_\gamma^{max}$
$I_\gamma < 10\% \times I_\gamma^{max}$
$I_\gamma > 10\% \times I_\gamma^{max}$
γ Decay (Uncertain)
55/2− 6838.0
53/2− 6462.3
55/2− 6433.5
51/2− 6096.9
53/2− 6057.9
49/2− 5894.2
49/2− 5751.2
51/2− 5643.5
47/2− 5417.4
49/2− 5285.9
45/2− 5173.2
45/2− 5098.9
47/2− 4918.4
43/2− 4774.9
45/2− 4586.6
(41/2−) 4501.6
41/2− 4443.2
43/2− 4266.3
39/2− 4094.5
41/2− 3967.6
37/2− 3713.6
39/2− 3689.5
37/2− 3427.7
35/2− 3265.1
35/2− 3171.3
33/2− 3014.5
33/2− 2920.9
31/2− 2626.2
1/2+ 0
741.1 17.8
375.7 4.8
711.1 21
365.4 D 4.3
790.0 29
375.6 7.5
679.5 20.6
345.7 D 6.4
772.0 31
414.4 10.1
721.0 3.0
652.3 22.6
333.8 D 10.6
725.0 39
357.6 13.3
642.4 18.8
318.5 0.3
699.30 33
367.4 12.3
730.0 3.5
655.7 13.8
598
323.9 8.0
652.10 42
331.9 16.8
680.4 20.6
619.0 35
320.2 16.6
788.0 2.5
729.6 12.6
576.80 44
298.8 25
923.1 8
829.4 9
539.90 38
278.0 27
699.10 38
518.1 47
261.9 17.8
506.80 38
256.2 27
639.0 9

$^{163}_{69}Tm_{94}$

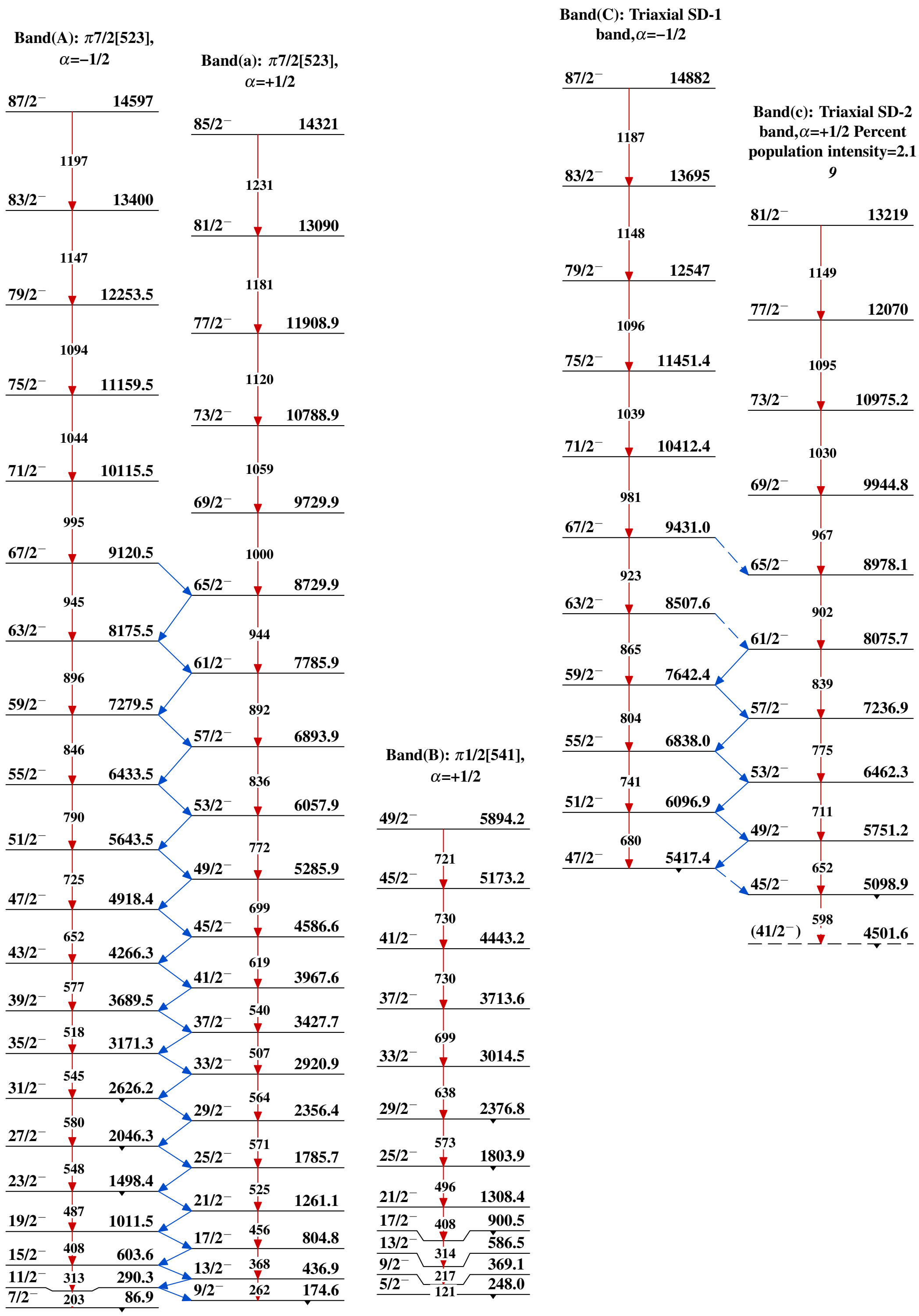
^{130}Te(^{37}Cl,4nγ) 2007Pa22

Level Scheme (continued)

Intensities: Relative I_γ



$^{130}Te(^{37}Cl,4n\gamma)$ 2007Pa22



$^{163}_{69}Tm_{94}$