^{197}Au(α,6nγ) 1978Li10

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Huang Xiaolong and Kang Mengxiao	NDS 121, 395 (2014)	1-Mar-2014

Target $J^\pi=3/2^+$.
E=76 MeV. Measured Eγ, Iγ, σ(Eγ,θ), $\gamma\gamma$-,$\alpha\gamma$(t) coin, a-γ delay, and ce with Ge(Li) and Si(Li). Rotational bands analyzed.
Others: 1974Ne16, 1976Di14, 1977LiZJ, 1977LiZG.

^{195}Tl Levels

All data are from 1978Li10, except as noted.
Similar to high-spin ^{197}Tl states excited by (α,4nγ): 1977LiZG and 1978Li10.
For B(E2) ratios of crossover and cascade transitions in the $9/2^-$ band, see 1978Li10.

E(level)[#]	J$^\pi$[b]	T$_{1/2}$[&]	Comments
0.0[@]	$1/2^+$	1.16[@] h *5*	
383.6 *3*	$3/2^+$[a]		
482.7[†] *5*	$9/2^-$[a]	3.6[@] s *4*	
876.8[†] *5*	$11/2^-$[a]		
1190.0[†] *5*	$13/2^-$[a]		
1484.0 *6*	$13/2^-$[a]		
1618.4[†] *5*	$15/2^-$[a]		
1924.0 *6*	$17/2^-$[a]		
2011.2[†] *6*	$17/2^-$[a]		Band assignment is based on B(E2) of crossover/cascade and relative population.
2037.0[‡] *6*	$15/2^+$[a]		
2212.7[‡] *6*	$17/2^+$[a]		
2469.8[†] *6*	$19/2^-$[a]		
2529.5[‡] *6*	$19/2^+$[a]		
2587.1[†] *6*	$21/2^-$[a]		
2840.6[‡] *7*	$21/2^+$[a]		
2860.7[†] *6*	$23/2^-$[a]		
3059.4[†] *6*	$25/2^-$[a]		
3156.7[†] *7*	$27/2^{(-)}$[a]		
3201.7[‡] *7*	$23/2^+$[a]		
3513.7[‡] *7*	$25/2^+$[a]		
3729.4[‡] *7*	$27/2^+$[a]		
3885.1[‡] *8*	$29/2^{(+)}$[a]		
4002.6[‡] *9*	$31/2^{(+)}$[a]		
4174.6[‡] *10*	$33/2^{(+)}$[a]		
4393.1[‡] *10*	$35/2^{(+)}$[a]		

[†] Band(A): h9/2 proton strongly coupled to oblate ^{194}Hg core. Authors Compare exp B(E2: crossover)/B(E2: cascade) with ^{197}Tl and theory.
[‡] Band(B): $\Delta J=1$ sequence built on $15/2^+$ three-particle configuration, consisting of π h9/2 + ν i13/2$^+$ ν.
[#] From Eγ using least-squares fit to data.
[@] From Adopted Levels.
[&] $T_{1/2}\leq 3$ ns for members of $\pi=+$ and $\pi=-$ bands for J>9/2.
[a] From $\gamma(\theta)$ measurements.
[b] From Adopted Levels, except as noted.

^{197}Au(α,6nγ) 1978Li10 (continued)

$\gamma(^{195}Tl)$

All data are from 1978Li10, except as noted.

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[&]	α[a]	Comments
[x]91.8 *3*	0.6[‡] *3*					(M1+E2)		9.7 *13*	α(K)=5 *5*; α(L)=3.8 *22*; α(M)=1.0 *6*; α(N+..)=0.29 *18* $\gamma(\theta)$: A_2=−0.24 *6*; A_4=−0.05 *9*.
97.3 *3*	0.7[‡] *3*	3156.7	27/2$^{(-)}$	3059.4	25/2$^-$	(M1+E2)[@]		8.0 *14*	α(K)=4 *4*; α(L)=2.9 *17*; α(M)=0.7 *5*; α(N+..)=0.22 *13* $\gamma(\theta)$: A_2=−0.14 *6*; A_4=−0.05 *9*.
99.1 *3*	0.6 *2*	482.7	9/2$^-$	383.6	3/2$^+$	E3		156 *4*	α(K)=0.565 *12*; α(L)=114 *3*; α(M)=32.4 *8*; α(N+..)=9.67 *22* Mult.: based on ce-ratios (^{195}Pb decay) $\gamma(\theta)$: A_2=−0.10 *15*; A_4=+0.21 *22*.
117.3 *5*	2.1[‡] *7*	2587.1	21/2$^-$	2469.8	19/2$^-$	(M1+E2)[@]		4.2 *12*	α(K)=2.5 *20*; α(L)=1.3 *6*; α(M)=0.34 *16*; α(N+..)=0.10 *5* Mult.: doublet $\gamma(\theta)$: A_2=−0.30 *2*, A_4=−0.01 *3* for 117.3γ + 117.5γ.
117.5 *5*	1.3[‡] *7*	4002.6	31/2$^{(+)}$	3885.1	29/2$^{(+)}$	(M1+E2)[@]		4.2 *12*	α(K)=2.5 *20*; α(L)=1.3 *6*; α(M)=0.34 *16*; α(N+..)=0.10 *5* Mult.: doublet $\gamma(\theta)$: A_2=−0.30 *2*, A_4=−0.01 *3* for 117.3γ + 117.5γ.
155.7 *3*	3.1 *3*	3885.1	29/2$^{(+)}$	3729.4	27/2$^+$	(M1+E2)		1.7 *8*	α(K)=1.1 *9*; α(L)=0.43 *10*; α(M)=0.11 *3*; α(N+..)=0.033 *9* $\gamma(\theta)$: A_2=−0.32 *3*; A_4=−0.03 *5*.
172.0 *3*	2.7 *3*	4174.6	33/2$^{(+)}$	4002.6	31/2$^{(+)}$	(M1+E2)[@]		1.3 *6*	α(K)=0.9 *7*; α(L)=0.30 *5*; α(M)=0.075 *15*; α(N+..)=0.022 *4* $\gamma(\theta)$: A_2=−0.35 *3*; A_4=−0.02 *5*.
175.7 *3*	10.4 *10*	2212.7	17/2$^+$	2037.0	15/2$^+$	M1+E2	0.13 *5*	1.71 *3*	α(K)=1.40 *3*; α(L)=0.242 *4*; α(M)=0.0567 *10*; α(N+..)=0.0174 *3* $\gamma(\theta)$: A_2=−0.39 *2*; A_4=−0.02 *3*. δ: from $\gamma(\theta)$.
198.8 *3*	2.8[‡] *7*	3059.4	25/2$^-$	2860.7	23/2$^-$	(M1+E2)[@]		0.8 *4*	α(K)=0.6 *5*; α(L)=0.177 *8*; α(M)=0.044 *4*; α(N+..)=0.0132 *10* $\gamma(\theta)$: A_2=−0.30 *6*; A_4=+0.01 *9*. δ: from $\gamma(\theta)$.
215.8 *3*	5.8 *6*	3729.4	27/2$^+$	3513.7	25/2$^+$	M1(+E2)	≤0.14	0.966 *16*	α(K)=0.790 *13*; α(L)=0.1352 *20*; α(M)=0.0316 *5*; α(N+..)=0.00967 *14* $\gamma(\theta)$: A_2=−0.35 *3*; A_4=−0.01 *5*. δ: from $\gamma(\theta)$.
218.5 *3*	2.9 *3*	4393.1	35/2$^{(+)}$	4174.6	33/2$^{(+)}$	(M1+E2)[@]		0.6 *4*	α(K)=0.5 *4*; α(L)=0.127 *4*; α(M)=0.0313 *9*; α(N+..)=0.00942 *17* $\gamma(\theta)$: A_2=−0.39 *7*; A_4=−0.02 *10*.
273.7 *3*	11.8 *15*	2860.7	23/2$^-$	2587.1	21/2$^-$	M1(+E2)	≤0.14	0.501 *8*	α(K)=0.410 *7*; α(L)=0.0696 *11*; α(M)=0.01626 *24*; α(N+..)=0.00498 *8* $\gamma(\theta)$: A_2=−0.38 *4*; A_4=−0.01 *6*. δ: from $\gamma(\theta)$.
305.8 *5*	1.6[‡] *8*	1924.0	17/2$^-$	1618.4	15/2$^-$	M1+E2	0.11 *+3−4*	0.369	α(K)=0.302 *5*; α(L)=0.0512 *8*; α(M)=0.01196 *18*;

$\gamma(^{195}Tl)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[&]	α[a]	Comments
									α(N+..)=0.00366 *6* $\gamma(\theta)$: A_2=−0.04 *4*; A_4=+0.01 *6*. δ: from $\gamma(\theta)$.
311.4 *5*	10 *3*	2840.6	21/2$^+$	2529.5	19/2$^+$	M1+E2	0.23 *5*	0.341 *8*	α(K)=0.279 *7*; α(L)=0.0480 *9*; α(M)=0.01124 *19*; α(N+..)=0.00344 *6* $\gamma(\theta)$: A_2=−0.54 *5*; A_4=−0.01 *8*. δ: from $\gamma(\theta)$.
312.3 *5*	6.4 *20*	3513.7	25/2$^+$	3201.7	23/2$^+$	M1+E2	0.27 *6*	0.334 *9*	α(K)=0.272 *8*; α(L)=0.0473 *9*; α(M)=0.01108 *20*; α(N+..)=0.00339 *7* $\gamma(\theta)$: A_2=−0.64 *5*; A_4=+0.02 *8*. δ: from $\gamma(\theta)$.
313.22 *12*	20 *4*	1190.0	13/2$^-$	876.8	11/2$^-$	M1+E2	0.38 *10*	0.317 *16*	α(K)=0.257 *15*; α(L)=0.0459 *13*; α(M)=0.0108 *3*; α(N+..)=0.00329 *9* E_γ: from 1977CoZM (^{195}Pb decay). $\gamma(\theta)$: A_2=−0.54 *5*; A_4=−0.02 *8*. δ: from $\gamma(\theta)$.
316.8 *3*	12.5 *15*	2529.5	19/2$^+$	2212.7	17/2$^+$	M1+E2	0.21 *4*	0.328 *7*	α(K)=0.268 *6*; α(L)=0.0459 *8*; α(M)=0.01074 *17*; α(N+..)=0.00329 *5* $\gamma(\theta)$: A_2=−0.51 *3*; A_4=−0.01 *5*. δ: from $\gamma(\theta)$.
361.1 *3*	6.3 *7*	3201.7	23/2$^+$	2840.6	21/2$^+$	M1+E2	0.23 *4*	0.228 *5*	α(K)=0.187 *4*; α(L)=0.0319 *6*; α(M)=0.00746 *12*; α(N+..)=0.00228 *4* $\gamma(\theta)$: A_2=−0.56 *3*; A_4=−0.03 *5*. δ: from $\gamma(\theta)$.
383.6 *3*	94 *8*	383.6	3/2$^+$	0.0	1/2$^+$	M1+E2	1.8 *+4−3*	0.090 *11*	α(K)=0.067 *10*; α(L)=0.0176 *10*; α(M)=0.00430 *22*; α(N+..)=0.00130 *7* δ: from K/L (1963Di10) ^{195}Tl IT decay. $\gamma(\theta)$: A_2=0.00 *2*; A_4=−0.01 *3*.
392.8 *5*	4.6[‡] *11*	2011.2	17/2$^-$	1618.4	15/2$^-$	(M1+E2)[@]	0.42 *13*	0.168 *12*	α(K)=0.137 *11*; α(L)=0.0241 *11*; α(M)=0.00565 *24*; α(N+..)=0.00173 *8* Mult.: doublet $\gamma(\theta)$: A_2=−0.68 *2*, A_4=+0.01 *3* for 392.8γ + 394.2γ.
394.2 *3*	54 *5*	876.8	11/2$^-$	482.7	9/2$^-$	M1+E2	0.42 *13*	0.167 *12*	α(K)=0.136 *10*; α(L)=0.0239 *11*; α(M)=0.00560 *24*; α(N+..)=0.00171 *8* Mult.: doublet $\gamma(\theta)$: A_2=−0.68 *2*, A_4=+0.01 *3* for 392.8γ + 394.2γ.
[x]402.1 *3*	1.9[‡] *5*					(M1+E2)		0.11 *7*	α(K)=0.09 *6*; α(L)=0.018 *6*; α(M)=0.0044 *13*; α(N+..)=0.0013 *5* $\gamma(\theta)$: A_2=−0.48 *5*; A_4=+0.01 *8*.
418.5 *3*	4.0 *6*	2037.0	15/2$^+$	1618.4	15/2$^-$	(E1)		0.01350	α(K)=0.01115 *16*; α(L)=0.00180 *3*; α(M)=0.000418 *6*; α(N+..)=0.0001265 *18* $\gamma(\theta)$: A_2=+0.29 *10*; A_4=−0.07 *15*.
428.6 *3*	10.7[‡] *20*	1618.4	15/2$^-$	1190.0	13/2$^-$	M1+E2	0.34 *6*	0.138 *5*	α(K)=0.113 *4*; α(L)=0.0195 *5*; α(M)=0.00455 *11*; α(N+..)=0.00139 *4*

$^{195}_{81}Tl_{114}$-3

γ(^{195}Tl) (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	δ[&]	α[a]	Comments
									γ(θ): A_2=−0.62 *3*; A_4=−0.04 *5*. δ: from γ(θ).
458.7 *3*	15.0 *20*	2469.8	19/2−	2011.2	17/2−	M1+E2	0.75 *15*	0.092 *9*	α(K)=0.074 *8*; α(L)=0.0138 *9*; α(M)=0.00327 *20*; α(N+..)=0.00100 *7* γ(θ): A_2=−0.92 *2*; A_4=+0.08 *3*. δ: from γ(θ).
472.3 *3*	1.8 *6*	3059.4	25/2−	2587.1	21/2−	E2		0.0323	α(K)=0.0227 *4*; α(L)=0.00724 *11*; α(M)=0.00180 *3*; α(N+..)=0.000539 *8* γ(θ): A_2=+0.46 *11*; A_4=0.00 *17*.
492.6 *3*	2.0 *6*	2529.5	19/2+	2037.0	15/2+	E2		0.0292	α(K)=0.0208 *3*; α(L)=0.00634 *9*; α(M)=0.001569 *23*; α(N+..)=0.000472 *7* γ(θ): A_2=+0.20 *13*; A_4=−0.11 *19*.
527.6 *3*	3.5 *7*	3729.4	27/2+	3201.7	23/2+	E2		0.0247	α(K)=0.0179 *3*; α(L)=0.00514 *8*; α(M)=0.001266 *18*; α(N+..)=0.000381 *6* γ(θ): A_2=+0.30 *7*; A_4=−0.11 *10*.
545.7 *3*	3.2 *7*	2469.8	19/2−	1924.0	17/2−	M1+E2	0.57 *16*	0.065 *6*	α(K)=0.053 *5*; α(L)=0.0093 *7*; α(M)=0.00217 *15*; α(N+..)=0.00066 *5* γ(θ): A_2=−0.82 *10*; A_4=+0.09 *15*. δ: from γ(θ).
552.9 *3*	4.8 *7*	2037.0	15/2+	1484.0	13/2−	(E1)		0.00749	α(K)=0.00621 *9*; α(L)=0.000980 *14*; α(M)=0.000227 *4*; α(N+..)=6.87×10^{-5} *10* γ(θ): A_2=−0.23 *7*; A_4=−0.02 *10*.
575.8 *3*	3.4 *5*	2587.1	21/2−	2011.2	17/2−	E2		0.0202	α(K)=0.01495 *21*; α(L)=0.00397 *6*; α(M)=0.000973 *14*; α(N+..)=0.000293 *5* γ(θ): A_2=+0.19 *8*; A_4=−0.05 *12*.
607.2 *3*	8.4 *11*	1484.0	13/2−	876.8	11/2−	M1+E2	0.66 *19*	0.047 *6*	α(K)=0.038 *5*; α(L)=0.0067 *6*; α(M)=0.00157 *14*; α(N+..)=0.00048 *4* γ(θ): A_2=−0.68 *4*; A_4=+0.06 *6*. δ: from γ(θ).
627.7 *3*	5.1 *8*	2840.6	21/2+	2212.7	17/2+	E2		0.01663	α(K)=0.01253 *18*; α(L)=0.00311 *5*; α(M)=0.000757 *11*; α(N+..)=0.000229 *4* γ(θ): A_2=+0.35 *6*; A_4=−0.12 *9*.
663.1 *3*	8.1 *9*	2587.1	21/2−	1924.0	17/2−	E2		0.01474	α(K)=0.01121 *16*; α(L)=0.00268 *4*; α(M)=0.000649 *10*; α(N+..)=0.000196 *3* γ(θ): A_2=+0.30 *4*; A_4=−0.04 *6*.
672.3 *5*	<9.1	3201.7	23/2+	2529.5	19/2+	E2		0.01430	α(K)=0.01091 *16*; α(L)=0.00258 *4*; α(M)=0.000625 *9*; α(N+..)=0.000189 *3* I_γ: doublet=9.1 *11* (for 672.3γ + 673.2γ). Mult.: doublet γ(θ): A_2=+0.30 *4*, A_4=−0.08 *6* for 672.3γ + 673.2γ.
673.2 *5*	<9.1	3513.7	25/2+	2840.6	21/2+	(E2)		0.01426	α(K)=0.01088 *16*; α(L)=0.00257 *4*; α(M)=0.000623 *9*; α(N+..)=0.000188 *3* I_γ: doublet=9.1 *11* (for 672.3γ + 673.2γ). Mult.: doublet γ(θ): A_2=+0.30 *4*, A_4=−0.08 *6* for 672.3γ + 673.2γ.
707.2 *3*	36.0 *28*	1190.0	13/2−	482.7	9/2−	E2		0.01283	α(K)=0.00987 *14*; α(L)=0.00226 *4*; α(M)=0.000545 *8*; α(N+..)=0.0001647 *24* γ(θ): A_2=+0.29 *2*; A_4=−0.07 *3*.
733.9 *3*	12.2 *12*	1924.0	17/2−	1190.0	13/2−	E2		0.01186	α(K)=0.00917 *13*; α(L)=0.00205 *3*; α(M)=0.000494 *7*; α(N+..)=0.0001493 *21* γ(θ): A_2=+0.26 *4*; A_4=−0.09 *6*.
741.5 *3*	11.5 *11*	1618.4	15/2−	876.8	11/2−	E2		0.01161	α(K)=0.00899 *13*; α(L)=0.00199 *3*; α(M)=0.000480 *7*; α(N+..)=0.0001453 *21* γ(θ): A_2=+0.28 *3*; A_4=−0.09 *5*.

$^{195}_{81}Tl_{114}$-4

$\gamma(^{195}Tl)$ (continued)

E_γ	I_γ[†]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	α[a]	Comments
821.3 *3*	13.1 *21*	2011.2	17/2$^-$	1190.0	13/2$^-$	E2	0.00939	α(K)=0.00737 *11*; α(L)=0.001542 *22*; α(M)=0.000369 *6*; α(N+..)=0.0001118 *16* $\gamma(\theta)$: A_2=+0.32 *3*; A_4=−0.07 *5*.
847.1 *5*	20 *7*	2037.0	15/2$^+$	1190.0	13/2$^-$	(E1)	0.00326	α(K)=0.00272 *4*; α(L)=0.000414 *6*; α(M)=9.55×10^{-5} *14*; α(N+..)=2.90×10^{-5} *4* $\gamma(\theta)$: A_2=−0.15 *5*; A_4=−0.01 *8*.
851.3 *3*	2.5 *12*	2469.8	19/2$^-$	1618.4	15/2$^-$	E2	0.00873	α(K)=0.00688 *10*; α(L)=0.001413 *20*; α(M)=0.000338 *5*; α(N+..)=0.0001023 *15* $\gamma(\theta)$: A_2=+0.42 *20*; A_4=−0.48 *30*.

† Normalized to I(γ+ce)(383.6γ)=100.
‡ Intensities determined from γ-γ coincidence experiment.
# Based on ^{195}Pb ε decay data, intensity balance considerations, and $\gamma(\theta)$.
@ From $\gamma(\theta)$ and known $\Delta\pi$.
& From $\gamma(\theta)$ A_2 and A_4: 1977LiZG, 1974Ne16, except as noted.
a 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.
x γ ray not placed in level scheme.

^{197}Au(α,6nγ) 1978Li10

Level Scheme

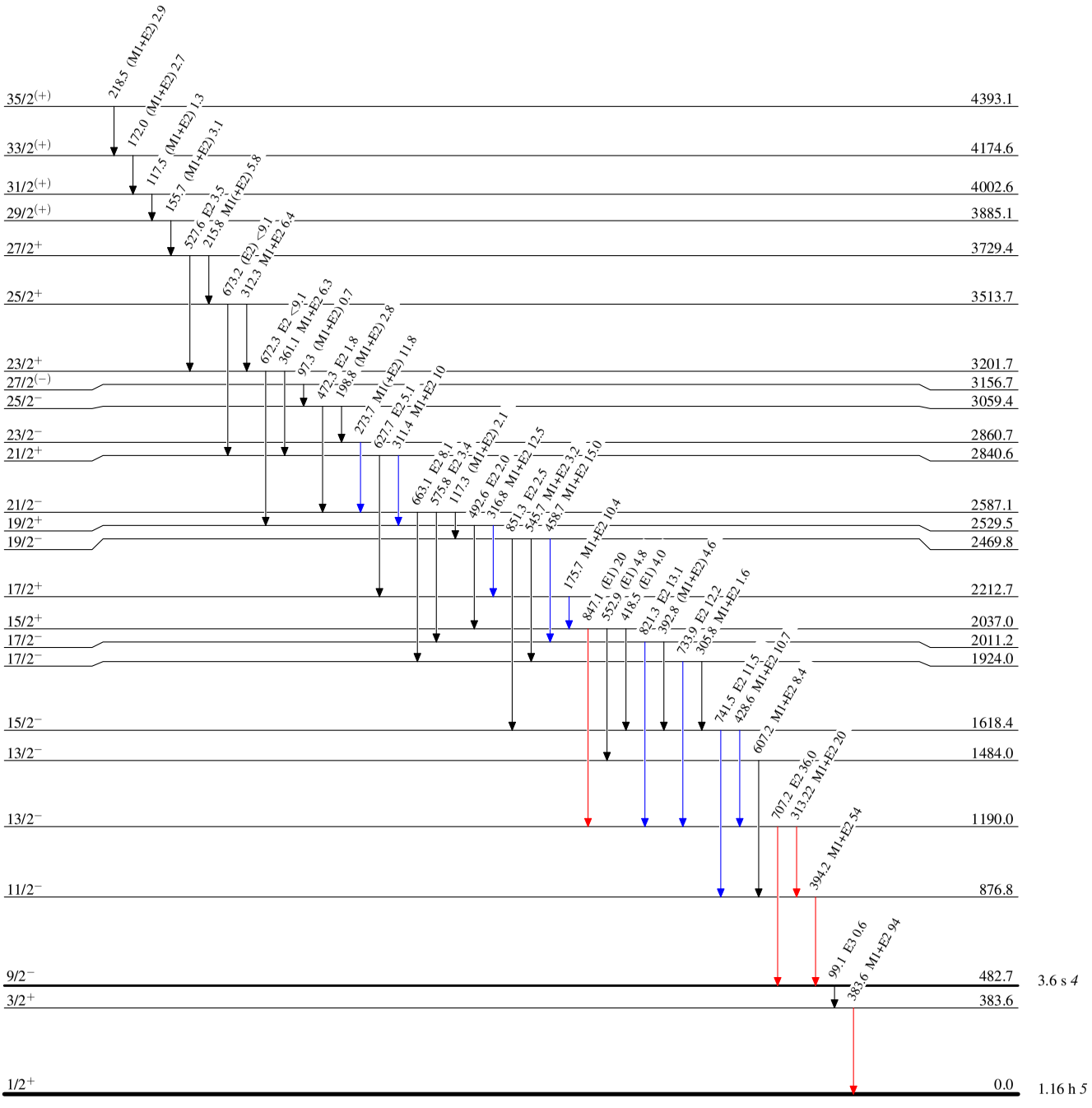
Intensities: Relative I_γ

Legend

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

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

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



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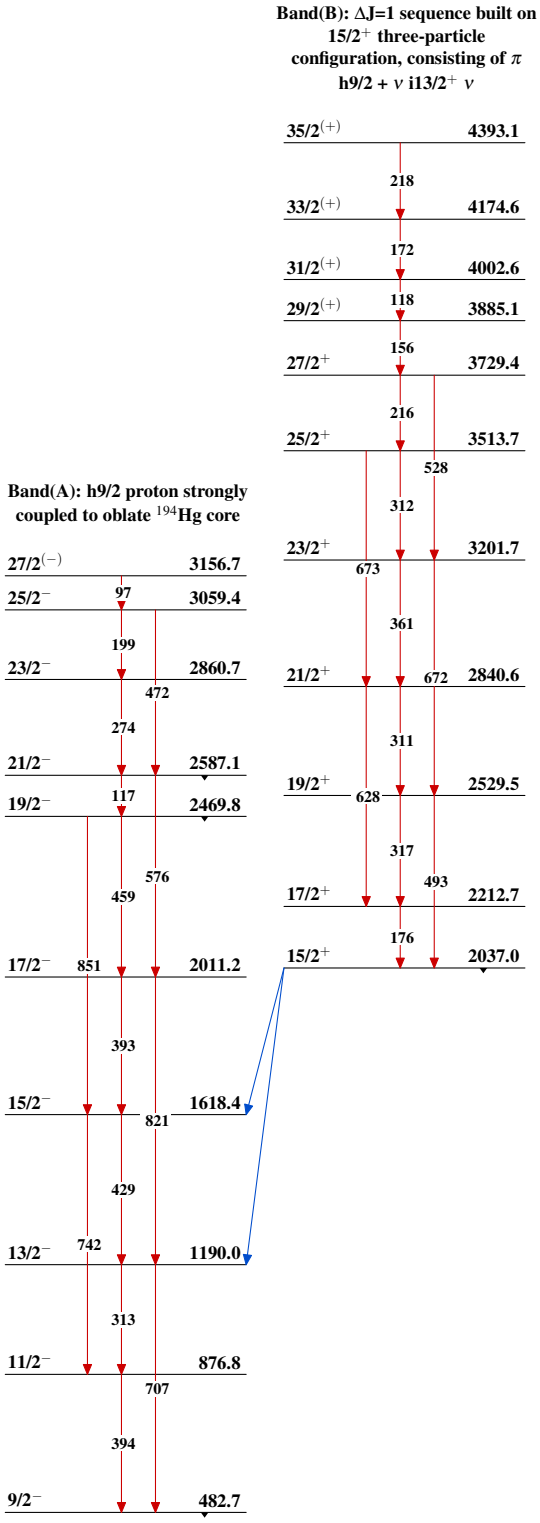

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