(HI,xnγ) 1986CoZR,1987By04,1988Fe01

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	C. W. Reich	NDS 113, 157 (2012)	31-Dec-2010

The excited level energies and J^π assignments are both from 1986CoZR and 1987By04, except as noted. 1975Tr08 give data for the yrast band from $13/2^+$ through $33/2^+$.

(HI,xnγ) studies have been done with the reactions ^{144}Sm(^{18}O,3nγ); ^{116}Cd(^{48}Ti,5nγ); ^{98}Mo(^{64}Ni,3nγ); and ^{48}Ti(^{116}Cd,5nγ) in the following references:

1975Tr08: ^{144}Sm(^{18}O,3n) at 77 MeV; report Eγ and Iγ for 5 γ's; $T_{1/2}$ for 2 levels using the recoil-distance Doppler-shift method.

1983RiZU: ^{116}Cd(^{48}Ti,5n) at 220 MeV; no data reported. See 1986CoZR.

1985CoZW: ^{98}Mo(^{64}Ni,3nγ) at 268 MeV; no data reported. See 1986CoZR.

1986CoZR: priv. comm.; report 44 levels in 3 bands, only information is a level scheme.

1985WeZZ: report $T_{1/2}$ of $17/2^+$ to $33/2^+$ yrast levels. Replaced by 1988Fe01.

1986WeZU: priv. comm.; ^{116}Cd(^{48}Ti,3nγ) at 205 MeV, report $T_{1/2}$ of $17/2^+$ to $37/2^+$ levels from recoil-distance method. Replaced by 1988Fe01.

1987By04: ^{120}Sn(^{44}Ca,5n) at 210 MeV; γ singles, γγ coin., γ(θ) in TESSA2 array of 6 Compton-suppressed Ge detectors and BGO ball; report 40 levels in 3 bands to $J^\pi=65/2^+$, $75/2^-$, and $69/2^-$.

1988Fe01: ^{116}Cd(^{48}Ti,5n) at 205 MeV and ^{48}Ti(^{116}Cd,5n) at 495 MeV; report 6 $T_{1/2}$ values for levels from $17/2^+$ to $33/2^+$ by recoil-distance method.

Data on continuous levels and γ spectra have been reported by by 1982Sa21, 1983Ha28, 1983Ja04, and 1983Sa10.

^{159}Yb Levels

E(level)[†]	J^π[‡]	$T_{1/2}$[#]	Comments
0	5/2		
0+x[a]	$(13/2^+)$		
299.6+x[a]	$(17/2^+)$	31 ps *4*	$T_{1/2}$: Also, 34 ps *3* (1975Tr08).
747.1+x[a]	$(21/2^+)$	3.7 ps *6*	$T_{1/2}$: Also,≈4 ps (1975Tr08).
1063.6+x[d]	$(19/2^+)$		
1296.2+x[a]	$(25/2^+)$	1.5 ps *4*	
1556.1+x[c]	$(21/2^-)$		
1612.1+x[d]	$(23/2^+)$		
1929.3+x[a]	$(29/2^+)$	2.4 ps *8*	
1976.6+x[c]	$(25/2^-)$		
2185.1+x[@d]	$(27/2^+)$		
2457.3+x[c]	$(29/2^-)$		
2626.8+x[a]	$(33/2^+)$	<1.2 ps	
2700.4+x[b]	$(31/2^-)$		
2960.4+x[c]	$(33/2^-)$		
3233.8+x[b]	$(35/2^-)$		
3375.9+x[a]	$(37/2^+)$	<9 ps	
3532.0+x[c]	$(37/2^-)$		
3857.8+x[b]	$(39/2^-)$		
4166.0+x[a]	$(41/2^+)$		
4180.9+x[c]	$(41/2^-)$		
4552.4+x[b]	$(43/2^-)$		
4894.6+x[c]	$(45/2^-)$		
4940.5+x[a]	$(45/2^+)$		
5340.1+x[b]	$(47/2^-)$		
5680.3+x[c]	$(49/2^-)$		
5704.8+x[a]	$(49/2^+)$		

Continued on next page (footnotes at end of table)

(HI,xnγ) 1986CoZR,1987By04,1988Fe01 (continued)

^{159}Yb Levels (continued)

E(level)[†]	J$^{\pi}$[‡]	Comments
6107.3+x[b]	(51/2$^-$)	
6466.0+x[c]	(53/2$^-$)	E(level): 1987By04 give energy as 6478+x with the order of one 785.7 and the 798.1 γ's reversed.
6489.9+x[a]	(53/2$^+$)	
6895.0+x[b]	(55/2$^-$)	
7264.1+x[c]	(57/2$^-$)	
7353.1+x[a]	(57/2$^+$)	
7707.4+x[b]	(59/2$^-$)	
8066.0+x[c]	(61/2$^-$)	
8280.8+x[a]	(61/2$^+$)	
8567.7+x[b]	(63/2$^-$)	
8961.1+x[c]	(65/2$^-$)	
9282.3+x[a]	(65/2$^+$)	
9455.6+x[b]	(67/2$^-$)	
9890.3+x[c]	(69/2$^-$)	
10380.3+x?[@a]	(69/2$^+$)	
10386.8+x[b]	(71/2$^-$)	
10906.7+x[@c]	(73/2$^-$)	
11337+x?[&b]	(75/2$^-$)	
11970.7+x?[@c]	(77/2$^-$)	

[†] From 1986CoZR, but also given by 1987By04, unless otherwise noted. The level energies of 1987By04 are systematically lower, by about 5 keV at 10 MeV.

[‡] Assignments for the excited levels are from 1986CoZR, 1975Tr08, and 1987By04 and are based on rotational-band sequences from coincidence measurements and the stretched E2 and E1 character of the γ's.

[#] From 1988Fe01 by recoil-distance method; see 1985WeZZ and 1986WeZU for earlier results by the same authors. Also, 1975Tr08.

[@] Reported only by 1986CoZR.

[&] Reported only by 1987By04.

[a] Band(A): π=+, α=+1/2 band. Yrast band to 41/2; assumed to be $\nu i_{13/2}$.

[b] Band(B): π=−, α=−1/2 band.

[c] Band(C): π=−, α=+1/2 band.

[d] Band(D): π=+, α=−1/2 band.

$\gamma(^{159}Yb)$

E$_\gamma$[†]	I$_\gamma$[‡]	E$_i$(level)	J$_i^\pi$	E$_f$	J$_f^\pi$	Mult.
259.4	2.8	2960.4+x	(33/2$^-$)	2700.4+x	(31/2$^-$)	
272.1	3.6	2457.3+x	(29/2$^-$)	2185.1+x	(27/2$^+$)	
299.6	100	299.6+x	(17/2$^+$)	0+x	(13/2$^+$)	E2
364.6	6.0	1976.6+x	(25/2$^-$)	1612.1+x	(23/2$^+$)	D
420.5	7.7	1976.6+x	(25/2$^-$)	1556.1+x	(21/2$^-$)	
447.5	94.0	747.1+x	(21/2$^+$)	299.6+x	(17/2$^+$)	E2
480.7	26.1	2457.3+x	(29/2$^-$)	1976.6+x	(25/2$^-$)	
492.5	6.0	1556.1+x	(21/2$^-$)	1063.6+x	(19/2$^+$)	
503.1	27.7	2960.4+x	(33/2$^-$)	2457.3+x	(29/2$^-$)	
527.3[#]	10.0	2457.3+x	(29/2$^-$)	1929.3+x	(29/2$^+$)	
533.4	14.6	3233.8+x	(35/2$^-$)	2700.4+x	(31/2$^-$)	

Continued on next page (footnotes at end of table)

(HI,xnγ) 1986CoZR,1987By04,1988Fe01 (continued)

$\gamma(^{159}Yb)$ (continued)

E_γ[†]	I_γ[‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.
549.1	86.3	1296.2+x	$(25/2^+)$	747.1+x	$(21/2^+)$	E2
571.6	28.6	3532.0+x	$(37/2^-)$	2960.4+x	$(33/2^-)$	
607.1	10.8	3233.8+x	$(35/2^-)$	2626.8+x	$(33/2^+)$	D
624.0	14.7	3857.8+x	$(39/2^-)$	3233.8+x	$(35/2^-)$	
633.1	70.7	1929.3+x	$(29/2^+)$	1296.2+x	$(25/2^+)$	E2
648.9	28.5	4180.9+x	$(41/2^-)$	3532.0+x	$(37/2^-)$	
680.1	11.0	1976.6+x	$(25/2^-)$	1296.2+x	$(25/2^+)$	
694.6	11.3	4552.4+x	$(43/2^-)$	3857.8+x	$(39/2^-)$	
697.5	50.0	2626.8+x	$(33/2^+)$	1929.3+x	$(29/2^+)$	E2
713.7	25.7	4894.6+x	$(45/2^-)$	4180.9+x	$(41/2^-)$	
749.1	39.7	3375.9+x	$(37/2^+)$	2626.8+x	$(33/2^+)$	E2
764.0	6.1	1063.6+x	$(19/2^+)$	299.6+x	$(17/2^+)$	
764.3	16.8	5704.8+x	$(49/2^+)$	4940.5+x	$(45/2^+)$	
767.2	11.9	6107.3+x	$(51/2^-)$	5340.1+x	$(47/2^-)$	
771.1	18.4	2700.4+x	$(31/2^-)$	1929.3+x	$(29/2^+)$	D
774.5	27.5	4940.5+x	$(45/2^+)$	4166.0+x	$(41/2^+)$	
785.1	17.1	6489.9+x	$(53/2^+)$	5704.8+x	$(49/2^+)$	
785.7	15.3	5680.3+x	$(49/2^-)$	4894.6+x	$(45/2^-)$	
785.7	15.3	6466.0+x	$(53/2^-)$	5680.3+x	$(49/2^-)$	
787.7	12.1	5340.1+x	$(47/2^-)$	4552.4+x	$(43/2^-)$	
787.7	12.1	6895.0+x	$(55/2^-)$	6107.3+x	$(51/2^-)$	
790.1	27.4	4166.0+x	$(41/2^+)$	3375.9+x	$(37/2^+)$	
798.1	15.1	7264.1+x	$(57/2^-)$	6466.0+x	$(53/2^-)$	
801.9	12.0	8066.0+x	$(61/2^-)$	7264.1+x	$(57/2^-)$	
808.5	1.5	1556.1+x	$(21/2^-)$	747.1+x	$(21/2^+)$	
812.4	5.6	7707.4+x	$(59/2^-)$	6895.0+x	$(55/2^-)$	
860.3	6.0	8567.7+x	$(63/2^-)$	7707.4+x	$(59/2^-)$	
863.2	10.2	7353.1+x	$(57/2^+)$	6489.9+x	$(53/2^+)$	
865.0	7.2	1612.1+x	$(23/2^+)$	747.1+x	$(21/2^+)$	
887.9	4.3	9455.6+x	$(67/2^-)$	8567.7+x	$(63/2^-)$	
888.9	9.8	2185.1+x	$(27/2^+)$	1296.2+x	$(25/2^+)$	
895.1	11.3	8961.1+x	$(65/2^-)$	8066.0+x	$(61/2^-)$	
927.7	8.8	8280.8+x	$(61/2^+)$	7353.1+x	$(57/2^+)$	
929.2	9.3	9890.3+x	$(69/2^-)$	8961.1+x	$(65/2^-)$	
931.2	3.8	10386.8+x	$(71/2^-)$	9455.6+x	$(67/2^-)$	
950[#]		11337+x?	$(75/2^-)$	10386.8+x	$(71/2^-)$	
1001.5	5.7	9282.3+x	$(65/2^+)$	8280.8+x	$(61/2^+)$	
1016.4	4.4	10906.7+x	$(73/2^-)$	9890.3+x	$(69/2^-)$	
1064[#]		11970.7+x?	$(77/2^-)$	10906.7+x	$(73/2^-)$	
1098[#]		10380.3+x?	$(69/2^+)$	9282.3+x	$(65/2^+)$	

[†] From 1986CoZR; for another complete set of values, see 1987By04. For a few values, see 1975Tr08.

[‡] From 1986CoZR, probably from ^{98}Mo(^{64}Ni,3nγ) at 268 MeV. Note that the γ's with the same energies (two at 785.7 and two at 787.7) also have the same intensities. Five intensities are given by 1975Tr08 for $13/2^+$ to $33/2^+$ levels and no intensities are given by 1987By04.

[#] Placement of transition in the level scheme is uncertain.

(HI,xnγ) 1986CoZR,1987By04,1988Fe01

Level Scheme

Intensities: Relative I_γ

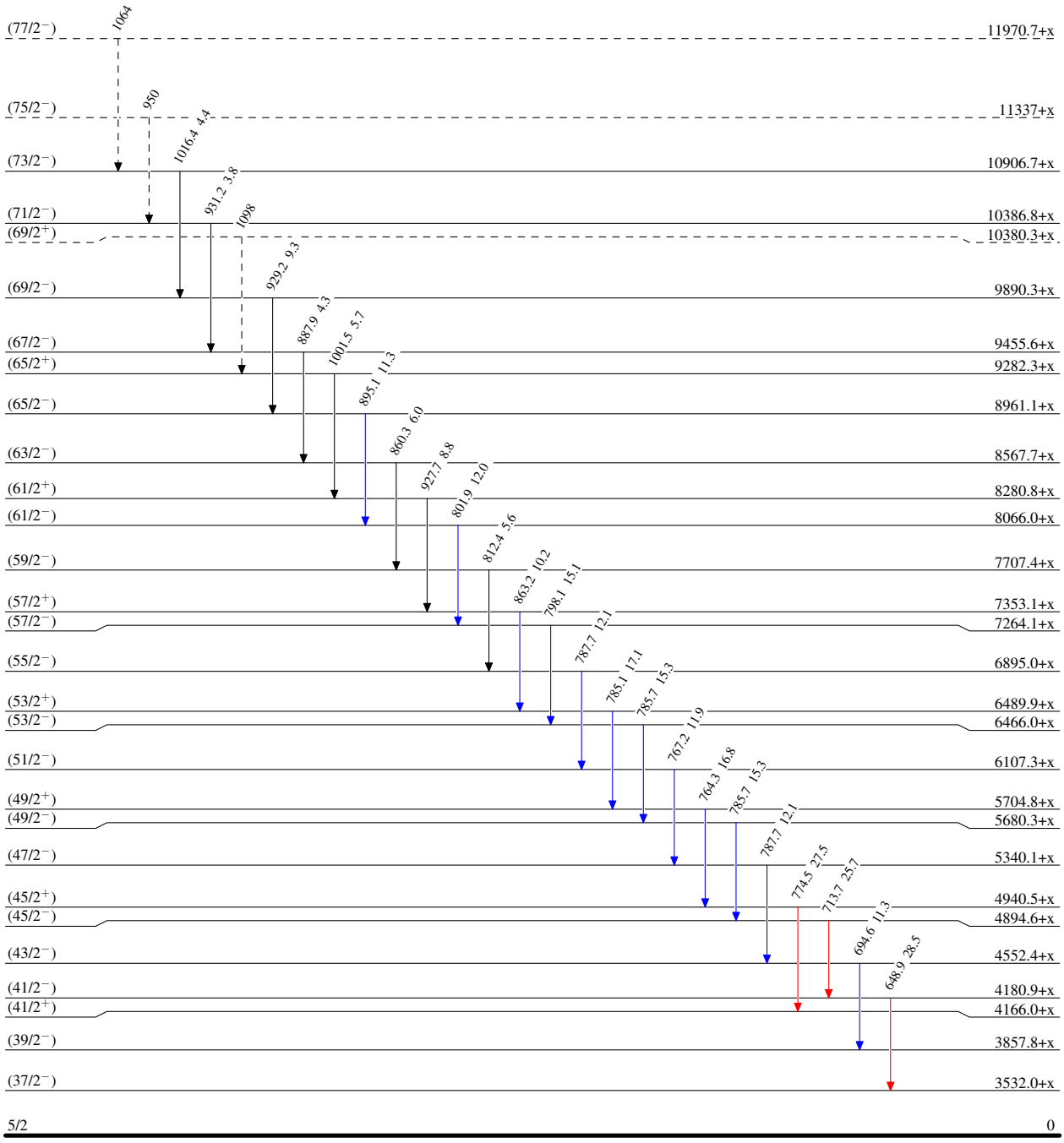
Legend

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

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

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

γ Decay (Uncertain)



$^{159}_{70}Yb_{89}$

(HI,xnγ) 1986CoZR,1987By04,1988Fe01

Level Scheme (continued)

Intensities: Relative I_γ

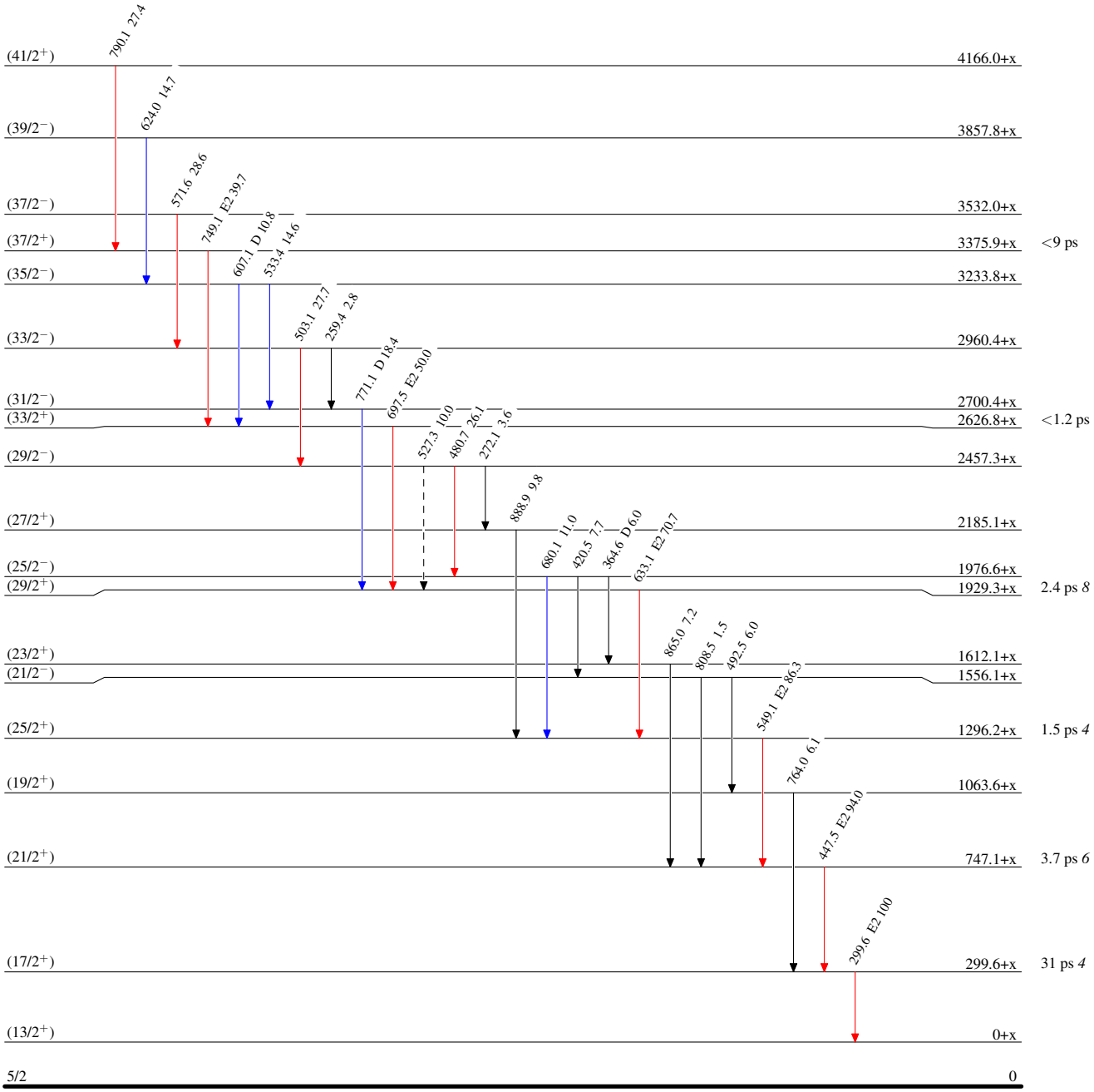
Legend

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

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

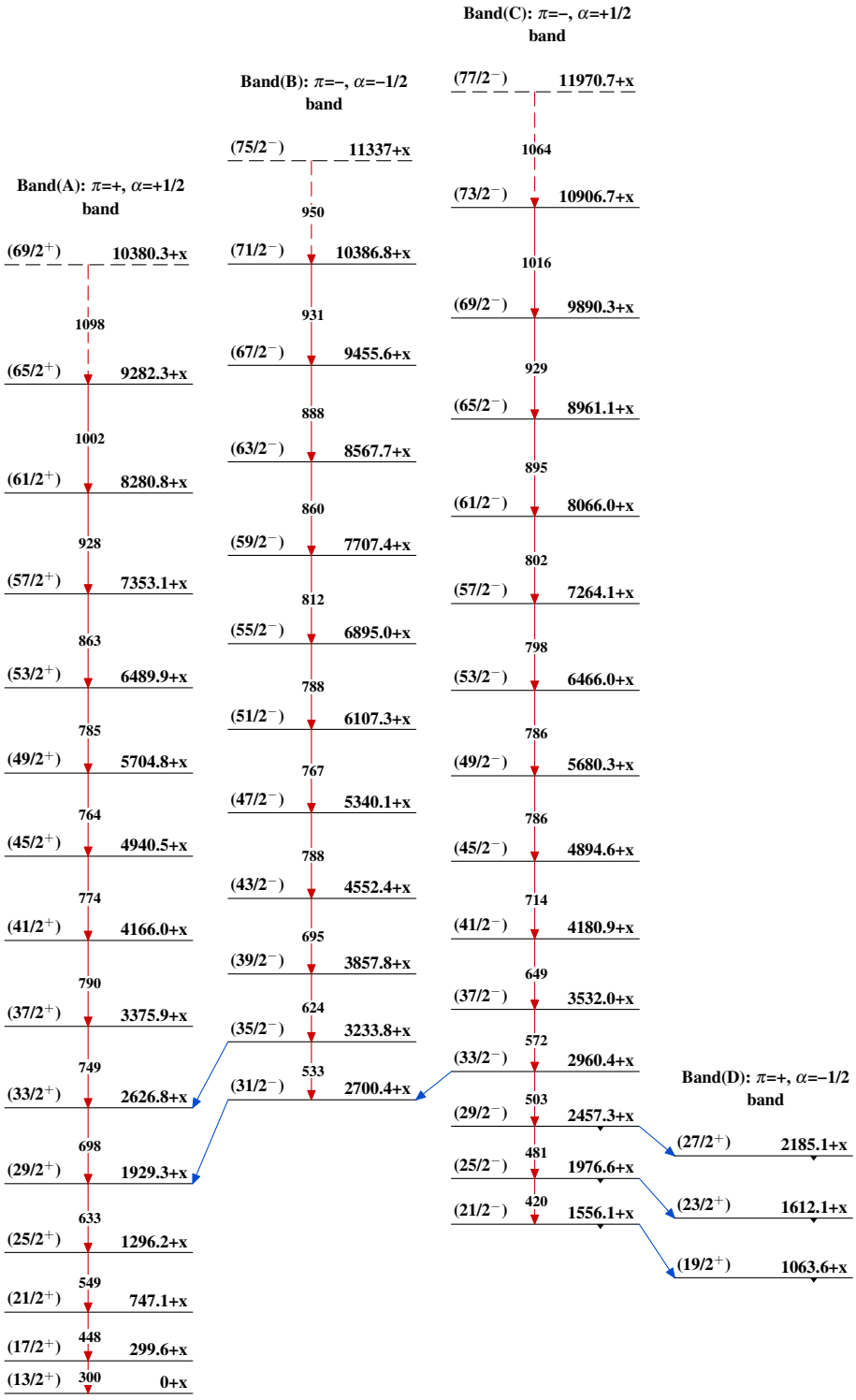
$I_\gamma > 10\% \times I_\gamma^{max}$

γ Decay (Uncertain)



$^{159}_{70}Yb_{89}$

(HI,xnγ) 1986CoZR,1987By04,1988Fe01



$^{159}_{70}Yb_{89}$