

¹²⁴Sn(³¹P,4n γ) 1988CuZY

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	Balraj Singh	NDS 110, 1 (2009)	20-Nov-2008

1988CuZY: ¹²⁴Sn(³¹P,4n γ) E=135, 145 MeV. Measured γ , $\gamma\gamma$, $\gamma(\theta)$. Feeding from SD bands to normal states deduced.

Single-particle configurations are given for a number of levels.

The level scheme and γ -ray placements are taken from 1994Pe17. The ordering of many transitions differ in 1988CuZY, these are noted under comments.

¹⁵¹Tb Levels

E(level) [†]	J π [‡]	T _{1/2}	E(level) [†]	J π [‡]	E(level) [†]	J π [‡]
0.0	1/2 ⁽⁺⁾		3128.6 3	(31/2 ⁻)	7304.4 3	(53/2 ⁺)
22.92 2	3/2 ⁽⁺⁾		3273.9 2	(33/2 ⁺)	7677.3 4	(55/2 ⁻)
72.39 3	(5/2 ⁺)		3808.3 4	(35/2 ⁻)	7883.4 4	(57/2 ⁻)
99.5 1	(11/2 ⁻)	25 s 3	3900.3 2	(35/2 ⁺)	7901.9 3	(57/2 ⁺)
703.7 1	(15/2 ⁻)		4147.8 2	(37/2 ⁺)	8283.3 3	(61/2 ⁺)
887.3 1	(13/2 ⁻)		4564.4 3	(39/2 ⁺)	8803.1 5	(61/2 ⁻)
1096.5 2	(15/2 ⁻)		4773.8 3	(41/2 ⁺)	9124.1 5	(63/2 ⁻)
1319.5 2	(19/2 ⁻)		4840.1 4	(39/2 ⁻)	9379.7 4	(65/2 ⁺)
1693.3 2	(19/2 ⁺)		5162.4 3	(45/2 ⁺)	9406.6 4	(65/2)
2002.0 2	(23/2 ⁻)		5466.5 5	(43/2 ⁻)	9490.1 4	(65/2 ⁺)
2120.4 2	(23/2 ⁻)		5924.2 6	(45/2 ⁻)	9709.0 5	(67/2)
2180.5 2	(25/2 ⁻)		5985.6 3	(47/2 ⁻)	9750.7 4	(67/2 ⁻)
2219.6 2	(23/2 ⁺)		6165.1 6	(49/2 ⁻)	10032.3 4	(67/2 ⁺)
2375.2 2	(27/2 ⁻)		6485.2 3	(49/2 ⁺)	10350.5 4	(69/2 ⁺)
2468.4 2	(25/2 ⁺)		6594.0 6	(51/2 ⁻)	10792.1 4	(71/2 ⁻)
2782.2 2	(27/2 ⁺)		6880.5 3	(51/2 ⁻)	11592.9 5	(73/2 ⁻)
2847.1 2	(29/2 ⁺)		7248.7 3	(53/2 ⁻)	11726.4 4	(75/2 ⁻)
3115.6 2	(31/2 ⁺)		7264.8 3	(53/2 ⁺)	12720.1 5	(79/2 ⁻)

[†] From least-squares fit to E γ 's.

[‡] From 'Adopted Levels'. For levels above the 11/2⁻ isomer the adopted values are based $\gamma(\theta)$ and ce data.

$\gamma(^{151}\text{Tb})$

From measured R=I γ (33 $^\circ$)/I γ (90 $^\circ$), 1988CuZY give mult=E2 for R>1 and mult=dipole for R<1.

E γ	I γ	E _i (level)	J π _i	E _f	J π _f	Comments
22.92 [†] 2		22.92	3/2 ⁽⁺⁾	0.0	1/2 ⁽⁺⁾	
27.1 [†] 1		99.5	(11/2 ⁻)	72.39	(5/2 ⁺)	
49.46 [†] 2		72.39	(5/2 ⁺)	22.92	3/2 ⁽⁺⁾	
65.1		2847.1	(29/2 ⁺)	2782.2	(27/2 ⁺)	I _(γ+ce) : 52 8 from intensity balance.
72.5 [†] 1		72.39	(5/2 ⁺)	0.0	1/2 ⁽⁺⁾	
158.4 1	24 2	3273.9	(33/2 ⁺)	3115.6	(31/2 ⁺)	I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.89 6.
178.6 1	14 1	2180.5	(25/2 ⁻)	2002.0	(23/2 ⁻)	I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.74 5.
194.8 1	13 1	2375.2	(27/2 ⁻)	2180.5	(25/2 ⁻)	I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.64 4.
206.1 2	4 1	7883.4	(57/2 ⁻)	7677.3	(55/2 ⁻)	I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.73 5. Placed from a 7515 level (1988CuZY).
209.2 1	28 2	1096.5	(15/2 ⁺)	887.3	(13/2 ⁻)	For a doublet, I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.75 5.
209.3 1	17 2	4773.8	(41/2 ⁺)	4564.4	(39/2 ⁺)	For a doublet, I γ (33 $^\circ$)/I γ (90 $^\circ$)=0.75 5.

Continued on next page (footnotes at end of table)

$^{124}\text{Sn}(^{31}\text{P},4n\gamma)$ **1988CuZY (continued)** $\gamma(^{151}\text{Tb})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
240.9 2	3 1	6165.1	(49/2 ⁻)	5924.2	(45/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.28$ 9. Placed from a 6136 level (1988CuZY).
247.5 1	11 1	4147.8	(37/2 ⁺)	3900.3	(35/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.77$ 5.
248.8 1	18 2	2468.4	(25/2 ⁺)	2219.6	(23/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.73$ 5.
260.6		9750.7	(67/2 ⁻)	9490.1	(65/2 ⁺)	Placed from a tentative 8544 level (1988CuZY).
268.4 1	84 1	3115.6	(31/2 ⁺)	2847.1	(29/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.60$ 4.
302.4 2	6 2	9709.0	(67/2)	9406.6	(65/2)	For a triplet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.02$ 4.
318.2 2	6 2	10350.5	(69/2 ⁺)	10032.3	(67/2 ⁺)	For a triplet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.02$ 4. Placed from a 9698 level (1988CuZY).
321.0 2	7 2	9124.1	(63/2 ⁻)	8803.1	(61/2 ⁻)	For a triplet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.02$ 4. Placed from a 8205 level (1988CuZY).
368.2 1	10 1	7248.7	(53/2 ⁻)	6880.5	(51/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.15$ 8. Placed from the 7883 level (1988CuZY).
371.0 1	30 2	9750.7	(67/2 ⁻)	9379.7	(65/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.61$ 4.
378.6 1	23 2	2847.1	(29/2 ⁺)	2468.4	(25/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.35$ 4.
381.4 1	68 1	8283.3	(61/2 ⁺)	7901.9	(57/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.32$ 4. Placed from a 5544 level (1988CuZY).
388.6 1	90 1	5162.4	(45/2 ⁺)	4773.8	(41/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.27$ 4.
392.8 1	55 1	1096.5	(15/2 ⁺)	703.7	(15/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.22$ 4.
399.9 2	3 1	8283.3	(61/2 ⁺)	7883.4	(57/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.55$ 5.
428.6 2	9 1	7677.3	(55/2 ⁻)	7248.7	(53/2 ⁻)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.65$ 6. Placed from a 7309 level (1988CuZY).
428.9 2	4 1	6594.0	(51/2 ⁻)	6165.1	(49/2 ⁻)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.65$ 6. Placed from a 4864 level (1988CuZY).
457.7 2	3 1	5924.2	(45/2 ⁻)	5466.5	(43/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.77$ 6. Placed from the 6594 level (1988CuZY).
466.0 2	5 1	2468.4	(25/2 ⁺)	2002.0	(23/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.92$ 7.
472.0 1	13 2	2847.1	(29/2 ⁺)	2375.2	(27/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.58$ 4.
526.4 1	85 1	2219.6	(23/2 ⁺)	1693.3	(19/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.34$ 3.
562.6 1	59 1	2782.2	(27/2 ⁺)	2219.6	(23/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.30$ 3.
596.8 1	94 1	1693.3	(19/2 ⁺)	1096.5	(15/2 ⁺)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.16$ 3.
597.3 1	19 2	7901.9	(57/2 ⁺)	7304.4	(53/2 ⁺)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.16$ 3. Placed from a 7464 level (1988CuZY).
604.2 1	100 1	703.7	(15/2 ⁻)	99.5	(11/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.16$ 3.
615.8 1	30 1	1319.5	(19/2 ⁻)	703.7	(15/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.27$ 3.
626.1 1	76 1	4773.8	(41/2 ⁺)	4147.8	(37/2 ⁺)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.32$ 4.
626.4		5466.5	(43/2 ⁻)	4840.1	(39/2 ⁻)	For a doublet, $I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.32$ 4. Placed from a 4435 level (1988CuZY).
634.7 2	5 1	7883.4	(57/2 ⁻)	7248.7	(53/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=2.23$ 11. Placed from a 7515 level (1988CuZY).
637.2 1	51 1	7901.9	(57/2 ⁺)	7264.8	(53/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.24$ 4. Placed from a 7504 level (1988CuZY).
652.6 2	7 1	10032.3	(67/2 ⁺)	9379.7	(65/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.12$ 6. Placed from the 10351 level (1988CuZY).
664.0 1	40 3	4564.4	(39/2 ⁺)	3900.3	(35/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.46$ 4.
679.7 2	6 1	3808.3	(35/2 ⁻)	3128.6	(31/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.83$ 10.
682.4 1	22 2	2002.0	(23/2 ⁻)	1319.5	(19/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.19$ 8.
753.4 2	6 1	3128.6	(31/2 ⁻)	2375.2	(27/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.09$ 9.
779.7 1	56 3	7264.8	(53/2 ⁺)	6485.2	(49/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.34$ 4. Placed from the 8284 level (1988CuZY).
784.7 1	54 3	3900.3	(35/2 ⁺)	3115.6	(31/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.31$ 4.
787.8 1	38 2	887.3	(13/2 ⁻)	99.5	(11/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.81$ 3.
800.8 1	12 1	2120.4	(23/2 ⁻)	1319.5	(19/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.13$ 2.
800.8		11592.9	(73/2 ⁻)	10792.1	(71/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.13$ 2.
819.1 1	24 2	7304.4	(53/2 ⁺)	6485.2	(49/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.20$ 4. Placed from the 8284 level (1988CuZY).

Continued on next page (footnotes at end of table)

$^{124}\text{Sn}(^{31}\text{P},4n\gamma)$ **1988CuZY (continued)** $\gamma(^{151}\text{Tb})$ (continued)

E_γ	I_γ	$E_i(\text{level})$	J_i^π	E_f	J_f^π	Comments
823.2	1	5985.6	(47/2 ⁻)	5162.4	(45/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.69$ 4.
873.9	1	4147.8	(37/2 ⁺)	3273.9	(33/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.38$ 4.
894.9	1	6880.5	(51/2 ⁻)	5985.6	(47/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.30$ 9.
919.7		8803.1	(61/2 ⁻)	7883.4	(57/2 ⁻)	Placed from the 9124 level (1988CuZY).
934.3	2	11726.4	(75/2 ⁻)	10792.1	(71/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.37$ 9.
970.8	2	10350.5	(69/2 ⁺)	9379.7	(65/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.01$ 7.
993.7	2	12720.1	(79/2 ⁻)	11726.4	(75/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.67$ 5.
1031.8	2	4840.1	(39/2 ⁻)	3808.3	(35/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.03$ 7. Placed from a 5896 level (1988CuZY).
1041.4	1	10792.1	(71/2 ⁻)	9750.7	(67/2 ⁻)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.13$ 4.
1096.4	1	9379.7	(65/2 ⁺)	8283.3	(61/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.48$ 4.
1123.3	2	9406.6	(65/2)	8283.3	(61/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=0.59$ 5.
1206.8	2	9490.1	(65/2 ⁺)	8283.3	(61/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.49$ 7. Placed from the 9751 level (1988CuZY).
1322.8	1	6485.2	(49/2 ⁺)	5162.4	(45/2 ⁺)	$I_\gamma(33^\circ)/I_\gamma(90^\circ)=1.42$ 3. Placed from a 6867 level (1988CuZY).

† From 'adopted gammas'.

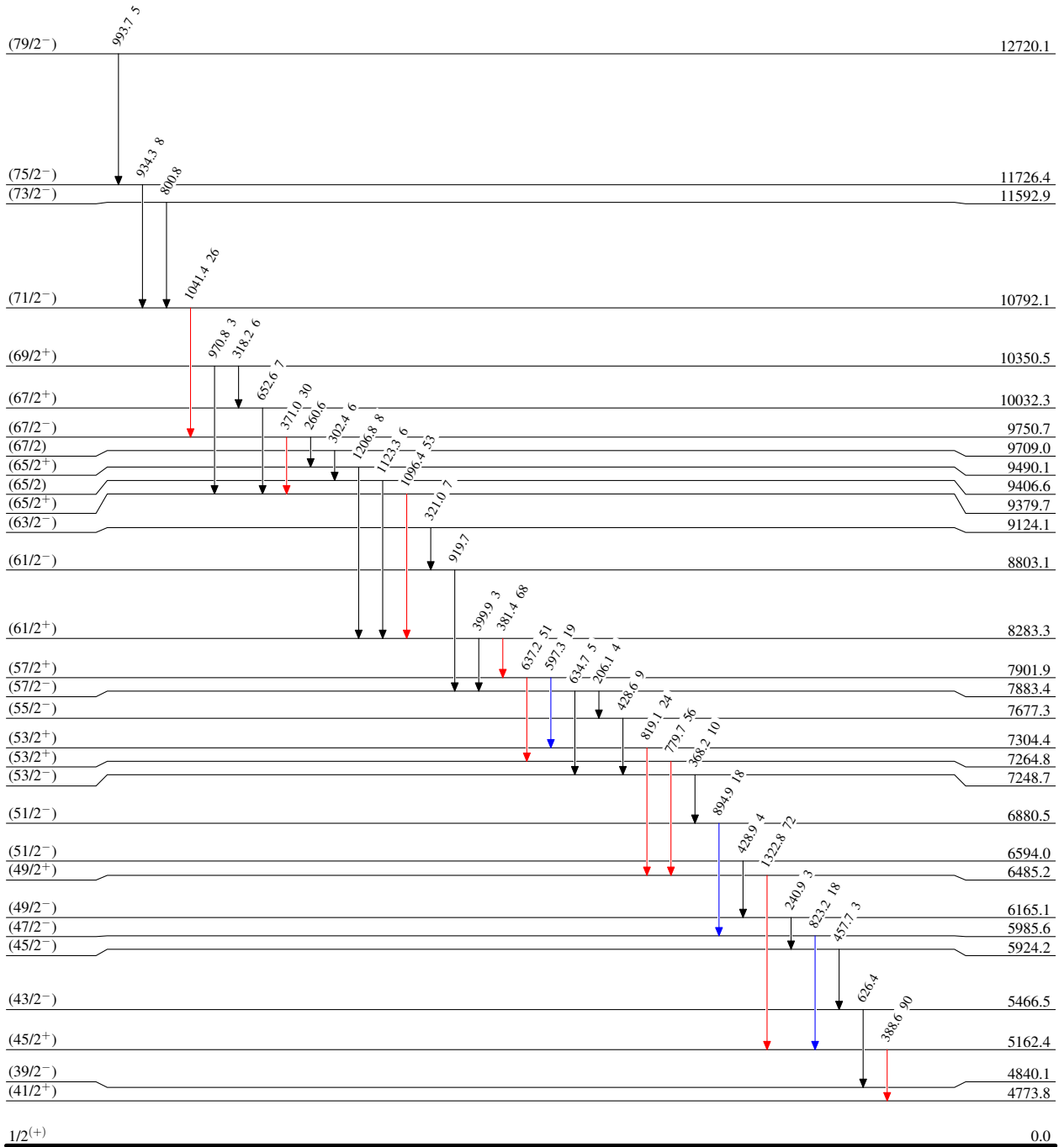
$^{124}\text{Sn}(^{31}\text{P},4n\gamma)$ 1988CuZY

Level Scheme

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$



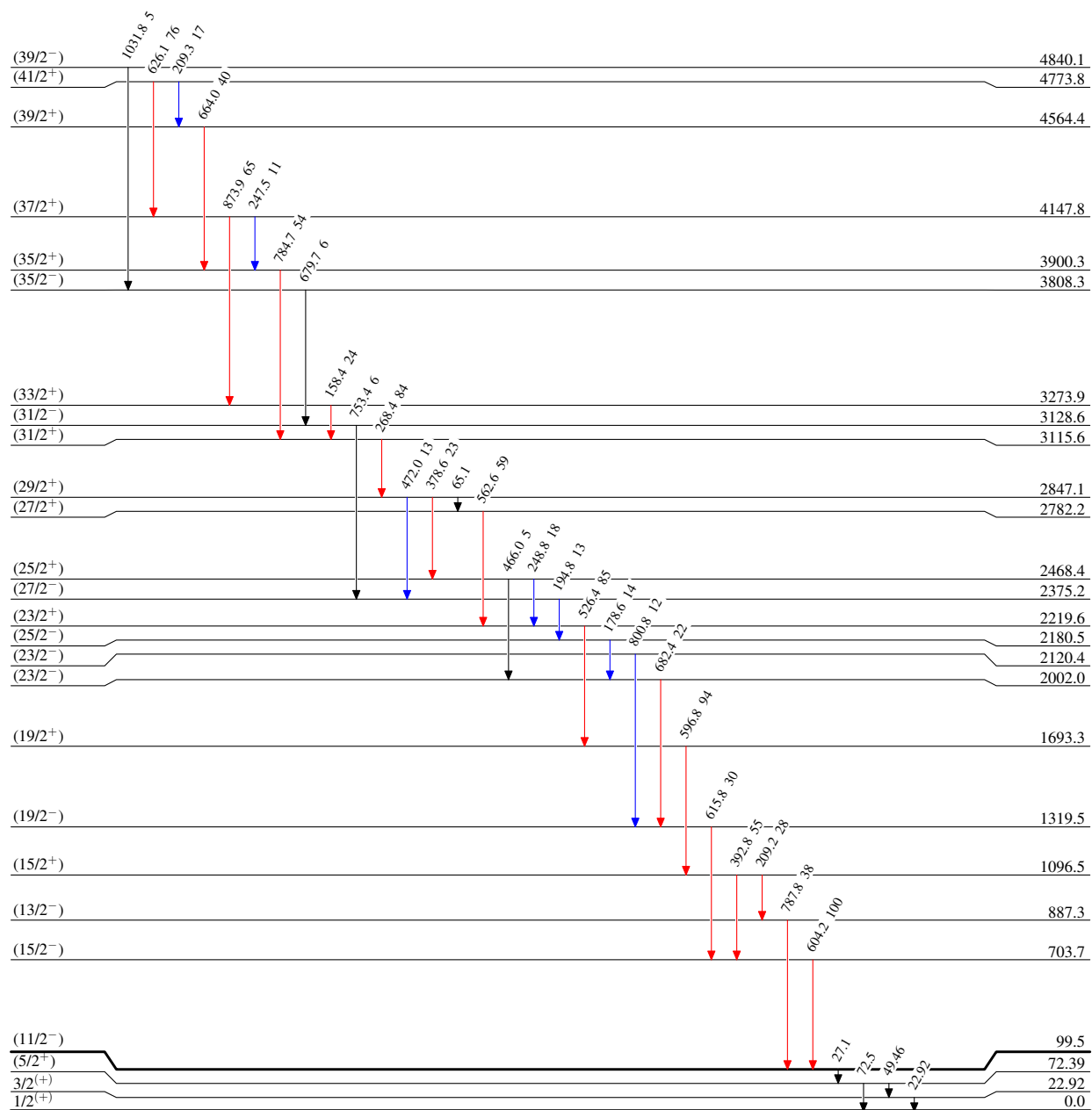
$^{124}\text{Sn}(^{31}\text{P},4\text{n}\gamma)$ 1988CuZY

Level Scheme (continued)

Intensities: Relative I_γ

Legend

- $I_\gamma < 2\% \times I_\gamma^{\text{max}}$
- $I_\gamma < 10\% \times I_\gamma^{\text{max}}$
- $I_\gamma > 10\% \times I_\gamma^{\text{max}}$



25 s 3