(HI,xnγ)

Type	Author	History Citation	Literature Cutoff Date
Full Evaluation	N. Nica	NDS 200,2 (2025)	22-Aug-2022

Additional information 1.

The level scheme is that reported by 1989Sc13.

1989Sc13: ^{118}Sn(^{40}Ar,4nγ), E(^{40}Ar)=180 MeV. γ′s measured in an array of 21 Ge detectors. γ(θ) given at 2 angles.

1981Wa04: ^{126}Te(^{32}S,4nγ), E(^{32}S)=155 MeV. Lifetimes measured by recoil-distance method. γ measured with Ge detectors.

1984Be49: ^{123}Sb(^{35}Cl,4nγ), E(^{35}Cl)=140-160 MeV. Measured γ excitation functions, γ(θ), γγ coin, and linear polarization with Ge and NaI(Tl) detectors.

For other (HI,xnγ) studies of this nuclide, see 1977Ag05, 1978Ag01, 1979Ag01, 1979Ba03, and the review of 1979SuZP.

1977Ag05: ^{147}Sm and ^{148}Sm(^{12}C,xnγ), E(^{12}C)=94-110 MeV. Measured γ singles, γ(t), γ(θ), and γγ coin with Ge detectors. States to J=29 reported.

1978Ag01: ^{147}Sm(^{12}C,5nγ), E(^{12}C)=92-101 MeV and ^{148}Sm(^{12}C,6nγ), E(^{12}C)= 60-110 MeV. Measured excitation functions, γ singles, γ(t), γ(θ), γγ coin, and γγ(t) with Ge detectors. See also, 1978AgZU.

1979Ag01: ^{118}Sn(^{40}Ar,4Nγ), E(^{40}Ar)=171 MeV. Measured lifetimes by recoil-distance method.

1979Ba03: ^{142}Nd(^{16}O,4nγ), E(^{16}O)=95-102 MeV and ^{94}Zr(^{64}Ni,4nγ), E(^{64}Ni)=270-275 MeV. Measured γ singles, γ(θ), and γγ coin with Ge detectors. States to J=36 reported.

1980Bo07: Targets bombarded with ^{65}Cu and ^{50}Ti beams at 4.6 MeV/amu. γ measured with sum spectrometer of NaI and Ge detectors. Search for high-spin isomers.

1981Ve09, 1982ChZM: Discuss and interpret level lifetimes.

1983Ng02: ^{124,126}Te(^{32}S,xn), E(^{32}S)=148 MeV. Measured γ(θ,t) with Ge detectors. Report g-factor.

1984BaZD: (^{34}S,4nγ), E(^{34}S)=170 MeV. Measurements made with multiplicity filter of Ge and NaI detectors. Report states to 38^+ and 37^-.

1984Ra11: ^{121}Sb(^{37}Cl,4n), E(^{37}Cl)=154 MeV. Measured γ(θ,t). Report g-factor.

Related articles that do not have any structure data. Properties of yrast states: 1979De33; 1979Pe15; 1981Do06; and 1984Mi18. Nuclear shapes at high spins: 1983CwZZ and 1985Du01. Properties in the continuum region: 1983De40; 1984Co26; 1985Th05; and 1986Bo16. Model calculations: 1981Bo12.

^{154}Er Levels

E(level)†‡	Jπ#	$T_{1/2}$@&	Comments
0.0[b]	0^+	3.73 min *9*	$T_{1/2}$: from ^{154}Er Adopted Levels.
560.00[b] *10*	2^+		
1161.30[b] *14*	4^+		
1786.6[b] *8*	6^+		
1896.0[c] *8*	5^-		
2328.6[b] *8*	8^+		
2461.0[c] *8*	7^-		
2582.5 *8*	8^+		
3014.8[c] *8*	9^-		
3016.4[b] *8*	10^+		
3026.4[c] *10*	11^-	39 ns *4*	E(level): deduced from energies of γ′s feeding this level. $T_{1/2}$: weighted average of 35 ns *3* (1978Ag01), 40 ns *3* (1979Ba03), and 50 ns *5* (1980Bo07).
3654.9[b] *8*	12^+		
3831.4[c] *10*	13^-	55 ps *17*	$T_{1/2}$: other: < 7 ps (1979Ag01).
4274.4[b] *8*	14^+		
4500.2[c] *10*	15^-	42 ps *14*	$T_{1/2}$: other: 156 ps *55* (1979Ag01).
4531.2 *9*	15^+		
4677.9[b] *9*	16^+		
5007.1[c] *10*	17^-	24 ps *10*	$T_{1/2}$: other: 69 ps *21* (1979Ag01).

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(HI,xnγ) (continued)

^{154}Er Levels (continued)

E(level)[†‡]	J$^{\pi}$[#]	T$_{1/2}$[@&]	Comments
5328.7[b] *9*	18$^+$		
5462.7[c] *10*	19$^-$	326 ps *28*	T$_{1/2}$: other: 73 ps *21* for 455-keV γ (1979Ag01).
6064.1[b] *11*	20$^+$		
6088.0 *10*	20$^-$		
6290.2[c] *10*	21$^-$	14 ps	T$_{1/2}$: other: ≤14 ps (1979Ag01) for 827γ and 104 ps for 202 γ, which here are from the same level.
6576.2?[a] *10*	(21$^-$)		
6746.2[b] *10*	22$^+$		
7016.9[c] *10*	23$^-$	256 ps *28*	
7335.2[c] *10*	25$^-$	42 ps *10*	T$_{1/2}$: other: ≤ 62 ps (1979Ag01).
8010.8 *10*	26$^-$		
8107.8[c] *10*	27$^-$	35×10^1 ps *10*	
8311.5 *10*	26$^+$		
8658.7 *10*	27$^{(+)}$		
8670.7 *10*	28$^+$		
9295.9 *10*	29$^{(+)}$		
9476.6[c] *10*	29$^-$		
9482.0 *10*	29$^{(+)}$		
9590.4 *10*	30$^+$		
9844.5 *10*	30$^+$		
10109.4[c] *10*	31$^-$		
10151.6 *10*	32$^+$		
10430.7[c] *10*	33$^-$	260 ps *49*	T$_{1/2}$: from 1979Ag01.
11355.2 *10*	34		
11505.1?[a] *10*	35		
11623.2 *10*	34$^{(+)}$		
11662.3 *10*	34$^{(+)}$		
11890.8 *11*	35		
11898.6 *10*	36$^{(+)}$		
13211.6 *11*	37		
13502.1 *11*	38		
13952.2?[a] *11*	(40)		
14002.1 *11*	38		
14270.8 *11*	39		
14384.1 *12*	39		
14677.9 *12*	39		
14923.3 *12*	41		
16031.8 *12*	42		

† Additional information 2.
‡ From least-squares fit to Eγ data.
# Values are from 1989Sc13 and are based on γ multipolarities and expected sequence of spins.
@ Half-lives are from 1981Wa04; the evaluator has associated each value with the particular γ ray indicated by 1981Wa04, even where the γ is placed differently than in 1981Wa04. The lifetimes of 1979Ag01, which are quite different, are noted in comments. The large differences may result in part from the very different γ placements assumed.
& Since the half-lives from 1981Wa04 and 1979Ag01 may depend on the ordering of the γ rays in the scheme, and the scheme given here differs from those of these authors, these half-lives for levels above 3500 keV have not been included in the ^{154}Er Adopted Levels data set.
[a] Level shown dashed by 1989Sc13. It is established by only one populating and one deexciting γ, having roughly equal intensities. The order of these γ's, and thus the location of this level, is ambiguous.

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(HI,xnγ) (continued)

^{154}Er Levels (continued)

[b] Band(A): Positive-parity level sequence.
[c] Band(B): Negative-parity level sequence.

γ(^{154}Er)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult. [#]	Comments
(9)		3026.4	11^-	3016.4	10^+		E_γ: γ transition to 10^+ state at 3016 has not been seen. Energy deduced from level energies.
(11)		3026.4	11^-	3014.8	9^-		E_γ: γ transition to 9^- state at 3014 has not been seen. Energy deduced from level energies.
97.0 *3*	7	8107.8	27^-	8010.8	26^-	D	
108.5 *4*	2.5	9590.4	30^+	9482.0	$29^{(+)}$	D	
113.8 *5*	0.5	9590.4	30^+	9476.6	29^-		
134.1 *4*	1.7	5462.7	19^-	5328.7	18^+	D	
146.7 *4*	2	4677.9	16^+	4531.2	15^+	D	
150.0 *2*	14	11505.1?	35	11355.2	34	D	
202.2 *1*	34	6290.2	21^-	6088.0	20^-	M1+E2	
236.2 *4*	2	11898.6	$36^{(+)}$	11662.3	$34^{(+)}$	E2	
253.8 *3*	5	2582.5	8^+	2328.6	8^+	D	
256.8 *4*	2	4531.2	15^+	4274.4	14^+	D	
265.0 *3*	5	10109.4	31^-	9844.5	30^+	D	
267.6 *3*	3	11890.8	35	11623.2	$34^{(+)}$	D	
268.7 *3*	4.5	14270.8	39	14002.1	38	D	
270.7 *4*	1.8	7016.9	23^-	6746.2	22^+	D	
275.2 *4*	1	11898.6	$36^{(+)}$	11623.2	$34^{(+)}$		
279.2 *1*	41	10430.7	33^-	10151.6	32^+	D	
294.5 *2*	21	9590.4	30^+	9295.9	$29^{(+)}$	M1+E2	
307.1 *3*	5	10151.6	32^+	9844.5	30^+	E2	
318.3 *1*	88	7335.2	25^-	7016.9	23^-	E2	
321.3 *2*	10	10430.7	33^-	10109.4	31^-	E2	
347.4 *3*	3.5	8658.7	$27^{(+)}$	8311.5	26^+	D	
359.0 *4*	1	8670.7	28^+	8311.5	26^+		
362.7 *3*	7	9844.5	30^+	9482.0	$29^{(+)}$		
393.6 *2*	19	11898.6	$36^{(+)}$	11505.1?	35	M1+E2	
403.5 *3*	6	4677.9	16^+	4274.4	14^+	E2	
432.2 *1*	34	3014.8	9^-	2582.5	8^+	D	
441.0 *3*	4	7016.9	23^-	6576.2?	(21^-)	E2	
450.1 *3*	3	13952.2?	(40)	13502.1	38		
455.6 *1*	94	5462.7	19^-	5007.1	17^-	E2	
500.0 *3*	4	14002.1	38	13502.1	38	D	
506.9 *1*	97	5007.1	17^-	4500.2	15^-	E2	
518.8 *3*	4.5	10109.4	31^-	9590.4	30^+	D	
542.0 *1*	68	2328.6	8^+	1786.6	6^+	E2	
[x]548.1 *3*	6						
553.8 *2*	29	3014.8	9^-	2461.0	7^-	E2	
560.0 *1*	200	560.00	2^+	0.0	0^+	E2	
561.1 *1*	35	10151.6	32^+	9590.4	30^+	E2	
562.9 *1*	55	8670.7	28^+	8107.8	27^-	E1	
565.0 *3*	4	2461.0	7^-	1896.0	5^-		
601.3 *1*	190	1161.30	4^+	560.00	2^+	E2	
619.5 *2*	12	4274.4	14^+	3654.9	12^+	E2	
625[@] *1*	132[@]	1786.6	6^+	1161.30	4^+	E2	
625[@] *1*	42[@]	6088.0	20^-	5462.7	19^-	D	
625[@] *1*	25[@]	9295.9	$29^{(+)}$	8670.7	28^+	D	

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(HI,xnγ) (continued)

γ(^{154}Er) (continued)

E_γ [†]	I_γ [‡]	E_i(level)	J_i^π	E_f	J_f^π	Mult.[#]	Comments
632.8 *2*	12	10109.4	31^-	9476.6	29^-	E2	
638.5 *2*	15	3654.9	12^+	3016.4	10^+	E2	
647.8 *3*	4	8658.7	$27^{(+)}$	8010.8	26^-	D	
650.8 *2*	10	5328.7	18^+	4677.9	16^+	E2	
652.5 *3*	3	14923.3	41	14270.8	39	E2	
668.8 *1*	98	4500.2	15^-	3831.4	13^-	E2	E_γ: 1981Wa04 argue 668.8 γ follows 805.0 γ.
674.5 *2*	25	2461.0	7^-	1786.6	6^+	D	
675.5 *1*	47	8010.8	26^-	7335.2	25^-	M1+E2	
682.0 *4*	1.5	6746.2	22^+	6064.1	20^+		Mult.: γ(θ) of 1989Sc13 suggests dipole, but J^π's require E2.
686.3 *2*	22	3014.8	9^-	2328.6	8^+	D	
687.8 *1*	39	3016.4	10^+	2328.6	8^+	E2	
726.7 *1*	85	7016.9	23^-	6290.2	21^-	E2	
735[@] *1*	4[@]	1896.0	5^-	1161.30	4^+	D	
735[@] *1*	3[@]	6064.1	20^+	5328.7	18^+	E2	
772.6 *2*	26	8107.8	27^-	7335.2	25^-	E2	
795.9 *2*	15	2582.5	8^+	1786.6	6^+	E2	
805.0 *1*	100	3831.4	13^-	3026.4	11^-	E2	
811.4 *2*	19	9482.0	$29^{(+)}$	8670.7	28^+	D	
827.5 *1*	49	6290.2	21^-	5462.7	19^-	E2	
919.7 *2*	19	9590.4	30^+	8670.7	28^+	E2	
924.5 *2*	25	11355.2	34	10430.7	33^-	D	
976.3 *3*	4.5	8311.5	26^+	7335.2	25^-	D	
1108.5 *4*	1.7	16031.8	42	14923.3	41	D	
1113.7 *3*	4	6576.2?	(21^-)	5462.7	19^-	E2	
1172.5 *5*	0.8	14384.1	39	13211.6	37	E2	
1192.3 *3*	5	11623.2	$34^{(+)}$	10430.7	33^-	D	
1231.5 *3*	5	11662.3	$34^{(+)}$	10430.7	33^-	D	
1313.0 *3*	3	13211.6	37	11898.6	$36^{(+)}$	D	
1368.8 *2*	12	9476.6	29^-	8107.8	27^-	E2	
1466.3 *4*	1	14677.9	39	13211.6	37	E2	
1471 *4*	1.5	11623.2	$34^{(+)}$	10151.6	32^+		
[x]1497 *4*	1						
1603.5 *3*	3.3	13502.1	38	11898.6	$36^{(+)}$	E2	
[x]1724 *5*	0.4						
[x]1766 *5*	0.5						
[x]2023 *5*	0.4						
2103.5 *4*	1.5	14002.1	38	11898.6	$36^{(+)}$	E2	
[x]2608 *4*	1.2						

[†] From 1989Sc13, unless noted otherwise. Others: 1977Ag05, 1984BaZD, 1984Be49. Uncertainties (assigned by evaluator, based on I_γ relative intensities (%)): 0.1 keV for I_γ>30%, 0.2 keV for 30%>I_γ>10%, 0.3 keV for 10%>I_γ>3%, 0.4 keV for 3%>I_γ>1%, 0.5 keV for 1%>I_γ; 1 keV for E_γ reported with no decimal.

[‡] From 1989Sc13, unless noted otherwise. Others: 1984Be49, for ^{123}Sb(^{35}Cl,4n) at E(^{35}Cl)=150 MeV; and 1978Ag01, for Sm(^{12}C,5n) at 92 MeV.

[#] Mostly from γ(θ) of 1989Sc13, where author assigns ΔJ=1 or 2; evaluator has assigned E2 for all ΔJ=2 cases. Other assignments, including all explicit E1 and M1+E2, are from γ(θ) and linear polarization measurements of 1984Be49. Other: 1978Ag01.

[@] Multiply placed with intensity suitably divided.

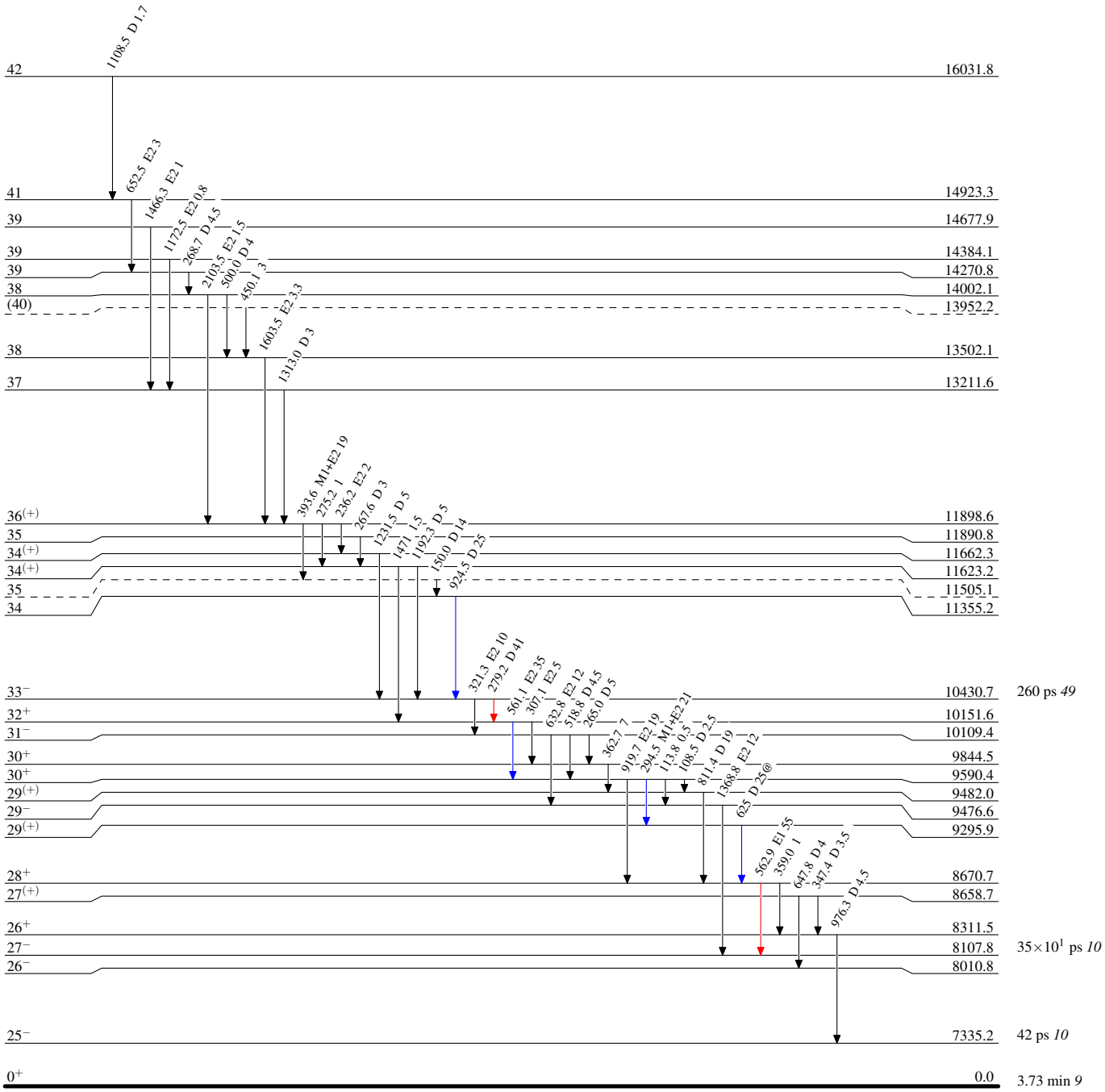
[x] γ ray not placed in level scheme.

(HI,xnγ)

Level Scheme

Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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



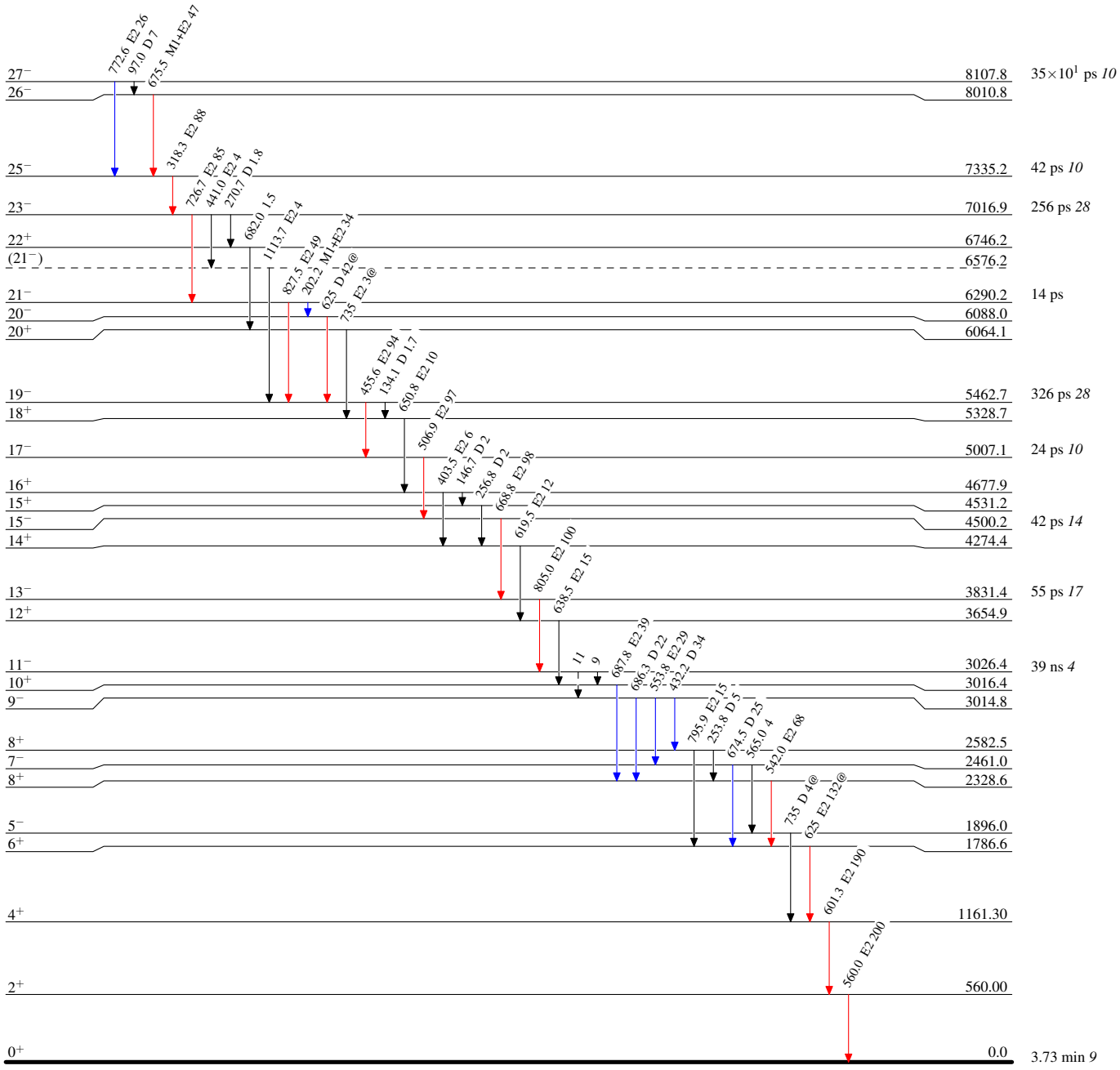
$^{154}_{68}Er_{86}$

(HI,xnγ)

Level Scheme (continued)

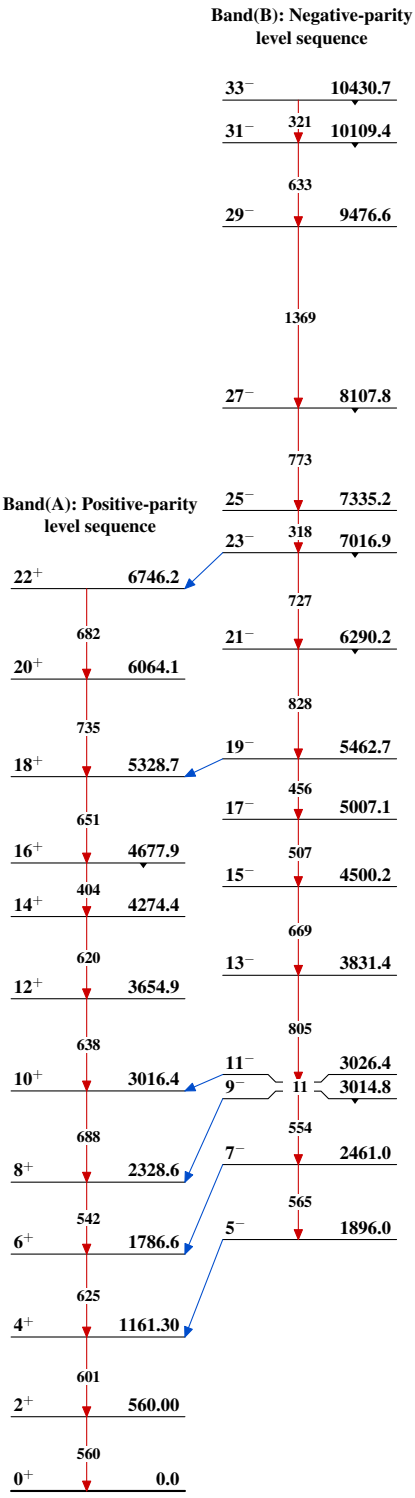
Intensities: Relative I_γ
@ Multiply placed: intensity suitably divided

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)



$^{154}_{68}Er_{86}$

(HI,xnγ)



$^{154}_{68}Er_{86}$