

**Adopted Levels, Gammas**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	M. S. Basunia	NDS 195,368 (2024)	1-Dec-2023

$Q(\beta^-)=-5992$  10;  $S(n)=9988$  10;  $S(p)=2201$  18;  $Q(\alpha)=4321$  24 [2021Wa16](#)

$^{191}\text{Tl}$  Levels

Cross Reference (XREF) Flags

<b>A</b>	$^{191}\text{Pb}$ $\varepsilon$ decay (2.18 min)	<b>D</b>	(HI,xn $\gamma$ )
<b>B</b>	$^{195}\text{Bi}$ $\alpha$ decay (183 s)	<b>E</b>	(HI,xn $\gamma$ ):SD
<b>C</b>	$^{195}\text{Bi}$ $\alpha$ decay (87 s)		

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	T <sub>1/2</sub>	XREF	Comments
0.0	1/2 <sup>+</sup>		<b>ABC</b>	<p><math>\mu=1.582</math> 4  <math>\% \varepsilon + \% \beta^+ = ?, \% \alpha = ?</math>                      J<sup>π</sup>: populated in <math>^{195}\text{Bi}</math> (J<sup>π</sup>=1/2<sup>+</sup>) unhindered <math>\alpha</math> decay (87 s). J<sup>π</sup>=1/2<sup>+</sup> g.s. occurs in heavier odd-A Tl isotopes.                      T<sub>1/2</sub>: Unobserved activity. T<sub>1/2</sub>=20 min in NUBASE (<a href="#">2021Ko17</a>) from systematics.                      RMS charge radius: 5.414 fm 7 (<a href="#">2004An14</a>).                      Isotope shift (IS): <math>\Delta \langle r^2 \rangle = -0.627</math> fm<sup>2</sup> 66 (<a href="#">1992Me07</a>), with respect to <math>^{205}\text{Tl}</math>.  <a href="#">2013Ba41</a> list <math>\Delta \langle r^2 \rangle = -0.6544</math> 7 (stat) 460 (syst) from <a href="#">1992Me07</a>.  <math>\mu</math>: From <a href="#">2019StZV</a>, <a href="#">1992Me07</a> – collinear fast beam laser spectroscopy.</p>
297 <sup>#</sup> 7	9/2 <sup>(-)</sup>	5.22 min 16	<b>AB D</b>	<p><math>\mu=+3.78</math> 2; <math>Q=-2.23</math> 2  <a href="#">Additional information 1</a>.                      E(level): From <a href="#">2021Ko07</a> – NUBASE. Also 297 keV 7 in <math>^{195}\text{Bi}</math> <math>\alpha</math> decay (183 s) (<a href="#">1985Co06</a>).                      J<sup>π</sup>: atomic beam (<a href="#">1984Be40</a>). Energy systematics of the 9/2<sup>-</sup> state in A=183-193 odd-mass Tl isotopes. Configuration: <math>\pi</math> (h<sub>9/2</sub>)<sup>1</sup> (<a href="#">2013Ba41</a>).                      T<sub>1/2</sub>: From <a href="#">1974Va19</a>, based on several <math>\gamma(t)</math> (earlier value 5.2 min 4 (<a href="#">1970FeZU</a>) – same research group). Other values: 5.42 min 30 (<a href="#">1988WoZZ</a>), 5.8 min 5 (<a href="#">1975UnZZ</a>), 6 min 1 (<a href="#">1974ZgZY</a>).  <math>\% \varepsilon + \% \beta^+ = 100</math> <math>\% \varepsilon = 98.2 + 6 - 17</math>, <math>\% \beta^+ = 1.8 + 17 - 6</math> (<a href="#">1974Ma14</a>). Other: <math>\% \beta^+ &lt; 3</math> (<a href="#">1974Va19</a>).  <math>\mu</math>: From <a href="#">2019StZV</a>, <a href="#">2012Ba32</a> (Resonance ionization spectroscopy). Others: +3.903 3 (<a href="#">1987Bo44</a> – collinear fast beam laser spectroscopy), 3.880 7 (<a href="#">1992Me07</a> – collinear fast beam laser spectroscopy).                      Q: From <a href="#">2016St14</a>, <a href="#">1992Me07</a> – collinear fast beam laser spectroscopy. Others: 2.28 eb 3 (<a href="#">1987Bo44</a> – collinear fast beam laser spectroscopy (no Sternheimer correction)), -2.27 eb 3 (<a href="#">1985Bo46</a>).                      Isotope shift (IS): <math>\Delta \langle r^2 \rangle = -0.471</math> fm<sup>2</sup> 56 (<a href="#">1992Me07</a>), with respect to <math>^{205}\text{Tl}</math>.  <a href="#">2013Ba41</a> list <math>\Delta \langle r^2 \rangle = -0.4899</math> 6 (IS unc) 340 (sys. unc) referring from <a href="#">1992Me07</a>. Others: -0.43 fm<sup>2</sup> 5 (<a href="#">1987Bo44</a>) listed in previous evaluation (<a href="#">2007Va21</a>) most likely based on reported IS -8.265 GHz 65 (<a href="#">1987Bo44</a>) with respect to <math>^{205}\text{Tl}</math>.</p>
341.20 <sup>e</sup> 20	(3/2 <sup>+</sup> )		<b>A C</b>	<p>E(level): from <math>^{191}\text{Pb}</math> <math>\varepsilon</math> decay. Other: 341 keV 7 from <math>^{195}\text{Bi}</math> (87 s) <math>\alpha</math> decay.                      J<sup>π</sup>: from systematic trends for the 3/2<sup>+</sup> state in <math>^{185-201}\text{Tl}</math> odd-A nuclei, which indicate an energy in the range of about 330-350 keV for the 3/2<sup>+</sup> level in <math>^{191}\text{Tl}</math> (see e.g. <a href="#">1981Mi11</a>).</p>
684.21 <sup>#</sup> 14	(11/2 <sup>-</sup> )		<b>A D</b>	
745.37 <sup>e</sup> 3	(5/2 <sup>+</sup> )		<b>A</b>	
857.70 17	(7/2 <sup>-</sup> )		<b>A</b>	J <sup>π</sup> : 560.6 $\gamma$ to 9/2 <sup>-</sup> .
1009.29 <sup>#</sup> 16	(13/2 <sup>-</sup> )		<b>A D</b>	

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Adopted Levels, Gammas (continued) $^{191}\text{Tl}$  Levels (continued)

E(level) <sup>†</sup>	J $\pi$ <sup>‡</sup>	XREF	Comments
1170.80 17	(9/2 <sup>-</sup> )	A	J $\pi$ : 873.9 $\gamma$ to 9/2 <sup>-</sup> , 313.0 $\gamma$ to (7/2 <sup>-</sup> ).
1216.6 <sup>e</sup> 3	(7/2 <sup>+</sup> )	A	
1297.54 <sup>@</sup> 21	(13/2 <sup>+</sup> )	A D	
1390.11 16	(13/2 <sup>-</sup> )	A	J $\pi$ : 705.7 $\gamma$ to (11/2 <sup>-</sup> ), 1093.3 $\gamma$ to 9/2 <sup>-</sup> .
1436.9 <sup>#</sup> 3	(15/2 <sup>-</sup> )	D	J $\pi$ : 427.3 $\gamma$ to (13/2 <sup>-</sup> ), 752.8 $\gamma$ to (11/2 <sup>-</sup> ).
1702.0 <sup>@</sup> 4	(15/2 <sup>+</sup> )	A D	
1758.3 <sup>#</sup> 4	(17/2 <sup>-</sup> )	D	
1927.8 5	(17/2 <sup>-</sup> )	D	J $\pi$ : 490.4 $\gamma$ to (15/2 <sup>-</sup> ), 918.5 $\gamma$ to (13/2 <sup>-</sup> ).
2008.0 <sup>@</sup> 4	(17/2 <sup>+</sup> )	D	
2074.4 <sup>&amp;</sup> 4	(17/2 <sup>+</sup> )	D	
2180.9 <sup>@</sup> 4	(19/2 <sup>+</sup> )	D	
2230.1 <sup>#</sup> 4	(19/2 <sup>-</sup> )	D	
2318.3 <sup>@</sup> 4	(21/2 <sup>+</sup> )	D	
2326.4 <sup>a</sup> 4	(21/2 <sup>+</sup> )	D	
2386.0 4	(19/2 <sup>-</sup> )	D	J $\pi$ : 457.8 $\gamma$ to (17/2 <sup>-</sup> ), 948.3 $\gamma$ to (15/2 <sup>-</sup> ).
2406.0 <sup>b</sup> 4	(19/2 <sup>-</sup> )	D	
2429.1 <sup>&amp;</sup> 4	(19/2 <sup>+</sup> )	D	
2483.9 <sup>@</sup> 4	(21/2 <sup>+</sup> )	D	
2598.9 <sup>#</sup> 4	(21/2 <sup>-</sup> )	D	
2620.6 <sup>b</sup> 4	(21/2 <sup>-</sup> )	D	
2639.3 <sup>a</sup> 4	(23/2 <sup>+</sup> )	D	
2673.4 <sup>@</sup> 4	(23/2 <sup>+</sup> )	D	
2735.8 <sup>&amp;</sup> 4	(21/2 <sup>+</sup> )	D	
2850.4 <sup>#</sup> 5	(23/2 <sup>-</sup> )	D	
2860.0 <sup>b</sup> 5	(23/2 <sup>-</sup> )	D	
2880.0 <sup>&amp;</sup> 5	(23/2 <sup>+</sup> )	D	
2953.0 <sup>@</sup> 5	(25/2 <sup>+</sup> )	D	
2966.0 <sup>a</sup> 5	(25/2 <sup>+</sup> )	D	
3075.7 <sup>#</sup> 5	(25/2 <sup>-</sup> )	D	
3092.0 <sup>b</sup> 6	(25/2 <sup>-</sup> )	D	
3128.3 <sup>&amp;</sup> 5	(25/2 <sup>+</sup> )	D	
3320.8 <sup>@</sup> 5	(27/2 <sup>+</sup> )	D	
3341.2 <sup>a</sup> 6	(27/2 <sup>+</sup> )	D	
3444.9 <sup>#</sup> 6	(27/2 <sup>-</sup> )	D	
3592.8 <sup>@</sup> 6	(29/2 <sup>+</sup> )	D	
3671.9 <sup>a</sup> 6	(29/2 <sup>+</sup> )	D	
3761.5 <sup>#</sup> 6	(29/2 <sup>-</sup> )	D	
3961.1 <sup>a</sup> 6	(31/2 <sup>+</sup> )	D	
4120.7 <sup>a</sup> 7	(33/2 <sup>+</sup> )	D	
4193.2 <sup>#</sup> 7	(31/2 <sup>-</sup> )	D	
4321.6 <sup>a</sup> 7	(35/2 <sup>+</sup> )	D	
4510.9 <sup>a</sup> 7	(37/2 <sup>+</sup> )	D	
4565.0 <sup>#</sup> 8	(33/2 <sup>-</sup> )	D	
4791.1 <sup>a</sup> 11	(39/2 <sup>+</sup> )	D	
5029.2 <sup>#</sup> 8	(35/2 <sup>-</sup> )	D	
5074.3 <sup>a</sup> 11	(41/2 <sup>+</sup> )	D	

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**Adopted Levels, Gammas (continued)**

$^{191}\text{Tl}$  Levels (continued)

E(level) <sup>†</sup>	J <sup>π</sup> <sup>‡</sup>	XREF	Comments
5424.7 <sup>#</sup> 9	(37/2 <sup>-</sup> )	D	
5428.8 <sup>a</sup> 12	(43/2 <sup>+</sup> )	D	
5791.8 <sup>a</sup> 12	(45/2 <sup>+</sup> )	D	
0.0+x <sup>c</sup>	J	E	Additional information 2. J <sup>π</sup> : J≈(23/2 <sup>+</sup> ), from 1998Re04, in (HI,xnγ):SD dataset. See also 1992Ha35.
131.4+x <sup>d</sup> 6	J+1	E	
276.6+x <sup>c</sup> 4	J+2	E	
427.5+x <sup>d</sup> 6	J+3	E	
594.3+x <sup>c</sup> 5	J+4	E	
764.7+x <sup>d</sup> 6	J+5	E	
953.3+x <sup>c</sup> 5	J+6	E	
1142.5+x <sup>d</sup> 6	J+7	E	
1352.1+x <sup>c</sup> 6	J+8	E	
1559.4+x <sup>d</sup> 6	J+9	E	
1790.4+x <sup>c</sup> 6	J+10	E	
2015.1+x <sup>d</sup> 6	J+11	E	
2267.2+x <sup>c</sup> 6	J+12	E	
2507.7+x <sup>d</sup> 7	J+13	E	
2781.8+x <sup>c</sup> 7	J+14	E	
3037.3+x <sup>d</sup> 7	J+15	E	
3333.2+x <sup>c</sup> 7	J+16	E	
3603.5+x <sup>d</sup> 8	J+17	E	
3920.7+x <sup>c</sup> 8	J+18	E	
4203.6+x <sup>d</sup> 9	J+19	E	
4542.5+x <sup>c</sup> 9	J+20	E	
4837.0+x <sup>d</sup> 10	J+21	E	
5198.8+x <sup>c</sup> 9	J+22	E	
5502.9+x <sup>d</sup> 11	J+23	E	
5888.6+x <sup>c</sup> 10	J+24	E	
6200.4+x <sup>d</sup> 12	J+25	E	
6609.6+x <sup>c</sup> 14	J+26	E	
6928.4+x <sup>d</sup> 16	J+27	E	

<sup>†</sup> From least-squares adjustment to the adopted  $\gamma$ -ray energies, holding 297 keV 7 level energy fixed.  $\Delta E$  for levels depopulate through 297 keV 7 does not include  $\Delta E=7$  keV.

<sup>‡</sup> Adopted from (HI,xn $\gamma$ ) (1995Re18) for normal structures, and from (HI,xn $\gamma$ ):SD, for superdeformed bands, except where noted otherwise. Spin and parity assignments are based on band structure and  $\gamma$ -ray decay patterns, and on the energy systematics of levels with known spin and parity in other odd-A Tl isotopes.

# Band(A): 9/2[505]  $\pi=-$  rotational band. See comments for this band in (HI,xn $\gamma$ ) dataset.

@ Band(B): (13/2<sup>+</sup>) single-particle like structure (1995Re18) See also comments for this structure in (HI,xn $\gamma$ ) dataset.

& Band(C): (17/2<sup>+</sup>) band fragment See comments for this band in (HI,xn $\gamma$ ) dataset.

<sup>a</sup> Band(D):  $\pi=+$  rotational band, possible conf 13/2[606] (1995Re18) See comments for this structure in (HI,xn $\gamma$ ) dataset.

<sup>b</sup> Band(E): (19/2<sup>-</sup>) band fragment See comments for this structure in (HI,xn $\gamma$ ) dataset.

<sup>c</sup> Band(F): SD-1 band  $\alpha=-1/2$  (1994Pi01,1998Re04).  $Q_0=18.6$  eb +10-8 (2000Re10). Other values: 18 eb  $I$ , from tentative average value for SD-1 and SD-2 bands (1998Re04). SD-1 and SD-2 are interpreted as signature partners arising from the  $\pi 5/2[642]$  orbital. Population of the SD bands is  $\approx 0.4\%$  of the reaction channel.

<sup>d</sup> Band(G): SD-2 band  $\alpha=+1/2$  (1994Pi01,1998Re04).  $Q_0=17.7$  eb +8-10 (2000Re10). Other values: 18 eb  $I$ , from tentative

**Adopted Levels, Gammas (continued)**

$^{191}\text{Tl}$  Levels (continued)

average value for SD-1 and SD-2 bands (1998Re04). See comments for SD-1.

<sup>e</sup> Possible member of  $K^\pi=(3/2^+)$  rotational band.

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^a$	$E_f$	$J_f^\pi$	$\gamma(^{191}\text{Tl})$	Comments
341.20	(3/2 <sup>+</sup> )	341.2 <sup>#</sup> 2	100	0.0	1/2 <sup>+</sup>		
684.21	(11/2 <sup>-</sup> )	387.1 <sup>#</sup> 2	100	297	9/2 <sup>(-)</sup>		$E_\gamma$ : Other: 387.4 4 in (HI,xn $\gamma$ ).
745.3?	(5/2 <sup>+</sup> )	404.0 <sup>de</sup> 2	100 <sup>d</sup>	341.20	(3/2 <sup>+</sup> )		
857.70	(7/2 <sup>-</sup> )	560.6 <sup>#</sup> 2	100	297	9/2 <sup>(-)</sup>		
1009.29	(13/2 <sup>-</sup> )	325.0 <sup>#</sup> 2	59 2	684.21	(11/2 <sup>-</sup> )		$E_\gamma$ : Other: 325.2 3 in (HI,xn $\gamma$ ). $I_\gamma$ : Other: $I_\gamma(712)/I_\gamma(325)=0.75$ 20 (HI,xn $\gamma$ ). $E_\gamma$ : Other: 712.6 7 (HI,xn $\gamma$ ).
		712.2 <sup>#</sup> 2	100 7	297	9/2 <sup>(-)</sup>		
1170.80	(9/2 <sup>-</sup> )	313.0 <sup>‡</sup> 2	35 4	857.70	(7/2 <sup>-</sup> )		
		873.9 <sup>‡</sup> 2	100 4	297	9/2 <sup>(-)</sup>		
1216.6	(7/2 <sup>+</sup> )	471.3 <sup>‡</sup> 2	67 33	745.3?	(5/2 <sup>+</sup> )		
		875.5 <sup>‡</sup> 2	100 7	341.20	(3/2 <sup>+</sup> )		
1297.54	(13/2 <sup>+</sup> )	288.1 3		1009.29	(13/2 <sup>-</sup> )		
		613.5 <sup>#</sup> 2		684.21	(11/2 <sup>-</sup> )		$E_\gamma$ : Other: 613.7 6 in (HI,xn $\gamma$ ). $I_\gamma$ : 100 13 (HI,xn $\gamma$ ) and 100 $^{191}\text{Pb}$ $\epsilon$ decay (2.18 m).
1390.11	(13/2 <sup>-</sup> )	705.7 <sup>‡</sup> 2	100 13	684.21	(11/2 <sup>-</sup> )		
		1093.3 <sup>‡</sup> 2	94 13	297	9/2 <sup>(-)</sup>		
1436.9	(15/2 <sup>-</sup> )	427.3 4		1009.29	(13/2 <sup>-</sup> )		
		752.8 8		684.21	(11/2 <sup>-</sup> )		
1702.0	(15/2 <sup>+</sup> )	404.6 4	100	1297.54	(13/2 <sup>+</sup> )		
1758.3	(17/2 <sup>-</sup> )	321.3 3		1436.9	(15/2 <sup>-</sup> )		
		748.8 8		1009.29	(13/2 <sup>-</sup> )		
1927.8	(17/2 <sup>-</sup> )	490.4 5		1436.9	(15/2 <sup>-</sup> )		
		918.5 9		1009.29	(13/2 <sup>-</sup> )		
2008.0	(17/2 <sup>+</sup> )	306.0 3		1702.0	(15/2 <sup>+</sup> )		
		571.6 6		1436.9	(15/2 <sup>-</sup> )		
		710.9 7		1297.54	(13/2 <sup>+</sup> )		
2074.4	(17/2 <sup>+</sup> )	372.4 4		1702.0	(15/2 <sup>+</sup> )		
		777.4 8		1297.54	(13/2 <sup>+</sup> )		
2180.9	(19/2 <sup>+</sup> )	106.6 2		2074.4	(17/2 <sup>+</sup> )		
		173.0 2		2008.0	(17/2 <sup>+</sup> )		
		422.9 4		1758.3	(17/2 <sup>-</sup> )		
2230.1	(19/2 <sup>-</sup> )	471.6 5		1758.3	(17/2 <sup>-</sup> )		
		792.8 8		1436.9	(15/2 <sup>-</sup> )		
2318.3	(21/2 <sup>+</sup> )	137.3 2	100	2180.9	(19/2 <sup>+</sup> )		
2326.4	(21/2 <sup>+</sup> )	145.5 2	100	2180.9	(19/2 <sup>+</sup> )		
2386.0	(19/2 <sup>-</sup> )	457.8 5		1927.8	(17/2 <sup>-</sup> )		
		948.3 10		1436.9	(15/2 <sup>-</sup> )		
2406.0	(19/2 <sup>-</sup> )	175.9 2		2230.1	(19/2 <sup>-</sup> )		
		225.4 <sup>e</sup> 2		2180.9	(19/2 <sup>+</sup> )		
		647.3 7		1758.3	(17/2 <sup>-</sup> )		
2429.1	(19/2 <sup>+</sup> )	248.2 3		2180.9	(19/2 <sup>+</sup> )		
		354.4 4		2074.4	(17/2 <sup>+</sup> )		
2483.9	(21/2 <sup>+</sup> )	165.5 2		2318.3	(21/2 <sup>+</sup> )		
		303.4 3		2180.9	(19/2 <sup>+</sup> )		
2598.9	(21/2 <sup>-</sup> )	193.0 <sup>e</sup> 2		2406.0	(19/2 <sup>-</sup> )		
		212.8 2		2386.0	(19/2 <sup>-</sup> )		

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**Adopted Levels, Gammas (continued)**

$\gamma(^{191}\text{Tl})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^a$	$E_f$	$J_f^\pi$	Comments
2598.9	(21/2 <sup>-</sup> )	368.7 4		2230.1	(19/2 <sup>-</sup> )	
		839.8 8		1758.3	(17/2 <sup>-</sup> )	
2620.6	(21/2 <sup>-</sup> )	214.6 2	100	2406.0	(19/2 <sup>-</sup> )	
2639.3	(23/2 <sup>+</sup> )	312.8 3		2326.4	(21/2 <sup>+</sup> )	
		321.0 3		2318.3	(21/2 <sup>+</sup> )	
		458.6 5		2180.9	(19/2 <sup>+</sup> )	
2673.4	(23/2 <sup>+</sup> )	189.6 2		2483.9	(21/2 <sup>+</sup> )	
		244.2 3		2429.1	(19/2 <sup>+</sup> )	
		269.2 <sup>e</sup> 3		2406.0	(19/2 <sup>-</sup> )	
2735.8	(21/2 <sup>+</sup> )	252.0 3		2483.9	(21/2 <sup>+</sup> )	
		306.6 3		2429.1	(19/2 <sup>+</sup> )	
2850.4	(23/2 <sup>-</sup> )	251.5 3	100	2598.9	(21/2 <sup>-</sup> )	
2860.0	(23/2 <sup>-</sup> )	239.4 3	100	2620.6	(21/2 <sup>-</sup> )	
2880.0	(23/2 <sup>+</sup> )	144.2 2		2735.8	(21/2 <sup>+</sup> )	
		282.8 <sup>e</sup> 3		2598.9	(21/2 <sup>-</sup> )	
2953.0	(25/2 <sup>+</sup> )	279.5 <sup>c</sup> 3	100	2673.4	(23/2 <sup>+</sup> )	
2966.0	(25/2 <sup>+</sup> )	326.7 3		2639.3	(23/2 <sup>+</sup> )	
		639.6 6		2326.4	(21/2 <sup>+</sup> )	
3075.7	(25/2 <sup>-</sup> )	225.3 2		2850.4	(23/2 <sup>-</sup> )	
		476.8 5		2598.9	(21/2 <sup>-</sup> )	
3092.0	(25/2 <sup>-</sup> )	232.0 2	100	2860.0	(23/2 <sup>-</sup> )	
3128.3	(25/2 <sup>+</sup> )	248.4 3	100	2880.0	(23/2 <sup>+</sup> )	
3320.8	(27/2 <sup>+</sup> )	192.5 2		3128.3	(25/2 <sup>+</sup> )	
		367.8 4		2953.0	(25/2 <sup>+</sup> )	
3341.2	(27/2 <sup>+</sup> )	375.0 4		2966.0	(25/2 <sup>+</sup> )	
		702.0 7		2639.3	(23/2 <sup>+</sup> )	
3444.9	(27/2 <sup>-</sup> )	369.1 4		3075.7	(25/2 <sup>-</sup> )	
		594.6 6		2850.4	(23/2 <sup>-</sup> )	
3592.8	(29/2 <sup>+</sup> )	272.0 3	100	3320.8	(27/2 <sup>+</sup> )	
3671.9	(29/2 <sup>+</sup> )	330.6 3		3341.2	(27/2 <sup>+</sup> )	
		706.2 7		2966.0	(25/2 <sup>+</sup> )	
3761.5	(29/2 <sup>-</sup> )	316.6 3		3444.9	(27/2 <sup>-</sup> )	
		685.8 7		3075.7	(25/2 <sup>-</sup> )	
3961.1	(31/2 <sup>+</sup> )	289.1 3		3671.9	(29/2 <sup>+</sup> )	
		620.0 6		3341.2	(27/2 <sup>+</sup> )	
4120.7	(33/2 <sup>+</sup> )	159.6 2		3961.1	(31/2 <sup>+</sup> )	
		449.0 5		3671.9	(29/2 <sup>+</sup> )	
4193.2	(31/2 <sup>-</sup> )	431.7 4		3761.5	(29/2 <sup>-</sup> )	
		748.6 8		3444.9	(27/2 <sup>-</sup> )	
4321.6	(35/2 <sup>+</sup> )	200.9 2	100	4120.7	(33/2 <sup>+</sup> )	
4510.9	(37/2 <sup>+</sup> )	189.2 2		4321.6	(35/2 <sup>+</sup> )	
		390.4 4		4120.7	(33/2 <sup>+</sup> )	
4565.0	(33/2 <sup>-</sup> )	371.7 4		4193.2	(31/2 <sup>-</sup> )	
		803.2 8		3761.5	(29/2 <sup>-</sup> )	
4791.1	(39/2 <sup>+</sup> )	279.5 <sup>c</sup> 10	100	4510.9	(37/2 <sup>+</sup> )	
5029.2	(35/2 <sup>-</sup> )	464.0 5		4565.0	(33/2 <sup>-</sup> )	
		836.5 8		4193.2	(31/2 <sup>-</sup> )	
5074.3	(41/2 <sup>+</sup> )	282.5 10		4791.1	(39/2 <sup>+</sup> )	
		564.1 10		4510.9	(37/2 <sup>+</sup> )	See footnote for this transition in the (HI,xny) dataset.
5424.7	(37/2 <sup>-</sup> )	395.5 4		5029.2	(35/2 <sup>-</sup> )	
		859.9 9		4565.0	(33/2 <sup>-</sup> )	
5428.8	(43/2 <sup>+</sup> )	354.5 4	100	5074.3	(41/2 <sup>+</sup> )	
5791.8	(45/2 <sup>+</sup> )	363.0 4	100	5428.8	(43/2 <sup>+</sup> )	
131.4+x	J+1	132		0.0+x	J	
276.6+x	J+2	145		131.4+x	J+1	

Continued on next page (footnotes at end of table)

**Adopted Levels, Gammas (continued)**

$\gamma(^{191}\text{Tl})$  (continued)

$E_i(\text{level})$	$J_i^\pi$	$E_\gamma^\dagger$	$I_\gamma^a$	$E_f$	$J_f^\pi$	Mult. <sup>b</sup>
276.6+x	J+2	276.5@ 4	39 4	0.0+x	J	
427.5+x	J+3	150		276.6+x	J+2	
		296.3& 4	20 2	131.4+x	J+1	
594.3+x	J+4	166		427.5+x	J+3	
		317.7@ 3	56 6	276.6+x	J+2	
764.7+x	J+5	170		594.3+x	J+4	
		337.2& 3	31 3	427.5+x	J+3	
953.3+x	J+6	190		764.7+x	J+5	
		359.0@ 2	82 8	594.3+x	J+4	
1142.5+x	J+7	189		953.3+x	J+6	
		377.8& 2	41 4	764.7+x	J+5	
1352.1+x	J+8	209		1142.5+x	J+7	
		398.8@ 2	95 9	953.3+x	J+6	Q
1559.4+x	J+9	208		1352.1+x	J+8	
		416.9& 2	90 9	1142.5+x	J+7	Q
1790.4+x	J+10	230		1559.4+x	J+9	
		438.3@ 2	100 10	1352.1+x	J+8	Q
2015.1+x	J+11	225		1790.4+x	J+10	
		455.7& 2	100 10	1559.4+x	J+9	Q
2267.2+x	J+12	252		2015.1+x	J+11	
		476.8@ 2	97 10	1790.4+x	J+10	Q
2507.7+x	J+13	240		2267.2+x	J+12	
		492.8& 3	100 10	2015.1+x	J+11	Q
2781.8+x	J+14	275		2507.7+x	J+13	
		514.5@ 3	77 8	2267.2+x	J+12	
3037.3+x	J+15	529.6& 3	70 7	2507.7+x	J+13	Q
3333.2+x	J+16	551.4@ 3	70 7	2781.8+x	J+14	Q
3603.5+x	J+17	566.1& 3	52 5	3037.3+x	J+15	Q
3920.7+x	J+18	587.5@ 3	49 5	3333.2+x	J+16	Q
4203.6+x	J+19	600.1& 4	40 4	3603.5+x	J+17	
4542.5+x	J+20	621.8@ 3	31 3	3920.7+x	J+18	
4837.0+x	J+21	633.4& 4	29 3	4203.6+x	J+19	
5198.8+x	J+22	656.3@ 4	21 2	4542.5+x	J+20	
5502.9+x	J+23	665.9& 4	18 2	4837.0+x	J+21	
5888.6+x	J+24	689.8@ 4	19 2	5198.8+x	J+22	
6200.4+x	J+25	697.5& 5	15 2	5502.9+x	J+23	
6609.6+x	J+26	721.0@ 10		5888.6+x	J+24	
6928.4+x	J+27	728.0& 10		6200.4+x	J+25	

† From (HI,xn $\gamma$ ) or (HI,xn $\gamma$ ):SD, except where noted.

‡  $E_\gamma$  and  $I_\gamma$  from  $^{191}\text{Pb}$   $\epsilon$  decay only.

# From  $^{191}\text{Pb}$   $\epsilon$  decay dataset.

@ Transition in SD Band 1.

& Transition in SD Band 2.

<sup>a</sup> From  $^{191}\text{Pb}$   $\epsilon$  decay.  $I_\gamma$  for  $\gamma$  rays from SD bands are relative values within a SD band.

<sup>b</sup> Assignments for transitions within SD bands suggested by 1994Pi01, based on their DCO ratios and the assumption that  $\Delta J=2$

Continued on next page (footnotes at end of table)

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**Adopted Levels, Gammas (continued)** **$\gamma(^{191}\text{Tl})$  (continued)**

transitions are stretched E2 in the dataset. Evaluator assigned as Q.

<sup>c</sup> Multiply placed.

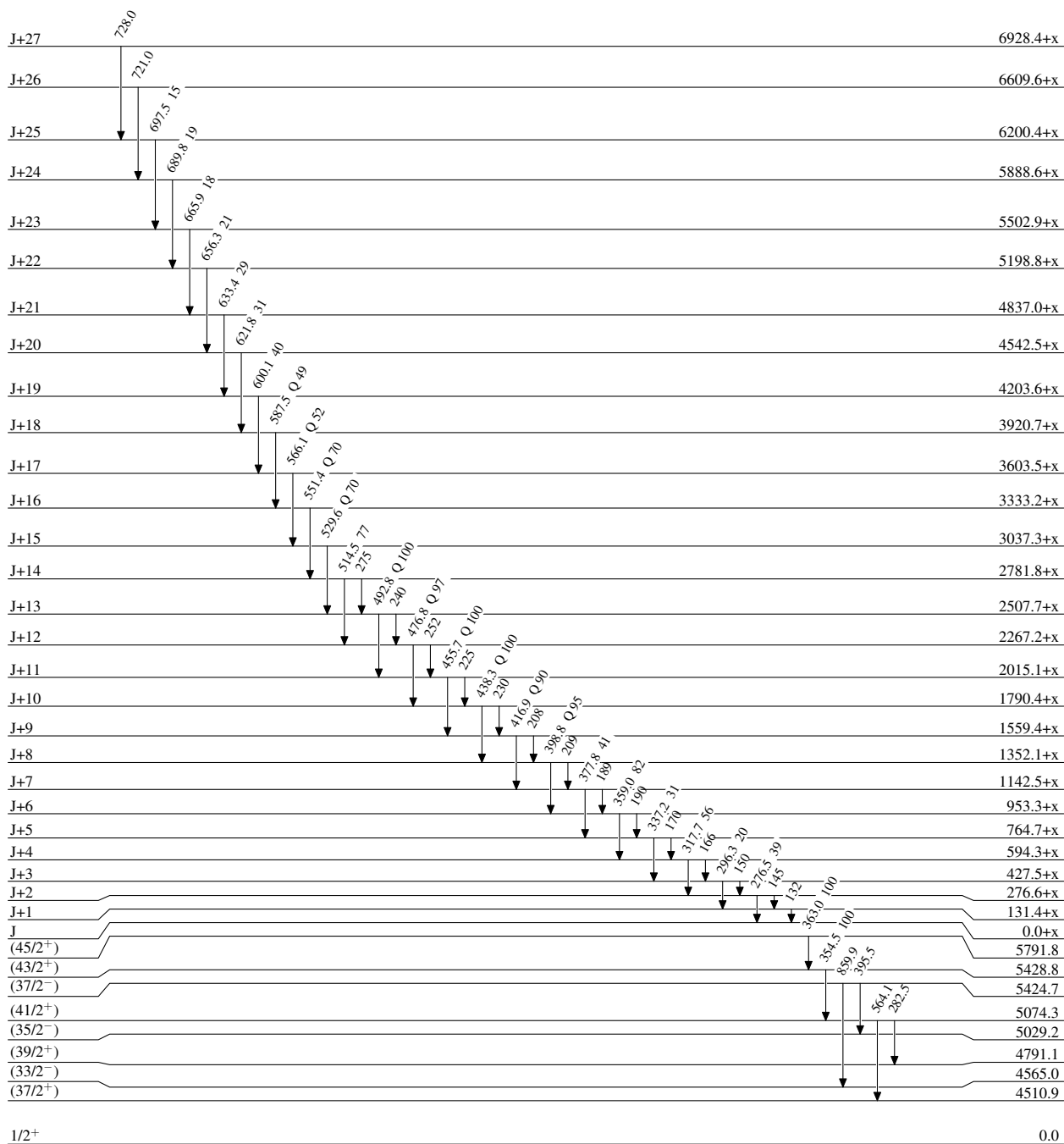
<sup>d</sup> Multiply placed with undivided intensity.

<sup>e</sup> Placement of transition in the level scheme is uncertain.

**Adopted Levels, Gammas**

Level Scheme

Intensities: Relative photon branching from each level





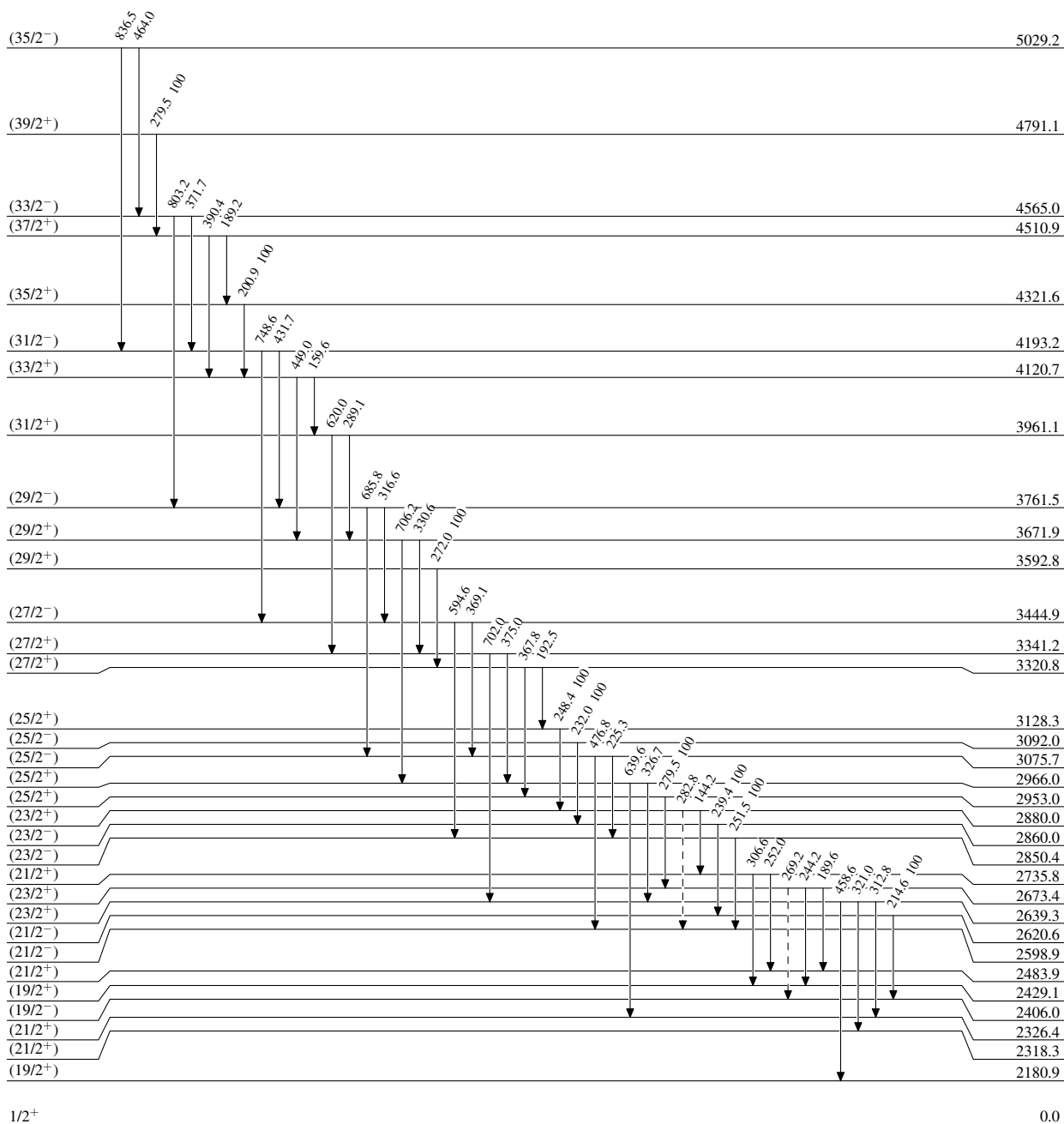
**Adopted Levels, Gammas**

Legend

**Level Scheme (continued)**

Intensities: Relative photon branching from each level

-----▶  $\gamma$  Decay (Uncertain)



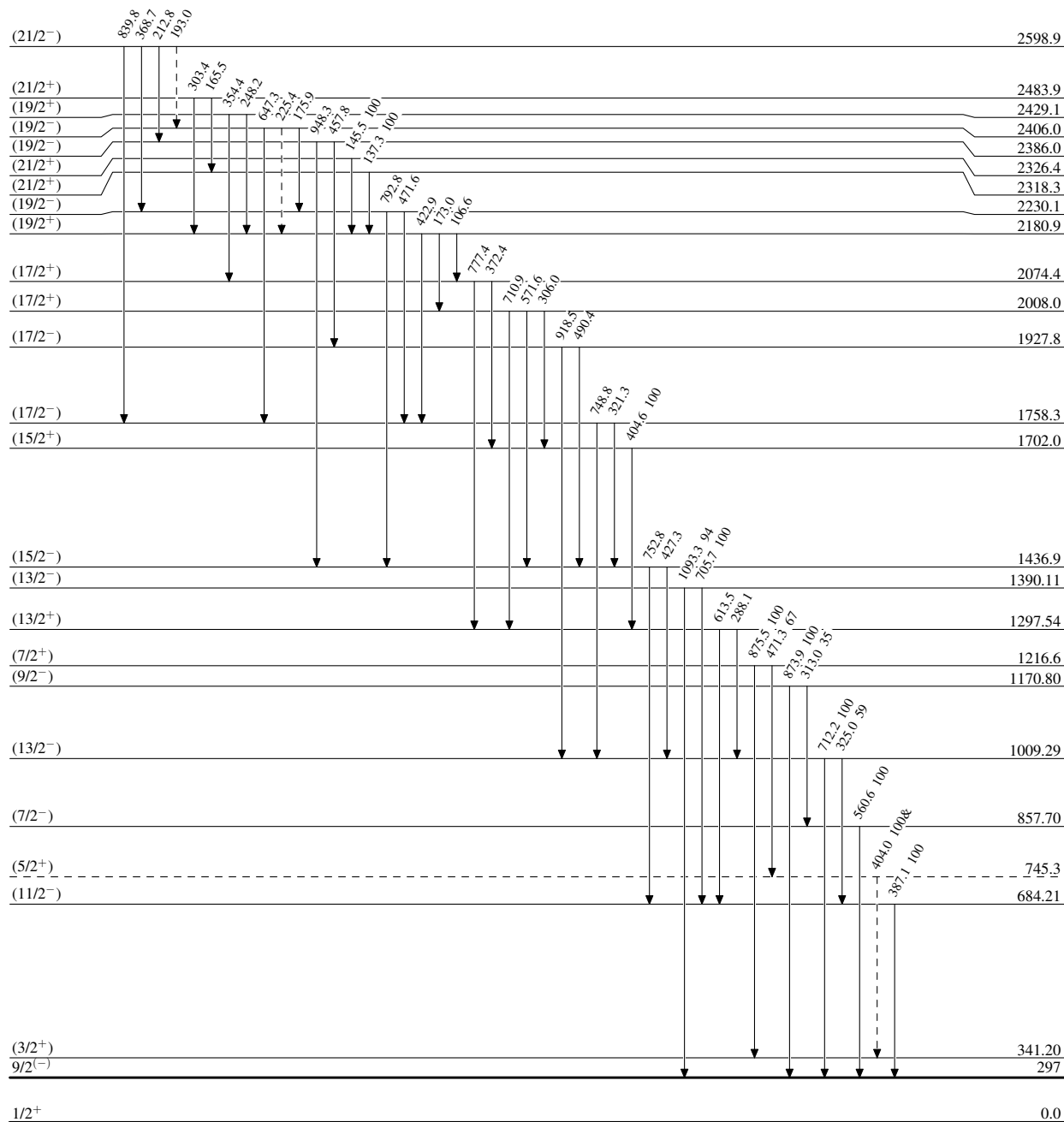
**Adopted Levels, Gammas**

Legend

Level Scheme (continued)

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

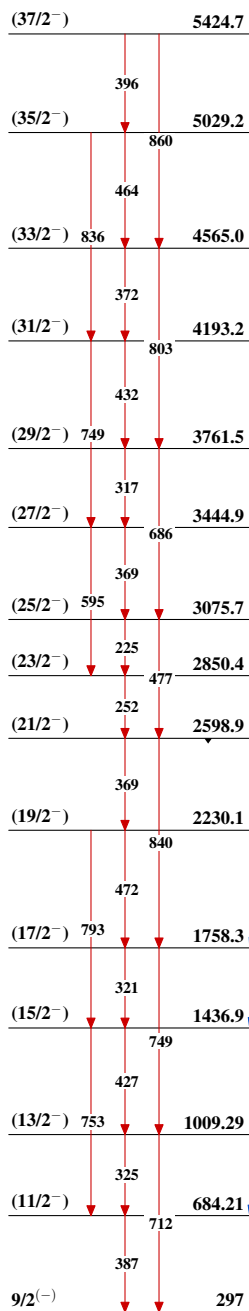
-----▶  $\gamma$  Decay (Uncertain)



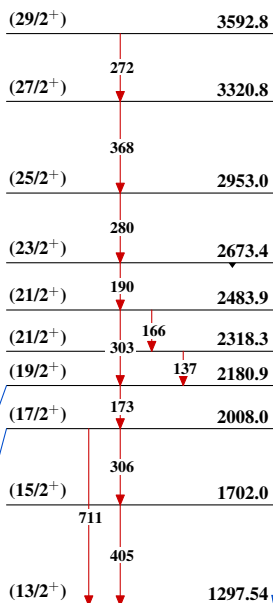
5.22 min 16

Adopted Levels, Gammas

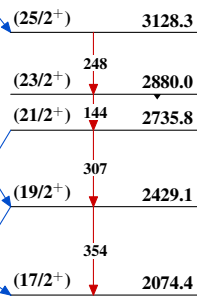
**Band(A):  $9/2[505] \pi=-$  rotational band**



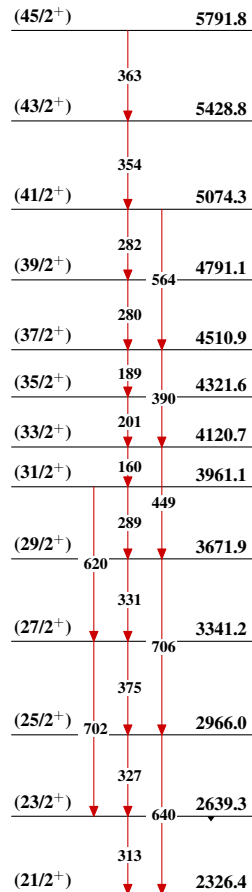
**Band(B):  $(13/2^+)$  single-particle like structure (1995Re18) See also comments for this structure in (HI, xn $\gamma$ ) dataset**



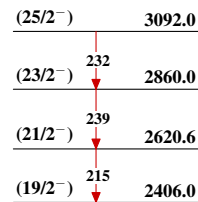
**Band(C):  $(17/2^+)$  band fragment See comments for this band in (HI, xn $\gamma$ ) dataset**

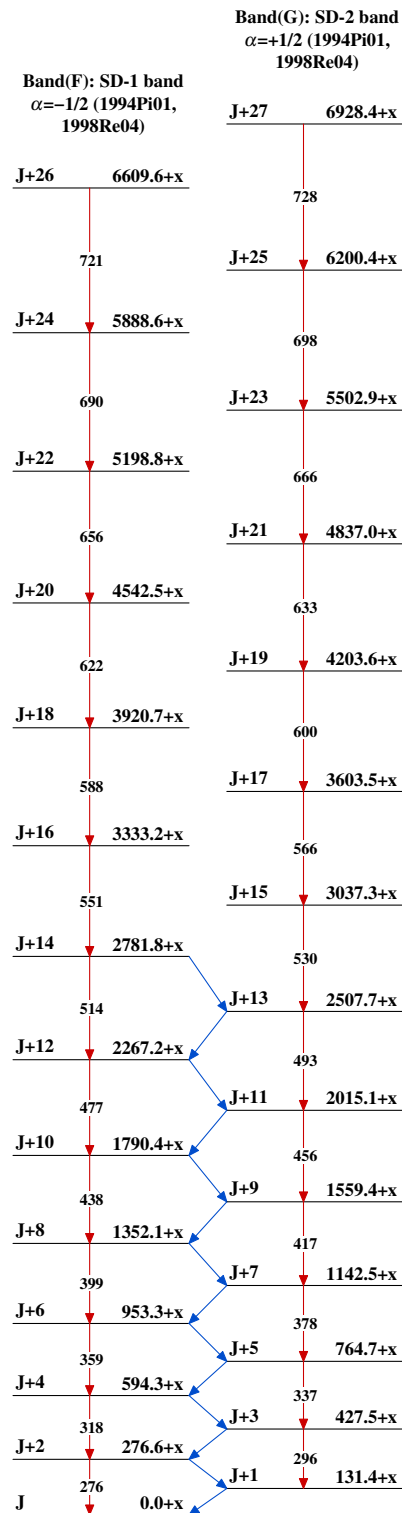


**Band(D):  $\pi=+$  rotational band, possible conf  $13/2[606]$  (1995Re18) See comments for this structure in (HI,xn $\gamma$ ) dataset**



**Band(E):  $(19/2^-)$  band fragment See comments for this structure in (HI,xn $\gamma$ ) dataset**



**Adopted Levels, Gammas (continued)** $^{191}_{81}\text{Tl}_{110}$