

¹⁸¹Ta(¹⁸O,5n γ):SD 1991Az03

Type	Author	History	Citation	Literature Cutoff Date
Full Evaluation	Jun Chen and Balraj Singh		NDS 177, 1 (2021)	3-Sep-2021

1991Az03 (also 1990Az03,1990Az06): E=95, 100, 104 MeV beams from the 88-inch Cyclotron at LBNL. Measured E γ , $\gamma\gamma$ -coin, $\gamma\gamma(\theta)$, excitation functions with the HERA array of 20 Compton-suppressed Ge detectors. Six superdeformed bands proposed. 1990Az03 used ¹⁷⁶Yb(²³Na,5n γ) E=116, 122 MeV reaction which showed weak population of SD-1 and SD-2 bands.

Other measurements:

1995Az01: ¹⁸⁴W(¹⁵N,5n γ) E=96 MeV. Measured E γ , I γ , $\gamma\gamma$ using EUROGAM array (45 Compton-suppressed Ge detectors), deduced SD bands and interconnecting dipole transitions. It is claimed in this report that all the six SD bands are extended to lower and higher transition energies. The authors also report cross-talk between one pair of the SD bands. The details of this study are not available.

1999Lu04: ¹⁸¹Ta(¹⁹F,p5n) E=120 MeV. Measured multiplicity by $\gamma\gamma$.

Level scheme of normal bands is from 2014Ma55, which is extended with respect to that of 1979Kr09 as well as that of 2012Pa16 in Re(¹³C,4n γ) and has been adopted by the evaluators in Adopted Levels, Gammas, because of higher statistics and completeness. Level scheme of super-deformed (SD) bands is from 1991Az03.

¹⁹⁴Tl Levels

E(level) [†]	J π^{\ddagger}	E(level) [†]	J π^{\ddagger}	E(level) [†]	J π^{\ddagger}
x ^b	J \approx (12)	z ^d	J2 \approx (10) [#]	6555.4+u? ^e 12	J3+28
268.0+x ^b 3	J+2	240.5+z ^d 3	J2+2	v ^f	J4 \approx (8) ^{&}
575.0+x ^b 5	J+4	520.5+z ^d 5	J2+4	187.9+v ^f 3	J4+2
920.1+x ^b 6	J+6	839.3+z ^d 6	J2+6	414.2+v ^f 5	J4+4
1304.3+x ^b 6	J+8	1197.4+z ^d 6	J2+8	678.2+v ^f 6	J4+6
1725.3+x ^b 7	J+10	1594.6+z ^d 7	J2+10	980.2+v ^f 6	J4+8
2182.3+x ^b 8	J+12	2029.9+z ^d 8	J2+12	1319.4+v ^f 7	J4+10
2677.2+x ^b 8	J+14	2502.9+z ^d 8	J2+14	1696.0+v ^f 8	J4+12
3208.1+x ^b 9	J+16	3013.8+z ^d 9	J2+16	2109.7+v ^f 8	J4+14
3775.1+x ^b 9	J+18	3560.4+z ^d 9	J2+18	2559.7+v ^f 9	J4+16
4376.3+x ^b 10	J+20	4142.6+z ^d 10	J2+20	3045.8+v ^f 9	J4+18
5011.2+x ^b 10	J+22	4760.0+z ^d 10	J2+22	3567.6+v ^f 10	J4+20
5681.0+x ^b 11	J+24	5412.0+z ^d 11	J2+24	4126.0+v ^f 10	J4+22
6384.6+x ^b 11	J+26	6097.5+z ^d 11	J2+26	4719.7+v ^f 11	J4+24
y ^c	J1 \approx (9)	6815.0+z ^d 12	J2+28	5347.4+v ^f 11	J4+26
209.3+y ^c 3	J1+2	u ^e	J3 \approx (9) [@]	w ^g	J5 \approx (9) ^a
457.7+y ^c 5	J1+4	220.3+u ^e 3	J3+2	207.0+w ^g 3	J5+2
745.2+y ^c 6	J1+6	479.7+u ^e 5	J3+4	452.4+w ^g 5	J5+4
1071.2+y ^c 6	J1+8	779.4+u ^e 6	J3+6	736.1+w ^g 6	J5+6
1435.6+y ^c 7	J1+10	1118.1+u ^e 6	J3+8	1057.9+w ^g 6	J5+8
1837.3+y ^c 8	J1+12	1496.4+u ^e 7	J3+10	1416.1+w ^g 7	J5+10
2276.6+y ^c 8	J1+14	1911.9+u ^e 8	J3+12	1812.3+w ^g 8	J5+12
2752.5+y ^c 9	J1+16	2366.1+u ^e 8	J3+14	2244.8+w ^g 8	J5+14
3264.5+y ^c 9	J1+18	2857.6+u ^e 9	J3+16	2714.9+w ^g 9	J5+16
3812.5+y ^c 10	J1+20	3385.4+u ^e 9	J3+18	3221.1+w ^g 9	J5+18
4396.0+y ^c 10	J1+22	3949.4+u ^e 10	J3+20	3764.8+w ^g 10	J5+20
5013.5+y ^c 11	J1+24	4549.1+u ^e ? 10	J3+22	4343.9+w ^g 10	J5+22
5665.5+y ^c 11	J1+26	5182.8+u ^e ? 11	J3+24	4956.9+w ^g 11	J5+24
6351.4+y ^c 12	J1+28	5852.0+u ^e ? 11	J3+26		

Continued on next page (footnotes at end of table)

¹⁸¹Ta(¹⁸O,5nγ):SD **1991Az03** (continued)

¹⁹⁴Tl Levels (continued)

† From γ-ray energies in **1991Az03**.

‡ From selected γγ(θ) data of **1991Az03** and least-squares fits of E_γ values to expansions related to rotational spectra (**1992Wu01,1990Be01**). The same assignments are adopted in Adopted Levels.

(11) is also possible (**1991Az03**).

@ (10) is also possible (**1991Az03**).

& (9) is also possible (**1991Az03**).

^a (10) is also possible (**1991Az03**).

^b Band(A): SD-1 band. Population intensity=1.5% of total ¹⁹⁴Tl yield (**1991Az03**).

^c Band(a): SD-2 band. Population intensity=1.0% of total ¹⁹⁴Tl yield (**1991Az03**). SD-1 and SD-2 bands are signature partners.

^d Band(B): SD-3 band. Population intensity=0.9% of total ¹⁹⁴Tl yield (**1991Az03**).

^e Band(b): SD-4 band. Population intensity=0.6% of total ¹⁹⁴Tl yield (**1991Az03**). SD-3 and SD-4 bands are signature partners.

^f Band(C): SD-5 band. Population intensity=0.6% of total ¹⁹⁴Tl yield (**1991Az03**).

^g Band(c): SD-6 band. Population intensity=0.8% of total ¹⁹⁴Tl yield (**1991Az03**). SD-5 and SD-6 bands are signature partners.

γ(¹⁹⁴Tl)

E _γ [†]	E _i (level)	J _i ^π	E _f	J _f ^π	E _γ [†]	E _i (level)	J _i ^π	E _f	J _f ^π
187.9 3	187.9+v	J4+2	v	J4≈(8)	439.3 3	2276.6+y	J1+14	1837.3+y	J1+12
207.0 3	207.0+w	J5+2	w	J5≈(9)	450.0 3	2559.7+v	J4+16	2109.7+v	J4+14
209.3 3	209.3+y	J1+2	y	J1≈(9)	454.2 3	2366.1+u	J3+14	1911.9+u	J3+12
220.3 3	220.3+u	J3+2	u	J3≈(9)	457.0 3	2182.3+x	J+12	1725.3+x	J+10
226.3 3	414.2+v	J4+4	187.9+v	J4+2	470.1 3	2714.9+w	J5+16	2244.8+w	J5+14
240.5 3	240.5+z	J2+2	z	J2≈(10)	473.0 3	2502.9+z	J2+14	2029.9+z	J2+12
245.4 3	452.4+w	J5+4	207.0+w	J5+2	475.9 3	2752.5+y	J1+16	2276.6+y	J1+14
248.4 3	457.7+y	J1+4	209.3+y	J1+2	486.1 3	3045.8+v	J4+18	2559.7+v	J4+16
259.4 3	479.7+u	J3+4	220.3+u	J3+2	491.5 3	2857.6+u	J3+16	2366.1+u	J3+14
264.0 3	678.2+v	J4+6	414.2+v	J4+4	494.9 3	2677.2+x	J+14	2182.3+x	J+12
268.0 3	268.0+x	J+2	x	J≈(12)	506.2 3	3221.1+w	J5+18	2714.9+w	J5+16
280.0 3	520.5+z	J2+4	240.5+z	J2+2	510.9 3	3013.8+z	J2+16	2502.9+z	J2+14
283.7 3	736.1+w	J5+6	452.4+w	J5+4	512.0 3	3264.5+y	J1+18	2752.5+y	J1+16
287.5 3	745.2+y	J1+6	457.7+y	J1+4	521.8 3	3567.6+v	J4+20	3045.8+v	J4+18
299.7 3	779.4+u	J3+6	479.7+u	J3+4	527.8 3	3385.4+u	J3+18	2857.6+u	J3+16
302.0 3	980.2+v	J4+8	678.2+v	J4+6	530.9 3	3208.1+x	J+16	2677.2+x	J+14
307.0 3	575.0+x	J+4	268.0+x	J+2	543.7 3	3764.8+w	J5+20	3221.1+w	J5+18
318.8 3	839.3+z	J2+6	520.5+z	J2+4	546.6 3	3560.4+z	J2+18	3013.8+z	J2+16
321.8 3	1057.9+w	J5+8	736.1+w	J5+6	548.0 3	3812.5+y	J1+20	3264.5+y	J1+18
326.0 3	1071.2+y	J1+8	745.2+y	J1+6	558.4 3	4126.0+v	J4+22	3567.6+v	J4+20
338.7 3	1118.1+u	J3+8	779.4+u	J3+6	564.0 3	3949.4+u	J3+20	3385.4+u	J3+18
339.2 3	1319.4+v	J4+10	980.2+v	J4+8	567.0 3	3775.1+x	J+18	3208.1+x	J+16
345.1 3	920.1+x	J+6	575.0+x	J+4	579.1 3	4343.9+w	J5+22	3764.8+w	J5+20
358.1 3	1197.4+z	J2+8	839.3+z	J2+6	582.2 3	4142.6+z	J2+20	3560.4+z	J2+18
358.2 3	1416.1+w	J5+10	1057.9+w	J5+8	583.5 3	4396.0+y	J1+22	3812.5+y	J1+20
364.4 3	1435.6+y	J1+10	1071.2+y	J1+8	593.7 3	4719.7+v	J4+24	4126.0+v	J4+22
376.6 3	1696.0+v	J4+12	1319.4+v	J4+10	599.7 [‡] 3	4549.1+u?	J3+22	3949.4+u	J3+20
378.3 3	1496.4+u	J3+10	1118.1+u	J3+8	601.2 3	4376.3+x	J+20	3775.1+x	J+18
384.2 3	1304.3+x	J+8	920.1+x	J+6	613.0 3	4956.9+w	J5+24	4343.9+w	J5+22
396.2 3	1812.3+w	J5+12	1416.1+w	J5+10	617.4 3	4760.0+z	J2+22	4142.6+z	J2+20
397.2 3	1594.6+z	J2+10	1197.4+z	J2+8	617.5 3	5013.5+y	J1+24	4396.0+y	J1+22
401.7 3	1837.3+y	J1+12	1435.6+y	J1+10	627.7 [‡] 3	5347.4+v?	J4+26	4719.7+v	J4+24
413.7 3	2109.7+v	J4+14	1696.0+v	J4+12	633.7 [‡] 3	5182.8+u?	J3+24	4549.1+u?	J3+22
415.5 3	1911.9+u	J3+12	1496.4+u	J3+10	634.9 3	5011.2+x	J+22	4376.3+x	J+20
421.0 3	1725.3+x	J+10	1304.3+x	J+8	652.0 3	5665.5+y	J1+26	5013.5+y	J1+24
432.5 3	2244.8+w	J5+14	1812.3+w	J5+12	652.0 3	5412.0+z	J2+24	4760.0+z	J2+22
435.3 3	2029.9+z	J2+12	1594.6+z	J2+10	669.2 [‡] 3	5852.0+u?	J3+26	5182.8+u?	J3+24

Continued on next page (footnotes at end of table)

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):\text{SD}$ 1991Az03 (continued) $\gamma(^{194}\text{Tl})$ (continued)

E_γ^\dagger	$E_i(\text{level})$	J_i^π	E_f	J_f^π
669.8 3	5681.0+x	J+24	5011.2+x	J+22
685.5 3	6097.5+z	J2+26	5412.0+z	J2+24
685.9 3	6351.4+y	J1+28	5665.5+y	J1+26
703.4 \ddagger 3	6555.4+u?	J3+28	5852.0+u?	J3+26
703.6 3	6384.6+x	J+26	5681.0+x	J+24
717.5 \ddagger 3	6815.0+z?	J2+28	6097.5+z	J2+26

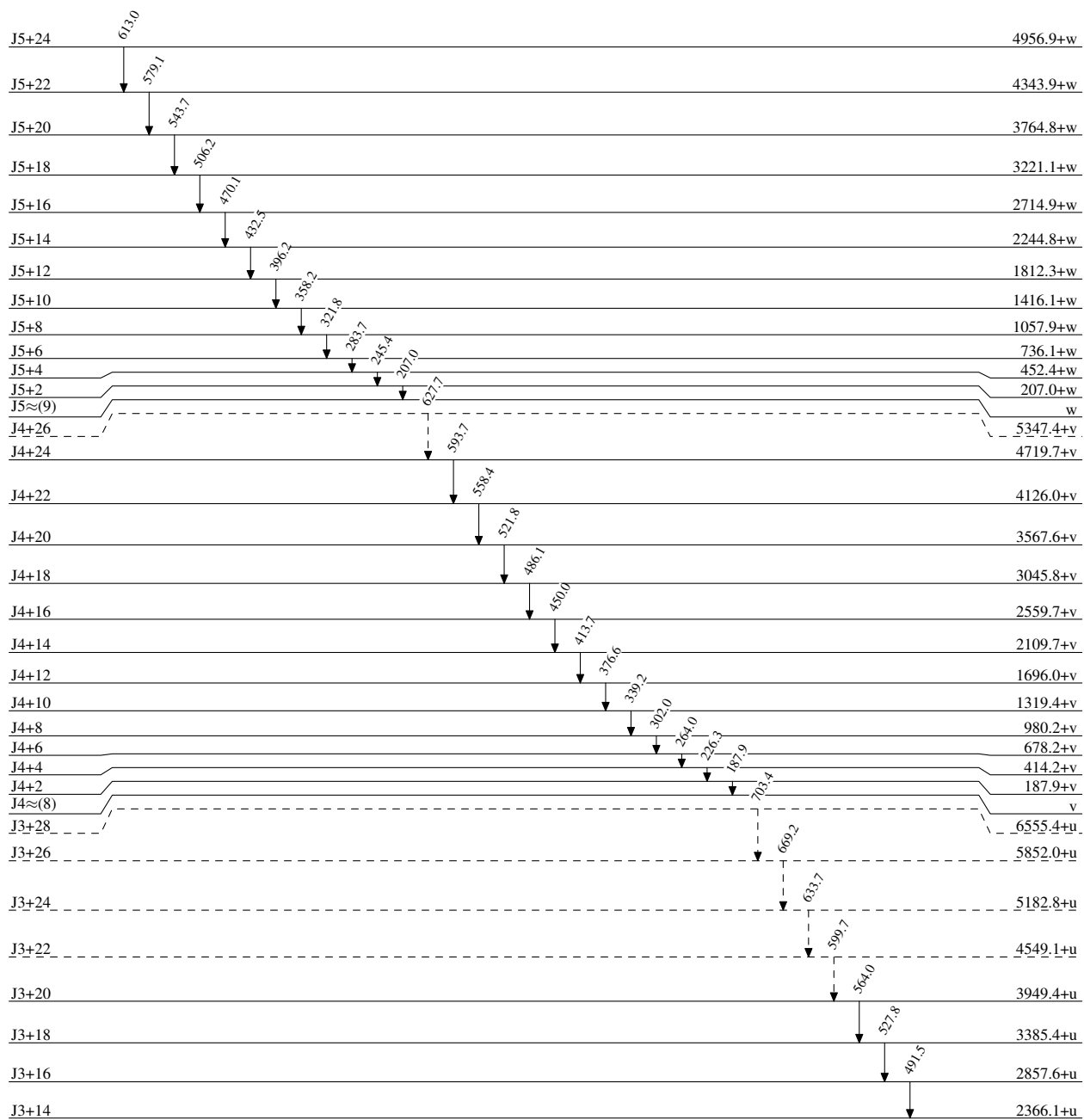
† From 1991Az03 for superdeformed, uncertainty is 0.3 to 1 keV.

\ddagger Placement of transition in the level scheme is uncertain.

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):SD$ 1991Az03

Legend

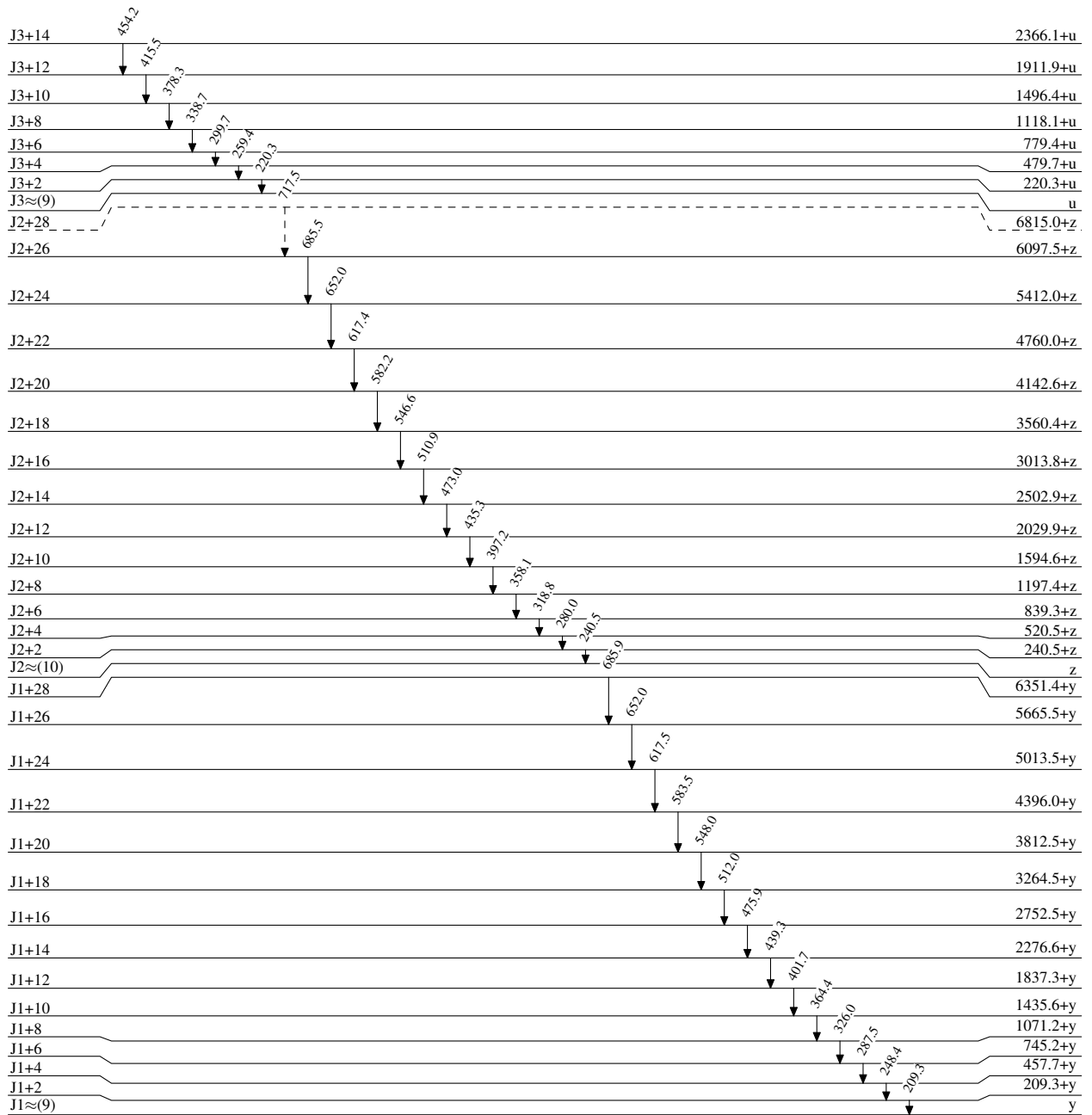
Level Scheme

-----► γ Decay (Uncertain) $^{194}_{81}\text{Tl}_{113}$

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):SD$ 1991Az03

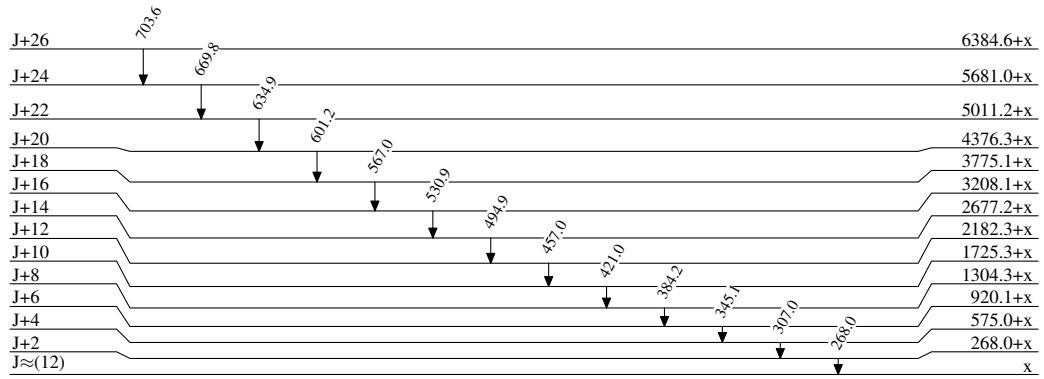
Legend

Level Scheme (continued)

-----► γ Decay (Uncertain) $^{194}\text{Tl}_{113}$

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):\text{SD}$ 1991Az03

Level Scheme (continued)

 $^{194}\text{Tl}_{113}$

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):\text{SD}$ 1991Az03

Band(B): SD-3 band		
J2+28		6815.0+z
J2+26	718	6097.5+z
J2+24	686	5412.0+z
J2+22	652	4760.0+z
J2+20	617	4142.6+z
J2+18	582	3560.4+z
J2+16	547	3013.8+z
J2+14	511	2502.9+z
J2+12	473	2029.9+z
J2+10	435	1594.6+z
J2+8	397	1197.4+z
J2+6	358	839.3+z
J2+4	319	520.5+z
J2+2	280	240.5+z
J2≈(10)	240	z

Band(a): SD-2 band		
J1+28		6351.4+y
J1+26	686	5665.5+y
J1+24	652	5013.5+y
J1+22	618	4396.0+y
J1+20	584	3812.5+y
J1+18	548	3264.5+y
J1+16	512	2752.5+y
J1+14	476	2276.6+y
J1+12	439	1837.3+y
J1+10	402	1435.6+y
J1+8	364	1071.2+y
J1+6	326	745.2+y
J1+4	288	457.7+y
J1+2	248	209.3+y
J1≈(9)	209	y

Band(A): SD-1 band		
J+26		6384.6+x
J+24	704	5681.0+x
J+22	670	5011.2+x
J+20	635	4376.3+x
J+18	601	3775.1+x
J+16	567	3208.1+x
J+14	531	2677.2+x
J+12	495	2182.3+x
J+10	457	1725.3+x
J+8	421	1304.3+x
J+6	384	920.1+x
J+4	345	575.0+x
J+2	307	268.0+x
J≈(12)	268	x

$^{181}\text{Ta}(^{18}\text{O},5n\gamma):\text{SD}$ 1991Az03 (continued)

		Band(c): SD-6 band	
		J5+24	4956.9+w
		J5+22	613 4343.9+w
		J5+20	579 3764.8+w
		J5+18	544 3221.1+w
		J5+16	506 2714.9+w
		J5+14	470 2244.8+w
		J5+12	432 1812.3+w
		J5+10	396 1416.1+w
		J5+8	358 1057.9+w
		J5+6	322 736.1+w
		J5+4	284 452.4+w
		J5+2	245 207.0+w
		J5≈(9)	207 w
		Band(C): SD-5 band	
		J4+26	5347.4+v
		J4+24	628 4719.7+v
		J4+22	594 4126.0+v
		J4+20	558 3567.6+v
		J4+18	522 3045.8+v
		J4+16	486 2559.7+v
		J4+14	450 2109.7+v
		J4+12	414 1696.0+v
		J4+10	377 1319.4+v
		J4+8	339 980.2+v
		J4+6	302 678.2+v
		J4+4	264 414.2+v
		J4+2	226 187.9+v
		J4≈(8)	188 v
		Band(b): SD-4 band	
		J3+28	6555.4+u
		J3+26	703 5852.0+u
		J3+24	669 5182.8+u
		J3+22	634 4549.1+u
		J3+20	600 3949.4+u
		J3+18	564 3385.4+u
		J3+16	528 2857.6+u
		J3+14	492 2366.1+u
		J3+12	454 1911.9+u
		J3+10	416 1496.4+u
		J3+8	378 1118.1+u
		J3+6	339 779.4+u
		J3+4	300 479.7+u
		J3+2	259 220.3+u
		J3≈(9)	220 u