

$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ **1996Fi02,1992Li21**

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Coral M. Baglin	NDS 113, 1871 (2012)	15-Jun-2012

Additional information 1.

Please see the $^{160}\text{Gd}(^{37}\text{Cl},5n\gamma)$ dataset for data from this reaction involving normal deformation states.

Others: **1993Ca23**, **1996RiZZ**.

1992Li21,1993Ca23: E=178, 181 MeV; measured γ , $\gamma\gamma$; 12 Ge, 50 BGO Atlas detector array, thick enriched target. Six SD bands deduced, but three of these bands were stated in a later study (**1996Fi02**) to have been misassigned.

1996Fi02: E=178 MeV; measured $E\gamma$, $\gamma\gamma\gamma$ coin; Gammasphere array (36 Compton-suppressed Ge detectors); 97.7% ^{160}Gd target.

A total of four SD bands were deduced (three bands from their earlier (**1992Li21**) study were confirmed and a new SD band was proposed). The remaining three of the six SD bands reported by **1992Li21** were not confirmed in the higher statistics and better (reaction) channel selection data of **1996Fi02** so were assumed to have been misassigned in **1992Li21**. Cranked-shell model calculations. See also **1996RiZZ**.

 ^{192}Tl Levels

E(level) [†]	J ^π	E(level) [†]	J ^π	E(level) [†]	J ^π	E(level) [†]	J ^π
u [@]	(15) [‡]	712.4+v ^{&} 3	(22) [‡]	1562.2+w ^a 5	(20) [#]	1092.6+s ^b 5	(17) [#]
283.0+u [@] 2	(17) [‡]	1125.8+v ^{&} 4	(24) [‡]	1990.1+w ^a 5	(22) [#]	1463.6+s ^b 5	(19) [#]
603.8+u [@] 3	(19) [‡]	1576.9+v ^{&} 4	(26) [‡]	2455.5+w ^a 6	(24) [#]	1872.9+s ^b 6	(21) [#]
962.8+u [@] 4	(21) [‡]	2066.5+v ^{&} 5	(28) [‡]	2957.3+w ^a 6	(26) [#]	2319.3+s ^b 6	(23) [#]
1360.6+u [@] 4	(23) [‡]	2593.9+v ^{&} 5	(30) [‡]	3495.1+w ^a 6	(28) [#]	2802.9+s ^b 6	(25) [#]
1797.7+u [@] 5	(25) [‡]	3159.4+v ^{&} 6	(32) [‡]	4068.1+w ^a 7	(30) [#]	3322.8+s ^b 7	(27) [#]
2273.8+u [@] 5	(27) [‡]	3762.5+v ^{&} 6	(34) [‡]	4675.3+w ^a 7	(32) [#]	3878.2+s ^b 7	(29) [#]
2789.0+u [@] 6	(29) [‡]	4403.4+v ^{&} 7	(36) [‡]	5317.9+w ^a 8	(34) [#]	4469.4+s ^b 8	(31) [#]
3343.4+u [@] 6	(31) [‡]	5081.1+v ^{&} 9	(38) [‡]	5994.7+w ^a 9	(36) [#]	5094.6+s ^b 8	(33) [#]
3936.4+u [@] 6	(33) [‡]	5796.1+v ^{&} 12	(40) [‡]	6707.2+w ^a 12	(38) [#]	5754.3+s ^b 9	(35) [#]
4568.4+u [@] 7	(35) [‡]	w ^a	(10) [#]	7451.9+w ^a 15	(40) [#]	6448.1+s ^b 10	(37) [#]
5238.8+u [@] 8	(37) [‡]	233.4+w ^a 2	(12) [#]	s ^b	(9) [#]	7175.4+s ^b 13	(39) [#]
5946.7+u [@] 12	(39) [‡]	507.2+w ^a 3	(14) [#]	213.4+s ^b 3	(11) [#]		
v ^{&}	(18) [‡]	820.2+w ^a 4	(16) [#]	467.1+s ^b 4	(13) [#]		
337.5+v ^{&} 2	(20) [‡]	1171.8+w ^a 4	(18) [#]	760.4+s ^b 5	(15) [#]		

[†] From $E\gamma$.

[‡] From **1996Fi02**; most probable value, deduced from observed signature splitting and comparison with the $i_{13/2}$ proton excitations in ^{193}Tl .

[#] From **1996Fi02**, deduced from fits to the dynamic moments of inertia.

[@] Band(A): SD-1 band (**1996Fi02,1992Li21**). Configuration= $((\nu j_{15/2})(\pi i_{13/2}))$, $\alpha=1$ (coupling of favored ($\alpha=-1/2$) $j_{15/2}$ neutron and unfavored ($\alpha=-1/2$) $i_{13/2}$ proton) (**1996Fi02**). Percent population=0.9 (**1992Li21**).

[&] Band(B): SD-2 band (**1996Fi02,1992Li21**). Configuration= $((\nu j_{15/2})(\pi i_{13/2}))$, $\alpha=0$ (coupling of favored ($\alpha=-1/2$) $j_{15/2}$ neutron and favored ($\alpha=+1/2$) $i_{13/2}$ proton) (**1996Fi02**). SD-1 and SD-2 bands are proposed (**1996Fi02**) as signature partners on the basis of transition energies. There is also weak evidence (from $\gamma\gamma$ data) of crosstalk between SD-1 and SD-2 bands. However, the population intensity of this band is $\approx 1/2$ of that for SD-1 band, which is not expected for signature partner bands with small signature splitting. This band seems to display $\Delta J=2$ staggering for seven transitions in $J=24$ to 36 range. From $\gamma\gamma$ coin data, **1996Fi02** deduce limits on $B(M1)/B(E2)$, with $B(M1) \leq \approx 1 \mu_n^2$. Population=1.1% (**1992Li21**); however, **1996Fi02** report that intensity of this band is $\approx 1/2$ that of SD-1 band (i.e., $\approx 0.45\%$).

^a Band(C): SD-3 band (**1996Fi02,1992Li21**). Configuration= $((\nu 5/2[512])(\pi 5/2[642]))$, $\alpha=0$ (**1996Fi02**). The neutron and proton orbitals arise from $h_{9/2}$ and $i_{13/2}$, respectively. Percent population=0.5 (**1992Li21**).

Continued on next page (footnotes at end of table)

$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ **1996Fi02,1992Li21 (continued)** ^{192}Tl Levels (continued)

^b Band(D): SD-4 band (**1996Fi02**). Configuration= $((\nu\ 5/2[512])(\pi\ 5/2[642]))$, $\alpha=1$ (**1996Fi02**). The neutron and proton orbitals arise from $h_{9/2}$ and $i_{13/2}$, respectively. SD-3 and SD-4 bands are proposed (**1996Fi02**) as signature partners, with no evidence of crosstalk (**1996Fi02**). The two bands remain strongly coupled (no evidence of signature splitting) over the whole range.

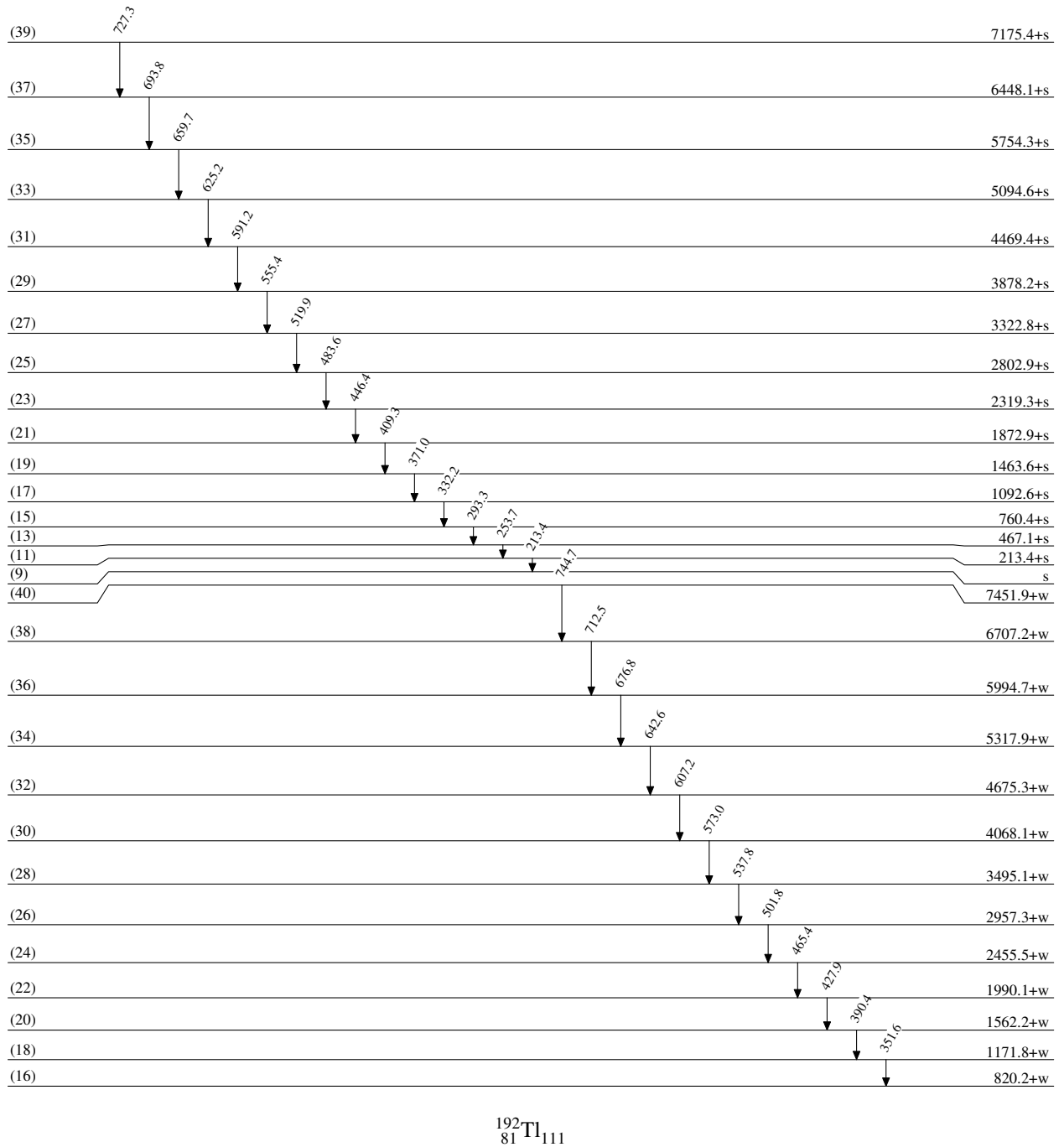
 $\gamma(^{192}\text{Tl})$

$E_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π	$E_\gamma^\dagger$	$E_i(\text{level})$	J_i^π	E_f	J_f^π
213.4 3	213.4+s	(11)	s	(9)	515.2 2	2789.0+u	(29)	2273.8+u	(27)
233.4 2	233.4+w	(12)	w	(10)	519.9 2	3322.8+s	(27)	2802.9+s	(25)
253.7 2	467.1+s	(13)	213.4+s	(11)	527.4 2	2593.9+v	(30)	2066.5+v	(28)
273.8 2	507.2+w	(14)	233.4+w	(12)	537.8 2	3495.1+w	(28)	2957.3+w	(26)
283.0 2	283.0+u	(17)	u	(15)	554.4 2	3343.4+u	(31)	2789.0+u	(29)
293.3 2	760.4+s	(15)	467.1+s	(13)	555.4 2	3878.2+s	(29)	3322.8+s	(27)
313.0 2	820.2+w	(16)	507.2+w	(14)	565.5 2	3159.4+v	(32)	2593.9+v	(30)
320.8 2	603.8+u	(19)	283.0+u	(17)	573.0 2	4068.1+w	(30)	3495.1+w	(28)
332.2 2	1092.6+s	(17)	760.4+s	(15)	591.2 3	4469.4+s	(31)	3878.2+s	(29)
337.5 2	337.5+v	(20)	v	(18)	593.0 2	3936.4+u	(33)	3343.4+u	(31)
351.6 2	1171.8+w	(18)	820.2+w	(16)	603.1 3	3762.5+v	(34)	3159.4+v	(32)
359.0 2	962.8+u	(21)	603.8+u	(19)	607.2 3	4675.3+w	(32)	4068.1+w	(30)
371.0 2	1463.6+s	(19)	1092.6+s	(17)	625.2 3	5094.6+s	(33)	4469.4+s	(31)
374.9 2	712.4+v	(22)	337.5+v	(20)	632.0 3	4568.4+u	(35)	3936.4+u	(33)
390.4 2	1562.2+w	(20)	1171.8+w	(18)	640.9 3	4403.4+v	(36)	3762.5+v	(34)
397.8 2	1360.6+u	(23)	962.8+u	(21)	642.6 4	5317.9+w	(34)	4675.3+w	(32)
409.3 2	1872.9+s	(21)	1463.6+s	(19)	659.7 3	5754.3+s	(35)	5094.6+s	(33)
413.4 2	1125.8+v	(24)	712.4+v	(22)	670.4 4	5238.8+u	(37)	4568.4+u	(35)
427.9 2	1990.1+w	(22)	1562.2+w	(20)	676.8 3	5994.7+w	(36)	5317.9+w	(34)
437.1 2	1797.7+u	(25)	1360.6+u	(23)	677.7 5	5081.1+v	(38)	4403.4+v	(36)
446.4 2	2319.3+s	(23)	1872.9+s	(21)	693.8 4	6448.1+s	(37)	5754.3+s	(35)
451.1 2	1576.9+v	(26)	1125.8+v	(24)	707.9 8	5946.7+u	(39)	5238.8+u	(37)
465.4 2	2455.5+w	(24)	1990.1+w	(22)	712.5 8	6707.2+w	(38)	5994.7+w	(36)
476.1 2	2273.8+u	(27)	1797.7+u	(25)	715.0 8	5796.1+v	(40)	5081.1+v	(38)
483.6 2	2802.9+s	(25)	2319.3+s	(23)	727.3 8	7175.4+s	(39)	6448.1+s	(37)
489.6 2	2066.5+v	(28)	1576.9+v	(26)	744.7 8	7451.9+w	(40)	6707.2+w	(38)
501.8 2	2957.3+w	(26)	2455.5+w	(24)					

[†] From **1996Fi02**.

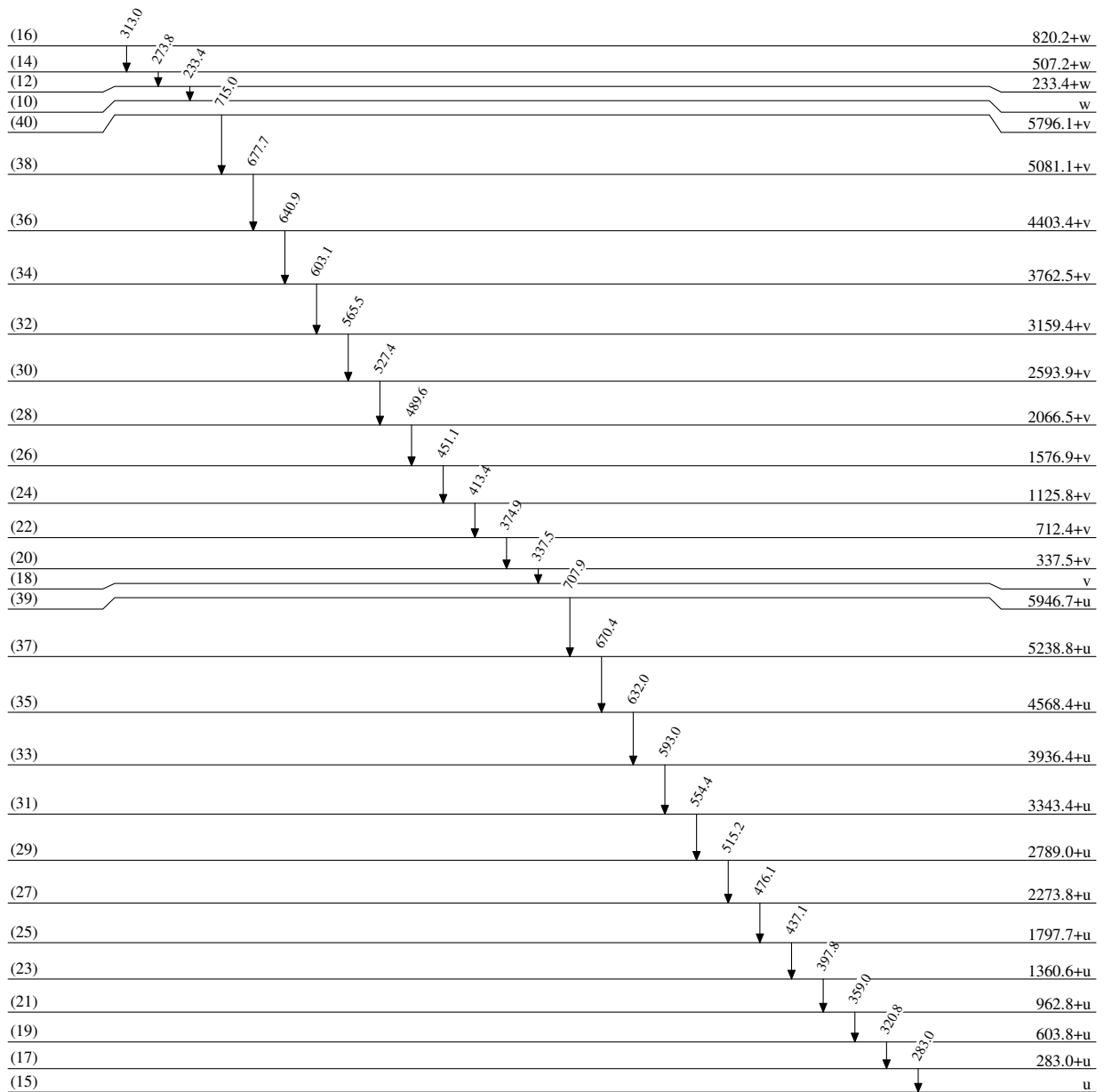
$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ 1996Fi02,1992Li21

Level Scheme



$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ 1996Fi02,1992Li21

Level Scheme (continued)

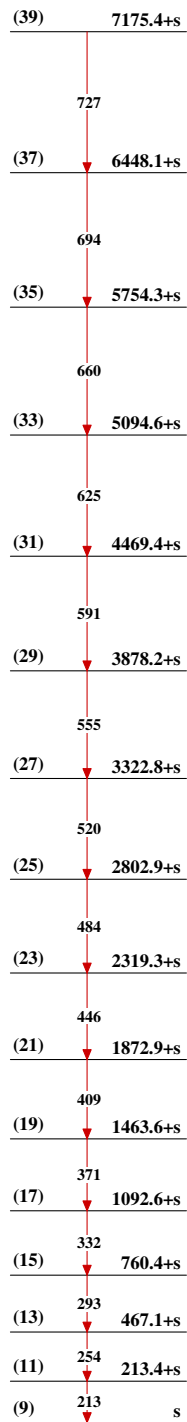
 $^{192}_{81}\text{Tl}_{111}$

$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ 1996Fi02,1992Li21

		Band(C): SD-3 band (1996Fi02,1992Li21)	
		(40)	7451.9+w
		(38)	745 6707.2+w
		(36)	712 5994.7+w
		(34)	677 5317.9+w
		(32)	643 4675.3+w
		(30)	607 4068.1+w
		(28)	573 3495.1+w
		(26)	538 2957.3+w
		(24)	502 2455.5+w
		(22)	465 1990.1+w
		(20)	428 1562.2+w
		(18)	390 1171.8+w
		(16)	352 820.2+w
		(14)	313 507.2+w
		(12)	274 233.4+w
		(10)	233 w
		Band(B): SD-2 band (1996Fi02,1992Li21)	
		(40)	5796.1+v
		(38)	715 5081.1+v
		(36)	678 4403.4+v
		(34)	641 3762.5+v
		(32)	603 3159.4+v
		(30)	566 2593.9+v
		(28)	527 2066.5+v
		(26)	490 1576.9+v
		(24)	451 1125.8+v
		(22)	413 712.4+v
		(20)	375 337.5+v
		(18)	338 v
		Band(A): SD-1 band (1996Fi02,1992Li21)	
		(39)	5946.7+u
		(37)	708 5238.8+u
		(35)	670 4568.4+u
		(33)	632 3936.4+u
		(31)	593 3343.4+u
		(29)	554 2789.0+u
		(27)	515 2273.8+u
		(25)	476 1797.7+u
		(23)	437 1360.6+u
		(21)	398 962.8+u
		(19)	359 603.8+u
		(17)	321 283.0+u
		(15)	283 u

$^{160}\text{Gd}(^{37}\text{Cl},5n\gamma):\text{SD}$ **1996Fi02,1992Li21 (continued)**

Band(D): SD-4 band
(1996Fi02)


 $^{192}_{81}\text{Tl}_{111}$